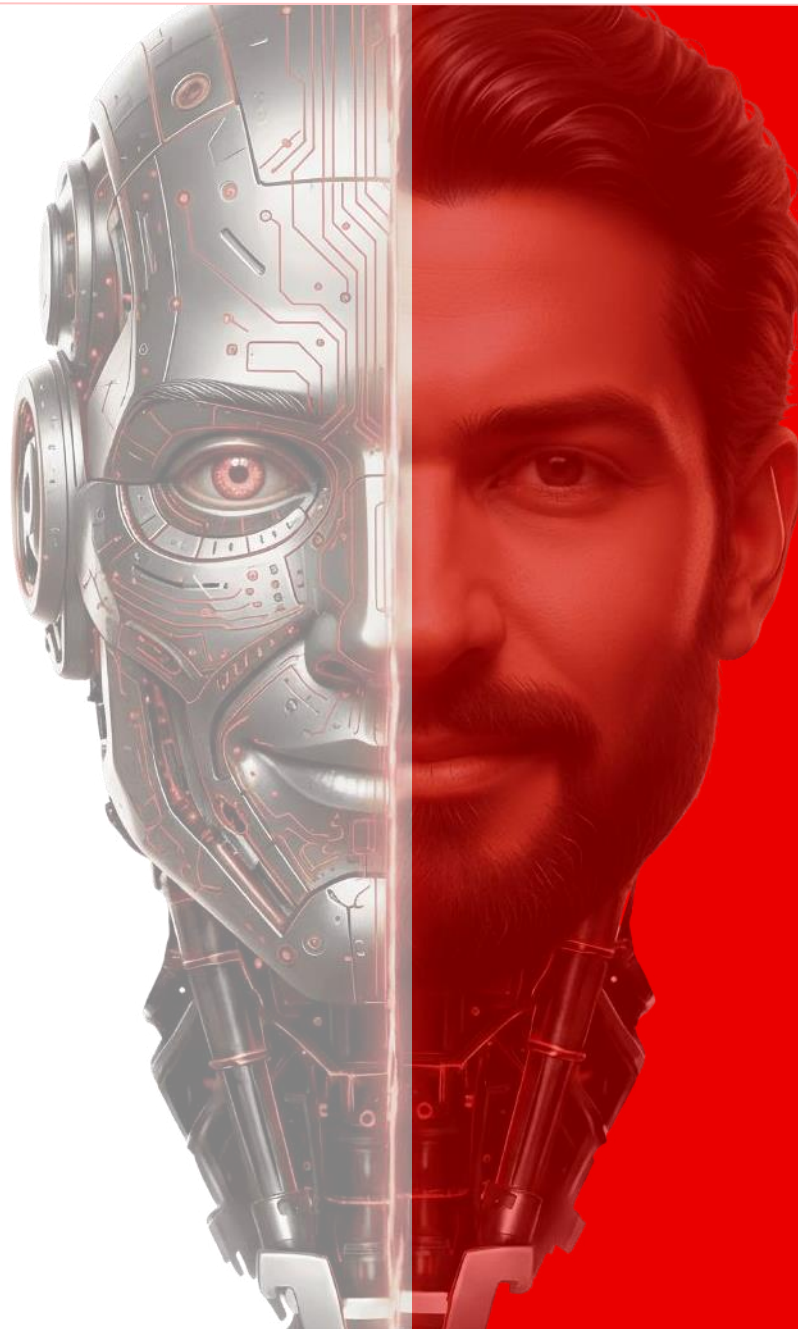




ICBI
UNIVERSITY OF KELANIYA
SRI LANKA **2025**

16th International Conference on Business and Information

"HuMAN INTELLIGENCE 2.0: Co-EVoLUTION THROuGH StRAtEGic HuMAN-AI CoLLABoRAtion FoR
SustAINABLE CoMPETItIVE ADVANTAGE"

CONFERENCE PROCEEDINGS

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Proceedings of the 16th International Conference on Business and Information (ICBI) - 2025

Edited by ICBI 2025 Editorial Board

Faculty of Commerce and Management Studies

University of Kelaniya

No. of Pages: 561

E ISSN: XXXX-XXXX



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Published by ICBI 2025 and Faculty of Commerce and Management Studies, Year 2025

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PREFACE

It is with great pleasure that we present the proceedings of the 16th International Conference on Business and Information (ICBI 2025), held on November 25, 2025, at Monarch Imperial, Colombo, Sri Lanka. Organised by the Faculty of Commerce and Management Studies of the University of Kelaniya, this year's conference is guided by the theme, **“Human Intelligence 2.0: Co-Evolution through Strategic Human–AI Collaboration for Sustainable Competitive Advantage.”**

As artificial intelligence reshapes industries, economies, and society, the role of human intelligence becomes even more vital. While AI offers unprecedented analytical and computational power, it is human creativity, ethical agency, contextual reasoning, and emotional understanding that determine how technology ultimately serves humanity. This year's conference invites scholars and practitioners to rethink the evolving relationship between human and artificial intelligence—not as competing forces, but as collaborative drivers of sustainable and responsible value creation.

ICBI 2025 marks a significant moment in the conference's trajectory. We received approximately 200 submissions, the highest to date, and over 100 papers were accepted following a rigorous double-blind review process. The conference features contributions from more than six countries, underscoring ICBI's expanding international footprint.

Several milestones distinguish this year's edition. For the first time, the proceedings are in collaboration with Taylor & Francis, advancing our pathway to Scopus indexing. This volume also carries Crossref DOI identifiers, enhancing global discoverability and long-term scholarly accessibility. The programme includes a keynote triad offering philosophical, technological, and ethical perspectives on Human–AI collaboration, thematic presentation tracks, an industry forum, and expanded student engagement through a Postgraduate Colloquium, SDG Youth Challenge, and the Three-Minute Thesis competition.

We extend our sincere appreciation to the Vice-Chancellor, the Dean of the Faculty, the Program Chair, the Editorial Board, the Organising Committee, the Technical Committee, and the Reviewers for their steadfast support. Above all, we thank the authors whose contributions form the core of this publication.

We hope this volume will serve as a valuable reference for academics, practitioners, and students as they navigate the next frontier of human-centred innovation in an AI-enabled world. We look forward to continued collaboration and to strengthening the scholarly impact of ICBI in the years ahead.

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KEY MESSAGES



Snr. Prof. Nilanthi de Silva

*Vice Chancellor
University of Kelaniya*

As the Faculty of Commerce and Management Studies of the University of Kelaniya hosts the 16th International Conference on Business & Information (ICBI) 2025, I am pleased to extend my warm greetings to all participants. The university remains committed to fostering research that drives national progress. In a rapidly evolving technological landscape, understanding how Human Intelligence and Artificial Intelligence co-evolve is essential for creating sustainable competitive advantage. This conference continues to serve as a critical platform for rigorous dialogue, research exchange, and the exploration of responsible innovation. I commend the organising committee for their dedicated efforts and wish all participants productive and insightful deliberations.

As the Faculty of Commerce and Management Studies of the University of Kelaniya hosts the 16th International Conference on Business & Information (ICBI) 2025, I am pleased to extend my warm greetings to all participants. The university remains committed to fostering research that drives national progress. In a rapidly evolving technological landscape, understanding how Human Intelligence and Artificial Intelligence co-evolve is essential for creating sustainable competitive advantage. This conference continues to serve as a critical platform for rigorous dialogue, research exchange, and the exploration of responsible innovation. I commend the organising committee for their dedicated efforts and wish all participants productive and insightful deliberations.



Prof. Bandara Wanninayake

*Dean - Faculty of Commerce and
Management Studies*



Prof. Sachith Mettananda

*Chairman of the Research Council
University of Kelaniya, Sri Lanka*

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It is my privilege to present the 16th edition of the International Conference on Business and Information (ICBI) 2025. Guided by the theme “Human Intelligence 2.0: Co-Evolution through Strategic Human–AI Collaboration for Sustainable Competitive Advantage,” this year’s conference brings together global scholars, practitioners, and students to explore how human capability and artificial intelligence can advance responsible innovation and future-ready organisations. ICBI 2025 builds on its legacy with new academic features, strengthened publication pathways, and a growing international presence—reflecting our commitment to relevance, rigour, and impact. I extend my sincere appreciation to the organising committee, reviewers, and partners whose dedication made this conference possible. I invite you to engage deeply with the scholarship presented in these proceedings as we continue to shape meaningful dialogue at the intersection of business, technology, and human intelligence.



Dr. Sugeeth Patabendige

*Conference Chair
ICBI 2025*



Ms. Isuri Udara

*Conference Secretary
ICBI 2025*

I am honoured to extend my warm greetings to all participants of the 16th milestone of the International Conference on Business and Information (ICBI) 2025. This year's theme, "Human Intelligence 2.0: Co-Evolution through Strategic Human-AI Collaboration for Sustainable Competitive Advantage," was chosen in response to a growing imbalance in global conversations where attention is heavily placed on the capabilities of AI, while the value and evolution of human intelligence often remain understated. By bringing this theme to the forefront, the conference aims to spark a critical dialogue on how HI can be strengthened, redefined, and strategically integrated with AI to drive meaningful and sustainable innovation. I am deeply grateful to the organising committee, reviewers, session chairs, and contributors, and warmly invite all participants to immerse themselves in the research presented and to engage in meaningful dialogue that will inspire impactful collaborations and future scholarship.

As the Co-Chair of the 16th International Conference on Business and Information (ICBI 2025), it is my pleasure to welcome you to this flagship event of the Faculty of Commerce and Management Studies, University of Kelaniya. Our theme, "Human Intelligence 2.0: Co-Evolution through Strategic Human-AI Collaboration for Sustainable Competitive Advantage," highlights the vital synergy between human capabilities and AI. With the SDG Youth Challenge, 3MT Competition, Postgraduate Colloquium, and Business Impact Forum, ICBI 2025 fosters innovation and meaningful dialogue. I look forward to your continued engagement as we prepare for an even more inspiring ICBI 2026.



Prof Amila Munasinghe

*Conference Co-Chair
ICBI 2025*



Prof. Ravi Dissanayake

*Editor-in-Chief
ICBI 2025*

The ICBI 2025 touched an excellent milestone of its legacy where invaluable research excellences are staged with quality outcomes. As the chief editor of the 16th International Conference on Business & Information (ICBI), I am truly honored to unveil the Proceedings of the conference resulted through a rigorous double-blind peer-review process, ensuring the quality, relevance, and scholarly integrity of the work presented. In a discourse often dominated by AI capabilities, this year's theme calls attention to the underexplored strength of Human Intelligence and its vital role in shaping the future of business and community at large. I extend my sincere appreciation to the authors, reviewers, and organising committee for their remarkable contributions. I trust these proceedings will inspire meaningful dialogue for a holistic impact.

It is with great pleasure that I extend my warm greetings to all contributors of the 16th International Conference on Business and Information (ICBI 2025). This proceedings volume reflects the dedication, scholarly rigour, and intellectual curiosity of our global research community. I am truly grateful to our authors, reviewers, track chairs, and the editorial team for their commitment in ensuring the quality and integrity of this publication. Your collective efforts have enriched this year's conference and strengthened our mission of fostering impactful research. I wish all participants an inspiring and rewarding experience at ICBI 2025.



Ms. Viduni Udovita

*Assistant Editor
ICBI 2025*



KEYNOTE SYNOPSIS

KEYNOTE TRIAD



Prof. Kathryn Pavlovich

*School of Management and Marketing
University of Waikato, New Zealand*

Can AI ever be conscious? My talk starts with the nature of consciousness and what this means for humanity; and what the impact of AI on society could be. I then turn to some cautions regarding the speed at which AI is being developed and that AI is no longer just a tool; it has agency. What could that mean for humanity? There are those who believe that the fusing of humans and technology will not only enhance humanity but will help us see ourselves as being interconnected rather than separate from non-human beings. The final part of my talk will focus on how we navigate these in terms of human and organisational flourishing today. From a philosophical perspective, our purpose on earth is to align our inner and outer worlds. AI will take us into realms that we don't understand, are not prepared for, and yet may provide flourishing beyond our wildest imaginations. We can align ourselves with our truth, humility and compassion.

AI is both feared and revered – often for good reasons. However, it is more important that it be understood and used ethically and responsibly. In my address, I will explore how human cognitive and emotional intelligence need to be nurtured in accordance with ethical principles for sustainable outcomes when using AI. To thwart the fear of being dumbed down by AI or being overwhelmed by AI, human beings will need to revisit learning models. We will evaluate based on a life-cycle continuous learning model how habits, values, and reflections will determine the quality of AI-human collaborations, and the role of organisational intermediaries.



Prof Nava Subramaniam

*School of Business
Amrita Vishwa Vidyapeetham, India
Honorary Professor- RMIT*



Prof Roshan Ragel

*Faculty of Engineering
University of Peradeniya, Sri Lanka*

Human Intelligence 2.0 examines how advanced AI architectures can function as extensions of human cognition. I will map the progression from deep neural networks to large foundation models, multimodal generative systems, and agentic frameworks with planning, memory, and tool-execution capabilities. The focus is on technologies that support real cognitive lift: human digital twins, augmentation layers that stabilise decision workflows, and context- and affect-sensitive models. I will also address engineering realities: data quality, supervision drift, alignment failures, interface design, interoperability, and energy constraints. The talk concludes with how tightly coupled human-AI feedback loops can improve decision accuracy, resilience, and system reliability.

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Human Resource Management, Organizational Behavior, and Inclusive Workplace

Business Technology and Digital Transformation (Fintech, AI in business and Data Science)

Multidisciplinary areas (e.g., Public Administration, Sustainability, Education and Learning, Tourism and Hospitality Management)



ACCOUNTING, FINANCE AND BUSINESS ECONOMICS

THE IMPACT OF FINANCIAL DISTRESS ON THE FINANCIAL PERFORMANCE OF COMPANIES: EVALUATION THROUGH STANDARD & POOR'S SRI LANKA 20 INDEX (S&P SL20)

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Abstract

This study investigates the impact of financial distress on the financial performance of companies listed in the Standard & Poor's Sri Lanka 20 (S&P SL20) Index from 2020-2024; a timeframe marked by significant economic turbulence, including the COVID-19 pandemic and Sri Lanka's unprecedented sovereign debt crisis: quantitative research approach and secondary financial data used for the analysis. The study employs the revised Altman Z- score and Ohlson O-score models to measure financial distress, while Return on Assets (ROA) and Return on Equity (ROE) serve as indicators of corporate financial performance. The research explores the extent of financial distress experienced by these top-tier firms, its influence on key performance metrics, and sectoral variations within the index. Findings highlight the substantial negative impact of financial distress on profitability and operational efficiency, underscoring the vulnerabilities of even the largest Sri Lankan companies amid macroeconomic shocks. The study contributes to the limited empirical literature on corporate distress in emerging markets. It provides valuable insights for policymakers, investors, and corporate leaders aiming to enhance resilience and informed decision-making in volatile economic environments.

Keywords: Altman Z-score, emerging markets, financial distress, Ohlson O-score, S&P Sri Lanka 20 index

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Introduction

Financial distress is when a company finds it difficult to pay its obligations, often resulting in declining profitability, asset depreciation, and operational disruptions, and can lead to insolvency or bankruptcy. It reflects a company experiencing a situation where operating cash flows are inadequate to meet immediate liabilities, leading to liquidity restrictions and loss of stakeholder confidence. Internal causes such as ineffective management, flawed strategies, lack of renewal products, and unstable corporate governance can also lead to financial distress. External shocks such as economic recessions, political instability, inflationary pressures, interest rate increases, exchange rate fluctuations and global events like pandemics can cause distress even in otherwise well-managed organisations. The consequences of the financial crisis extend beyond individual companies. It can have a chain reaction, leading to job losses, reduced investor returns, non-performing loans in the banking sector, and a decline in market confidence. This is especially the case in emerging markets, where financial markets are less developed, regulatory infrastructure is less robust, and where the ripple effects of corporate distress can undermine systemic stability and macroeconomic resilience. The problem addressed in this study is the adverse effect of financial distress on the financial performance of companies listed in the Standard & Poor's Sri Lanka 20 (S&P SL20) Index between 2020 and 2024. Despite these companies' critical role in the Sri Lankan economy, there is limited empirical research on how financial distress has influenced their operational and financial outcomes during this turbulent period.

The period under review includes a series of unprecedented disruptions. The COVID-19 pandemic (2020–2021) triggered economic slowdowns and global supply chain breakdowns, reducing revenues and raising operational costs. In 2022, Sri Lanka defaulted on its sovereign debt for the first time amid severe balance of payments issues. The Central Bank of Sri Lanka (CBSL, 2022) reported that gross domestic product (GDP) contracted by 7.8%, inflation peaked at over 70% by September, and the rupee depreciated sharply, severely undermining business stability and investment. The crisis extended into 2023, when the economy contracted again by 2.3% (CBSL, 2023). Sectors such as construction, manufacturing, Information Technology (IT), and finance experienced continued stress due to weak private demand, restricted access to credit, and input shortages. Although a modest recovery was recorded in tourism and services, many S&P SL20 index companies, particularly in manufacturing and banking, remained under financial pressure, as reflected in quarterly earnings reports and declining return metrics. By 2024, the macroeconomic environment began to stabilise. The Central Bank projected real GDP growth of approximately 5.0%, inflation entered negative territory in September 2024, and the rupee appreciated by 10.7% against the USD (CBSL, 2024). Despite these improvements, financial fragility persists at the corporate level due to legacy debt, cautious credit expansion, and the lagging effects of multi-year operational disruptions. Many listed companies have adopted restructuring strategies, but financial performance remains uneven, with sluggish recovery in Return on Assets (ROA) and Return on Equity (ROE) metrics for several firms.

Given this context, there is a clear research gap in systematically analysing how financial distress, quantified through predictive models like the Altman Z-score and Ohlson O-score, has affected the performance of these key firms over a five-year crisis and recovery period. Understanding these dynamics is vital for building early warning systems, strengthening corporate governance, and shaping evidence-based policy to enhance corporate and economic resilience.

The study seeks to answer the following research question; *'What is the impact of financial distress on the financial performance of companies in the S&P SL20 Index?'*

In line with the research question, the objectives of this study are:

RO1: *To find the impact of financial distress among companies in the S&P SL20 Index from 2020 to 2024 using established financial distress models: Altman Z-score & Ohlson O-score model.*

RO2: *To find the impact of financial distress on key financial performance metrics, including ROA and ROE.*

Literature Review

Impact of financial distress on corporate financial performance

The adverse effect of financial distress on firm performance has been widely documented. Whitaker (1999) identified declining cash flows as a primary indicator of corporate distress, highlighting that operational inefficiencies and liquidity pressures typically precede bankruptcy. Andrade and Kaplan (1998) further demonstrated that distressed firms often face substantial reductions in key performance metrics such as ROA and ROE, signaling deteriorating profitability and shareholder value. Altman and Hotchkiss (2010) expanded on these findings by demonstrating that financial distress systematically undermines corporate value and long-term competitiveness. They emphasized the relevance of predictive models such as the Altman Z-score and Ohlson's O-score as practical early detection and risk mitigation tools.

These models provide actionable insights into financial vulnerability, allowing firms to adopt proactive restructuring and financial strategies. In emerging markets, the consequences of financial distress are often more pronounced due to institutional weaknesses, less-developed financial systems, and heightened macroeconomic uncertainty (Laeven & Valencia, 2018; Claessens & Kose, 2013). In the Sri Lankan context, recent empirical work by De Mel and Buddhika (2024) identified a significant negative relationship between financial distress, measured using the revised Altman Z-score, and corporate profitability metrics such as ROA and ROE. Their findings affirm that even firms within the S&P SL20 Index are not immune to financial fragility, particularly under economic instability and exchange rate pressure.

Stock markets, index inclusion, and firm behaviour in Sri Lanka

Structural developments in Sri Lanka's financial markets have significantly influenced corporate behaviour, particularly following the S&P SL20 Index in 2012. This index comprises the 20 most liquid and highly capitalised companies on the Colombo Stock Exchange (CSE), representing a cross-section of leading firms across key sectors such as banking, telecommunications, consumer goods, and manufacturing.

Perera et al. (2016) noted that the creation of the S&P SL20 Index catalysed enhanced corporate governance and operational discipline. Firms in the index often face heightened scrutiny from investors, regulators, and rating agencies, prompting improvements in financial disclosure, transparency, and efficiency. However, the performance pressures associated with index inclusion can also lead to aggressive financial strategies, including higher leverage, cost-cutting, and risky expansion behaviours that may increase exposure to financial distress during economic instability.

Commercial Bank of Ceylon PLC, one of the largest private banks in the country, has demonstrated resilience in managing liquidity and credit risks. However, during the post-COVID-19 economic downturn and subsequent sovereign debt crisis, the bank, like many others, faced elevated non-performing loan (NPL) ratios and tightening margins, highlighting the vulnerability of even substantial index firms to macroeconomic shocks.

These practical scenarios demonstrate how firms in the S&P SL20 Index are not immune to financial challenges despite their strong market positions. Their behaviour under pressure offers valuable insights into broader capital market dynamics. Declining performance or distress in these firms often signals systemic risk and directly affects investor sentiment, foreign capital flows, and stock market stability (Fernando & Ranasinghe, 2020).

Financial distress in the Sri Lankan stock market

The country's historic sovereign debt default in 2022 was a turning point in the financial landscape, which triggered a cascade of adverse economic effects. Acute liquidity shortages, steep depreciation of the Sri Lankan rupee, escalating inflation, fuel and energy scarcities, and disruptions in supply chains and consumer demand characterized the macroeconomic crisis. These conditions placed immense pressure on corporate financial structures, even among the most stable firms listed on S&P SL20 Index.

Scholarly studies have increasingly begun to investigate these dynamics. For example, Senaratne and Ajward (2018) explored the financial health of listed companies in Sri Lanka. They found that firms with weak governance structures and high debt ratios were more susceptible to distress during macroeconomic downturns. In the Sri Lankan context, De Mel and Buddhika (2024) recently confirmed a statistically significant negative relationship between financial distress, measured through the Altman Z-score, and firm performance indicators such as ROA and ROE, particularly during the years 2020 to 2023. Their study highlights that even firms within the S&P SL20 Index, typically considered more resilient due to their market capitalisation and liquidity, were not immune to the deteriorating economic environment.

Therefore, analysing the evolution of financial distress among S&P SL20 companies from 2020 to 2024 offers valuable insights into how top-tier Sri Lankan firms navigated systemic pressures. This period encompasses pre-crisis and crisis phases, making it ideal for assessing firm-level resilience, adaptability, and strategic financial management. It also underscores the importance of context-specific research for institutional capacity, regulatory effectiveness, and unique socio-economic challenges in Sri Lanka.

Methodology

Study period and sample

This study adopts a quantitative research approach relying on secondary data to investigate the relationship between financial distress and corporate financial performance among companies listed on the S&P SL20 Index between 2020 and 2024. Secondary data from audited financial statements, annual reports, and official company filings was accessed via the CSE and individual company websites. Macroeconomic data, including inflation rates,

interest rates, and exchange rate movements, will be obtained from the Central Bank of Sri Lanka and the World Bank databases to provide the contextual backdrop for financial analysis. The population for this study comprises all companies listed on the S&P SL20 Index as of 2024. The index includes 20 of the most liquid and largest firms traded on the CSE, representing a broad spectrum of industries in Sri Lanka. A purposive sampling method is employed for sample selection. Based on the research objectives, the following hypotheses were formulated:

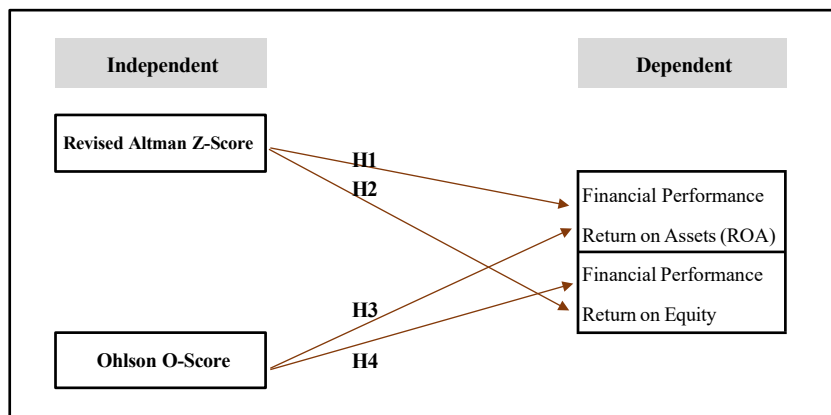
H1: *There is a significant impact of financial distress (Z-Score) on the ROA of S&P SL 20 Index companies in Sri Lanka.*

H2: *There is a significant impact of financial distress (Z-Score) on the ROE of S&P SL 20 Index companies in Sri Lanka*

H3: *There is a significant impact of financial distress (O-Score) on the ROA of S&P SL 20 Index companies in Sri Lanka*

H4: *There is a significant impact of financial distress (O-Score) on the ROE of S&P SL 20 Index companies in Sri Lanka*

Figure 1
Conceptual Framework



(Source: Developed by authors based on literature (2024))

Dependent variable:

Return on Assets: ROA measures a firm's efficiency in utilising its assets to generate net income. It is a key indicator of operational performance and reflects the firm's ability to manage its resources productively.

Return on Equity: ROE evaluates a firm's profitability relative to shareholders' equity. It is commonly used to assess how effectively a company uses investors' capital to generate earnings and is particularly important for gauging shareholder value during periods of financial stress.

Independent variable:

Revised Altman Z-Score: The Altman Z-score, initially introduced in 1968, was revised in 2012 to enhance its relevance across various industries and economic settings, particularly in emerging markets. The updated model includes a combination of financial ratios that capture profitability, leverage, liquidity, solvency, and operational activity. This revision offers improved accuracy in predicting corporate bankruptcy and is more suited to the financial characteristics of firms listed on the S&P SL20 Index (Altman et al., 2017)

Ohlson O-Score: Developed by Ohlson (1980), this model uses a logistic regression approach to assess bankruptcy probability based on nine financial variables, including size, leverage, liquidity, and performance indicators. It applies to various industries and provides a complementary perspective to the Altman Z-score. Including the O-score in this study enhances methodological robustness and accounts for different dimensions of financial distress not captured by a single model.

Model specifications

Z-Score Model developed by Altman (1968), the Altman Z-score model was revised in 2012 to enhance its applicability across various sectors and geographic contexts, particularly emerging markets. The revised model retains the core structure of combining multiple financial ratios but adjusts the coefficients and interpretation to

reflect contemporary accounting standards and economic realities. The 2012 revised Z-score includes five key financial ratios: working capital to total assets, retained earnings to total assets, earnings before interest and taxes to total assets, market value of equity to total liabilities, and sales to total assets. These components measure a firm's liquidity, profitability, solvency, leverage, and efficiency. the revised model offers a more suitable and robust framework for assessing corporate financial distress in the Sri Lankan context (Altman et al., 2017). The Ohlson O-Score model, developed by Ohlson (1980), is a logistic regression model that estimates the likelihood of corporate bankruptcy across industries. It is recognised for its broader applicability compared to the Altman model and includes a combination of financial ratios reflecting firm size, leverage, liquidity, profitability, and historical financial performance. The original logistic regression model is expressed as:

$$O = -1.32 - 0.407 \times LOGTA + 6.03 \times TLTA - 1.43 \times WCTA + 0.0757 \times CLCA - 2.37 \times OENEG - 1.83 \times NITA + 0.285 \times FUTL - 0.521 \times INTWO + 0.1 \times CHIN$$

Table 01
Original logistic regression model used in Ohlson O-Score Analysis

Variable	Description
LOGTA	Natural log of total assets (size effect)
TLTA	Total liabilities / Total assets (leverage ratio)
WCTA	Working capital / Total assets (liquidity indicator)
CLCA	Current liabilities / Current assets (liquidity indicator)
OENEG	1 if total liabilities > total assets (negative equity), 0 otherwise
NITA	Net income / Total assets (profitability indicator)
FUTL	Funds from operations / Total liabilities
INTWO	1 if net income was negative for the last two years, 0 otherwise
CHIN	Year-over-year percentage change in net income

(Source: Author compiled based on Ohlson, 1980)

Findings and Discussion

Normality test

To determine whether the data is normally distributed, which is crucial for many statistical analyses, the Shapiro-Wilk test was used before the regression analysis was carried out. The Kurtosis value is greater than 02, which indicates the data set is not normal. But according to Klubnual et al. (2023), it is acceptable to use non-normal for testing special situations. The variable debt-to-equity (as well as the others examined) showed a significant deviation from a normal distribution, according to the results (p-value < 0.05). This implies a non-normal distribution of the data. Outliers may impact the distribution if the test results indicate non-normality. By capping extreme values at predetermined percentiles (1st and 99th), their impact brings the data closer to a normal distribution. Researchers frequently retest normality to ensure the data now satisfies the necessary presumptions

Hausman test for panel data

The panel data was evaluated using fixed effects (FE) and random effects (RE) models. The Hausman specification test was used to choose the best model.

Table 02
Hausman test results

	Coef (ROA)	Coef (ROE)
Chi-square test value	1.202499	0.287448
P-value	0.5481	0.8661

(Source: Eviews Output Author Compiled, 2024)

With a p-value of 0.5481 & 0.8661, the values are greater than 0.05, where it may be concluded that the random effects model is suitable for the ROA & ROE regression analysis.

Correlation analysis

The correlation between ROE and ROA is strong and positive (0.87), indicating that companies with higher returns on equity tend also to have higher returns on assets. Ohlson O-Score has a weak positive correlation with ROE (0.19) and a slight negative correlation with ROA (-0.13), suggesting limited alignment with profitability measures. In contrast, Altman Z-Score shows a very weak negative correlation with ROE (0.04) and a weak positive correlation with ROA (0.07), implying minimal association with short-term profitability. The strongest negative relationship is between Ohlson O-Score and Altman Z-Score (-0.43), reflecting that as one score indicates higher financial risk, the other tends to show lower risk. Overall, the results suggest that ROE and ROA are closely linked, while the bankruptcy prediction models (Ohlson and Altman) vary more independently, capturing different dimensions of financial distress.

Table 03
Summary of hypothesis testing

Hypothesis	P-Value	Decision	Reason
H1: Z-Score → ROA	0.7497	Rejected	P-value > 0.05 → no statistically significant impact
H2: Z-Score → ROE	0.6200	Rejected	P-value > 0.05 → no statistically significant impact
H3: O-Score → ROA	0.0144	Accepted	P-value < 0.05 → statistically significant negative impact
H4: O-Score → ROE	0.6430	Rejected	P-value > 0.05 → no statistically significant impact

(Source: Author compiled, 2024)

According to statistics Altman Z score model does not have any significant impact on ROA and ROE where Ohlson model impact on ROA but no significant impact on ROE.

Conclusion

The research findings indicate that among Sri Lanka's S&P SL20 companies, financial distress indicators have varying levels of impact on corporate profitability. The Ohlson O-Score shows a statistically significant negative relationship with ROA, suggesting that financial distress adversely affects firms' operational profitability. However, neither the Altman Z-Score nor the Ohlson O-Score demonstrates a significant relationship with ROE. Although the Altman Z-Score generally indicates a sound financial position, it shows considerable variability and potential outliers, warranting further investigation. The strong correlation between ROA and ROE also underscores their mutual importance in evaluating firm performance. Therefore, it is recommended that firms closely monitor Ohlson O-Score trends as indicators of operational inefficiencies. Future research should also focus on refining these models by addressing outliers and incorporating sector-specific dynamics to enhance predictive accuracy. It is recommended that future research endeavours focus on enhancing the predictive accuracy of financial distress models by incorporating additional explanatory variables, such as macroeconomic indicators, corporate governance attributes, and firm-specific qualitative factors.

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IMPACT OF SUSTAINABILITY PRACTICES ON FIRMS' FINANCIAL PERFORMANCE OF INSURANCE COMPANIES IN SRI LANKA

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Abstract

A vital part of the nation's financial system, the insurance sector in Sri Lanka is currently negotiating stakeholder expectations, regulatory restrictions, and competitive pressures. Integrating Environmental, Social, and Governance (ESG) principles has become increasingly popular worldwide to enhance financial performance and ensure long-term sustainability. On the other hand, nothing is known about the effects of ESG practices on Sri Lankan insurers' financial results. From 2013 to 2022, this study examines the connection between 26 insurance companies in Sri Lanka and their financial performance as shown by Return on Assets (ROA) and sustainable practices using a quantitative research design. These businesses fall within the general and life insurance categories. In particular, the study investigates how the ESG factors impact these industries' financial results. Results show that social responsibility programs have a significant impact on ROA for both life and general insurance firms, underscoring the crucial role that social practices play in influencing financial performance. On the other hand, it was discovered that environmental or governance issues did not statistically influence ROA. There are apparent sectoral differences: general insurers place more emphasis on governance issues, while life insurers typically give priority to social and environmental norms. Additionally, correlation analysis reveals fewer correlations in general insurance and moderate associations in the life insurance industry. The study emphasises how crucial it is to incorporate social initiatives like employee welfare and community involvement into fundamental business plans to boost financial performance. It suggests enhancing sustainability reporting guidelines and creating industry-specific sustainability guidelines adapted to the unique needs of general and life insurance companies. The study offers valuable insights into how sustainable practices can impact financial outcomes in Sri Lanka's insurance industry, despite its limitations, which include its reliance on secondary data and the use of only one financial performance metric (ROA). These results demonstrate the growing importance of ESG integration in achieving industry competitiveness and long-term viability.

Keywords: environmental practices, governance practices, return on assets, social responsibility practices, Sri Lanka's insurance sector, sustainability practices

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Introduction

The insurance sector is a pillar of economic resilience, providing risk mitigation and long-term financial stability. This sector is significant in Sri Lanka, where it has existed for over a century. By 2024, the business had grown to 29 insurance companies offering a wide range of products, including life and health insurance and vital property and liability insurance (IRCSL, 2022). Despite its importance, the sector faces increased competition, regulatory compliance requirements, and changing consumer expectations. Despite these limitations, sustainability practices have evolved as a game-changing paradigm. Globally, businesses are implementing Environmental, Social, and Governance (ESG) frameworks to align their operations with social and environmental objectives. ESG practices have been linked to improved corporate reputation, risk management, and operational efficiency. In the financial services sector, particularly insurance, these practices are increasingly critical to driving profitability while meeting stakeholder expectations. Sustainability strategies utilised in global marketplaces improve financial performance, presumably due to enhanced brand loyalty, lower operating costs, and better risk management. Despite the growing global discourse on ESG integration, empirical research examining the link between sustainability practices and firm performance remains limited in the Sri Lankan context. While numerous international studies have explored ESG–financial performance relationships in banking, manufacturing, and energy sectors, the insurance industry has received comparatively little scholarly attention, especially in developing economies like Sri Lanka. Most existing literature focuses on developed markets where ESG disclosure frameworks are well established and data availability is high. However, Sri Lanka's insurance sector operates within a unique institutional and regulatory environment, characterised by evolving sustainability reporting standards, limited stakeholder awareness, and differing resource capacities between life and general insurers.

Therefore, this study contributes to the existing body of knowledge by offering sector-specific, quantitative evidence on the impact of ESG dimensions on firm performance in both life and general insurance sectors in Sri Lanka. Findings from this study can guide insurers, regulators, and policymakers in promoting ESG frameworks that strengthen financial performance and sustainability reporting standards in Sri Lanka. The study employs Return on Assets (ROA) as a financial performance metric and assesses the influence of ESG dimensions on the life and general insurance industries. Based on the above justifications following research questions are formulated.

RQ1: *How do sustainability practices influence financial performance in Sri Lanka's Life Insurance sector?*

RQ2: *How do sustainability practices influence financial performance in Sri Lanka's General Insurance sector?*

The research objectives are as follows.

RO1: *How do sustainability practices implemented by Sri Lankan Insurance companies impact their financial performance?*

RO2: *Which dimensions of sustainability practices (ESG) have the most significant impact on the financial performance of Insurance companies?*

The remainder of the paper is organised as follows: Section 2, literature review, Section 3 describes data and methodology, Section 4 presents results and discussion, and Section 5 concludes the study.

Literature Review

The impact of corporate social responsibility (CSR) initiatives on firm performance

The study explores the correlation between corporate social responsibility (CSR) performance and audit fees in Malaysia. It suggests two possibilities: firms use CSR to enhance their image and personal benefits, leading to higher audit risks and fees, or CSR initiatives improve employee welfare, community development, and customer satisfaction. The study suggests policymakers must revise Malaysia's sustainability reporting framework (Krisnawati, 2014). The paper compares robust social sustainability programs in Malaysian capital markets, focusing on market acceptance, corporate image, and risk reduction, and suggests monitoring and enhancing the current CSR reporting framework to improve ethical standards and social norms (Yip, 2023).

Government practices and the financial stability in the insurance industry

The insurance industry is crucial for sustainable development and financial stability, requiring good corporate governance, health, and risk management. Research highlights the importance of environmental, social, and governance factors in the sector, as well as aligning economic profits with social inclusion and environmental protection. Insurance companies are incorporating ESG principles to address climate change, human rights, and disaster management. Robust governance frameworks, including United Nations sustainable insurance guidelines, help assess ESG risks and leverage opportunities for sustainable development (Kansal, 2023). Insurance companies can support national economic and social goals, create employment, and promote social inclusion by adhering to governance practices, corporate social responsibility initiatives, and ethical practices (Kansal, 2023).

Sustainability reporting and its effects on financial performance

Sustainability reporting significantly impacts a company's financial outcomes when adhering to global standards. It provides detailed disclosures on environmental and governance practices, allowing stakeholders to understand the company's commitment to sustainable operations. This transparency fulfils regulatory requirements and attracts investment by demonstrating long-term visibility and risk management capabilities. Investors view sustainability reports as indicators of operational efficiency, risk management, and forward-thinking strategies, leading to improved financial performance and competitive advantage (Angioni, 2024).

Transparent sustainability practices have been shown to boost investor confidence and market performance. Companies like Unilever and Patagonia have consistently demonstrated their commitment to reducing environmental impact and improving social welfare, attracting long-term investments. Transparent reporting on environmental footprints and social initiatives resonates with ethical investors, increasing market valuation and customer loyalty. High levels of transparency in sustainability reporting lead to increased investor confidence, improved market performance, and risk-taking, solidifying a company's market position and financial resilience (Angioni, 2024).

The hypotheses formulated for both life and General insurance firms consist of six in number.;

Life insurance sector

Environmental Practices

H1: The level of environmental practices implemented by Sri Lankan Life insurance companies has a significant positive impact on the firms' financial performance.

Social Practices

H2: The level of social practices implemented by Sri Lankan life insurance companies has a significant positive impact on the firms' financial performance.

Governance Practices

H3: The level of governance practices implemented by Sri Lankan Life insurance companies has a significant positive impact on the firms' financial performance.

General insurance sector

H4: The level of environmental practices implemented by Sri Lankan general insurance companies has a significant positive impact on the firms' financial performance.

Social Practices

H5: The level of social practices implemented by Sri Lankan insurance general companies has a significant positive impact on the firms' financial performance.

Governance Practices

H6: The level of governance practices implemented by Sri Lankan general insurance companies has a significant positive impact on the firms' financial performance.

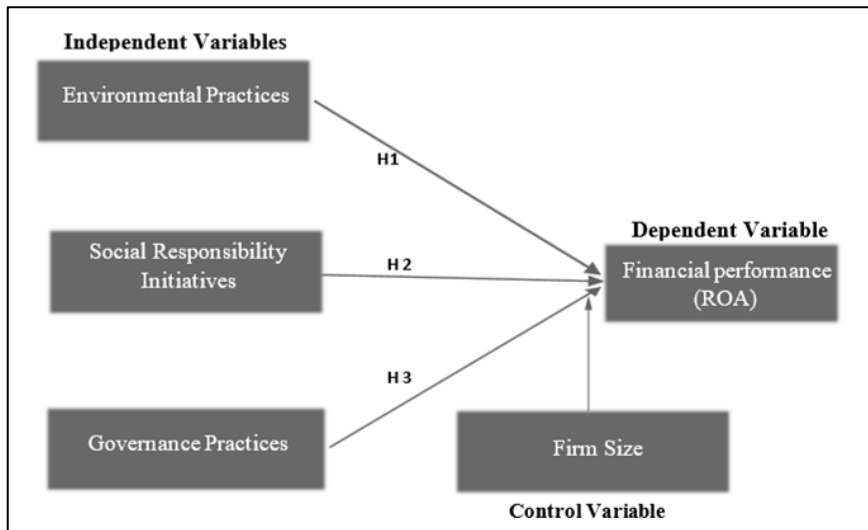
Methodology

Study period and sample

The main data source for this study is secondary data, which will be obtained from the annual reports of the chosen insurance companies from 2013 to 2022 that are listed on the CSE. Twenty-six selected insurance companies were selected out of a total population of twenty-nine insurance companies; this study examines nearly the full population. These businesses were chosen on the basis of their continuous operation throughout the past 10 years, which guarantees their financial stability. A comprehensive analysis of the trends and patterns in sustainability practices and financial performance can be conducted throughout the ten years (2013 - 2022). To determine long-term effects and correlations, this longitudinal technique offers an extensive dataset.

A methodical approach can be employed to create a Sustainability Reporting (SR) Index that utilises GRI standards to evaluate the sustainability performance of companies. The process begins by gathering sustainability disclosures from the companies' annual reports, ensuring adherence to GRI G4 guidelines for categorisation. The disclosures are then classified into three groups: environmental (12 indicators), social (30 indicators) and economic (4 indicators). A scoring system is then utilised whereby the presence of a disclosure qualifies for a score of 1, while the absence scores 0. In order to calculate the compliance scores, the number of disclosed indicators is divided by the total number of indicators within each examined category. Then, those scores are in turn converted into percentages. Finally, the final overall SR Index is reported as a weighted average of the three dimensions, assuming equal weights for ease of computation. This system makes it possible to evaluate the company's sustainability performance without leaving the GRI framework. The conceptual framework is given below

Figure1
Conceptual Framework



(Source: Developed by authors based on literature (2025))

Dependent variable

Among the ratios that are used to assess a company's profitability is ROA. ROA is a metric used to assess how well a business can generate revenue from its assets within management's authority. An increasing ROA value signifies improved success for the organisation. (Kadar, 2017).

Independent variable

Environmental practices, Social Responsibility initiatives and Governance practices were considered as independent variables, according to the GRI G4 guidelines.

Control variables

Firm size is frequently used as a determining factor for environmental, social, and economic activities. The natural logarithm of the total assets is used as the condition in the model to account for the company's size (Lassala, 2017).

This study adopts a quantitative approach using panel regression analysis. Assumption tests such as multicollinearity, heteroskedasticity, and autocorrelation diagnostics were conducted to ensure model validity.

Model specifications: The two models were developed based on life insurance firms and general insurance firms.

Model 1: Life Insurance sector

$$ROA_{it} = \beta_0 + \beta_1 \text{Environmental\_Lit} + \beta_2 \text{Social\_Lit} + \beta_3 \text{Governance\_Lit} + \beta_4 \text{FirmSize\_Lit} + \epsilon_i$$

Model 2: General Insurance sector

$$ROA_{it} = \beta_0 + \beta_1 \text{Environmental\_Git} + \beta_2 \text{Social\_Git} + \beta_3 \text{Governance\_Git} + \beta_4 \text{FirmSize\_Git} + \epsilon_i$$

Findings and Discussion

A broad variety of values across several factors can be found in the life insurance firms' descriptive statistics. With a substantial standard deviation of 3.09 and an average of 22.65 for firm size, there is a significant range in these firms' sizes. The 2.49 'within' standard deviation indicates that there may be some variation in the size of individual businesses over time. The standard deviations reveal considerable variation, with mean scores for governance, environmental, and social responsibility requirements being relatively low. This implies that some businesses have made substantial progress in these fields while others are still lagging. Another indicator of financial performance that varies throughout companies is the ROA. With a standard deviation of 0.07 and an average ROA of 0.03, an extensive range of profitability levels is indicated. The descriptive statistics show how diverse Sri Lanka's life insurance market is, with differences in size, financial performance, and sustainability policies.

The descriptive statistics for general insurance companies reveal the distribution of essential variables. With an average of 22.73 and a standard deviation of 1.41, firm size is a critical factor, showing a modest variance. Significant variations in size across enterprises are shown by the ‘between’ standard deviation of 1.02, whereas the ‘within’ standard deviation of 0.59 implies minimal changes in size within particular firms over time. The firm size ranges from 21.07 to 24.96, further supporting the notion. These areas require development regarding sustainability practices as the mean scores for governance, environmental, and social responsibility criteria are relatively low. Significant variance across organisations is shown by the standard deviations for these variables, suggesting that some companies are more advanced in their sustainability efforts than others.

Lastly, ROA, a measure of financial success, exhibits an average of 0.04 with a standard deviation of 0.04. This implies that general insurance providers in Sri Lanka have varying degrees of profitability. The descriptive statistics illustrate that Sri Lanka's general insurance market is diversified, with differences in financial performance, sustainability practices, and company size.

Both sectors exhibit comparable trends in sustainability practices, with comparatively low average scores for social responsibility, environmental, and governance criteria. The standard deviations, however, demonstrate a great deal of variance within each sector, pointing to a wide variety of sustainability methods businesses use. The two sectors' average financial performance is identical, as determined by ROA. The life insurance industry seems to have a somewhat higher standard deviation for ROA, which suggests that there is more variation in the profitability levels of life insurance companies. Overall, the life insurance industry appears to have a wider diversity of firm sizes, even if both industries have low average sustainability scores and differing degrees of financial performance.

Regression analysis

Regression Model of the Life Insurance Sector:

$$ROA_{it} = \beta_0 + \beta_1 \text{Environmental\_Lit} + \beta_2 \text{Social\_Lit} + \beta_3 \text{Governance\_Lit} + \beta_4 \text{FirmSize\_Lit} + \epsilon_i$$

$$ROA_{it} = -0.1182 - 0.0447 \text{Environmental\_Lit} + 0.0763 \text{Social\_Lit} - 0.0013 \text{Governance\_Lit} + 0.0059 \text{FirmSize\_Lit} + \epsilon_i$$

Regression Model of the General Insurance Sector:

$$ROA_{it} = \beta_0 + \beta_1 \text{Environmental\_Git} + \beta_2 \text{Social\_Git} + \beta_3 \text{Governance\_Git} + \beta_4 \text{FirmSize\_Git} + \epsilon_i$$

$$ROA_{it} = -0.1356 + 0.0003 \text{Environmental\_Git} + 0.0747 \text{Social\_Git} + 0.0155 \text{Governance\_Git} + 0.0068 \text{FirmSize\_Git} + \epsilon_i$$

Table 01

Regression analysis - Life

Variable	Coef.	Std. Err.	z	P> z	95% conf.	Interval
Social_res_L	0.0763437	0.0294801	2.59	0.010	0.0185638	0.1341235
Environment_L	-0.044699	0.0257211	-1.74	0.082	-0.0951115	0.0057134
Governance_L	-0.0013172	0.0157376	-0.08	0.933	-0.0321623	0.029528
FirmSize_L	0.0059165	0.0034213	1.73	0.084	-0.0007892	0.0126221
Constant	-1.181639	0.761887	-1.55	0.121	-2.67491	0.311632
P-value	0.0043					
R-squared (within)	0.1006					
R-squared (between)	0.0909					
R-squared (overall)	0.0906					

(Source: Authors, based on survey results)

The R-squared values suggest a moderate fit of the model to the data. The within-group R-squared of 0.1006 indicates that the model explains 10.06% of the variation in ROA within each company. The between-group R-squared of 0.0909 suggests that the model explains 9.09% of the variation in average ROA across companies. When all other variables are equal, a 0.0763 rise in ROA corresponds to a one-unit increase in the social responsibility standard score. At the 1% level, this effect is statistically significant. When all other factors are held constant, a 0.0447 decrease in ROA corresponds to a one-unit increase in the environmental standard score. Nevertheless, at the standard 5% level, this effect is not statistically significant. When all other variables are equal, a 0.0013 drop in ROA corresponds to a one-unit increase in the governance standard score. There is no statistical significance to this impact. When all other factors are equal, a one-unit increase in firm size is linked to a 0.0059 rise in ROA. At the 10% level, this effect is statistically significant to a moderate extent. The model indicates that social responsibility positively and statistically significantly affects life insurance firms' financial performance, as ROA indicates. ROA does not seem to be much impacted by environmental or governance specifications, and firm size has a marginal effect.

Table 02
Regression analysis - General

Variable	Coef.	Std. Err.	z	P> z	95% conf.	Interval
Social_res_G	0.0747068	0.0212101	3.52	0.000	0.0331358	0.1162778
Environment_G	0.0003444	0.0013425	0.26	0.798	-0.0022869	0.0029757
Governance_G	-0.0155335	0.0153352	-1.01	0.311	-0.04559	0.014523
Firmsize_G	0.0067563	0.0052042	1.30	0.194	-0.0034437	0.0169564
Constant	-1.355901	1.1146938	-1.18	0.237	-0.3603857	0.892056
P-value	0.0000					
R-squared (within)	0.2582					
R-squared (between)	0.0307					
R-squared (overall)	0.1735					

(Source: Authors, based on survey results)

R-squared values imply that the model fits the data moderately. The within-group R-squared of 0.2582 indicates that the model accounts for 25.82% of the variation in ROA within each company. The between-group R-squared of 0.0307 implies that the model accounts for 3.07% of the variation in average ROA across enterprises. A one-unit rise in the social responsibility standard score relates to a 0.0747 increase in ROA when other parameters remain unchanged. The effect is statistically significant at the 1% level. A one-unit increase in environmental standard score corresponds with a 0.0003 increase in ROA, assuming all other factors remain constant. This effect is statistically insignificant. A one-unit increase in the governance standard score relates to a 0.0155 decrease in ROA, assuming all other factors remain unchanged. This effect is statistically insignificant. A one-unit increase in firm size is associated with a 0.0068 increase in ROA, holding other factors constant. This effect is not statistically significant. Overall, the model indicates that social responsibility has a favourable and statistically significant effect on general insurance companies' financial performance, as evaluated by ROA. Environmental, governance and firm size do not seem to impact ROA substantially. In both sectors, as evaluated by ROA, social responsibility is identified as the most critical element driving financial performance. A more excellent social responsibility score led to a considerable rise in ROA.

These findings align with Krisnawati (2014), who emphasised that social responsibility programs enhance a company's image, foster employee satisfaction, and contribute positively to profitability — consistent with the significant positive effect of social practices found in this study. Similarly, Yip (2023) highlighted that strong social performance and transparent CSR initiatives improve market reputation and stakeholder trust, ultimately reducing audit risks and increasing investor confidence. This supports the current study's evidence that social responsibility practices significantly influence the Return on Assets (ROA) of both life and general insurers in Sri Lanka.

However, the insignificant relationship between environmental practices and financial performance contrasts with the findings of Zhang et al. (2021) and Angioni et al. (2024), who reported that environmentally responsible behaviour enhances long-term financial resilience by improving risk management and attracting ethical investors. The difference may arise from the relatively low level of environmental reporting and investment in eco-initiatives within Sri Lanka's insurance sector compared to developed markets. This study is limited by its reliance on secondary data sources, the use of a single profitability metric (ROA), and the absence of qualitative insights that could provide deeper contextual understanding. To address these limitations, future research could incorporate primary data collection methods and adopt a broader set of financial indicators to capture a more comprehensive view of insurer performance.

Conclusion

According to the study's findings, social responsibility initiatives are essential for boosting the insurance sector's financial performance in Sri Lanka. It has been shown that companies in the life and general insurance industries gain from offering social initiatives like ethical corporate conduct, community involvement, and employee welfare as top priorities. These efforts also appear to boost ROA. This is consistent with the rising amount of research indicating that CSR improves financial results by lowering operational risks, boosting consumer loyalty, and improving brand reputation.

In contrast to what was anticipated, environmental and governance standards had no statistically significant impact on financial performance. The comparatively early adoption of sustainability reporting in Sri Lanka's insurance industry and the difficulties in quantifying the financial gains directly related to governance and environmental initiatives are two possible causes. The low financial impact observed from these two variables may also result

from structural and cultural variations in the insurance market. Due to the limited scope of governance practices reflected in the available data, there may not be a substantial correlation between financial performance and governance standards, even when the coefficient is positive but not statistically significant.

Minor variations in the relationship between these sustainability factors and financial performance exist between the life and general insurance industries. The life insurance industry exhibits a stronger association between environmental standards and social responsibility, indicating a more integrated approach to sustainability, even though social responsibility has a beneficial impact on ROA in both industries. However, compared to the life insurance industry, the general insurance industry places a greater emphasis on governance practices, which are more closely correlated with firm size and social responsibility scores.

The results suggest that Sri Lankan insurers can significantly improve profitability by adopting more robust and strategic social responsibility initiatives. This underscores the importance of embedding ESG principles into core business practices. Furthermore, policymakers have a critical role to play in fostering this shift by introducing incentives and strengthening disclosure frameworks, which would encourage greater transparency and accountability in ESG integration across the insurance sector.

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(Note: MDPI journals require the journal name. If this is the MDPI journal *Sustainability*, this correction is accurate.)

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IMPACT OF MICRO FINANCE ON WOMEN’S EMPOWERMENT EVIDENCE: FROM ANURADHAPURA DISTRICT IN SRI LANKA

Chandrasena H.M.¹, Tharshiga P.²

Abstract

The present study aims to analyse the impact of microfinance on women’s empowerment in the Anuradhapura District of Sri Lanka. For the analysis purpose, microcredit, micro savings, and microinsurance are the measures of microfinance that serve as independent variables influencing women’s empowerment, which is measured by decision-making power, income generation, education, health, and well-being. Guided by Empowerment Theory, the research employs a quantitative approach, utilizing a structured questionnaire administered to 150 women beneficiaries selected through stratified random sampling across three divisional secretariats: Madawachchiya, Mihinthale, and Rambewa. The data were analysed using Partial Least Squares–Structural Equation Modelling (PLS-SEM) to examine the structural relationships between microfinance services and empowerment dimensions. A structured questionnaire was used to gather data from the women beneficiaries of the microfinance program across three divisional secretariats: Madawachchiya, Mihinthale, and Rambewa. The study’s findings reveal that microfinance plays a significant and positive role in improving women’s empowerment. Among the microfinance components, microcredit and micro savings emerged as the key drivers, enhancing financial independence and household decision-making. The findings emphasise that while microfinance facilitates economic empowerment, persistent socio-cultural and institutional barriers limit women’s full autonomy. The study highlights the importance of integrating financial services with financial literacy and social inclusion programs to ensure sustainable empowerment outcomes. The results provide valuable insights for policymakers, financial institutions, and development agencies seeking to strengthen gender-responsive microfinance frameworks in Sri Lanka.

Keywords: Micro credit, micro finance, micro insurance, micro savings, women empowerment

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[Proceedings of the 16th International Conference on Business and Information - ICBI 2025](#) © 2025 by [The Faculty of Commerce and Management Studies, University of Kelaniya, Sri Lanka](#) is licensed under CC BY-SA 4.0.

DOI:

Introduction

Microfinance and the empowerment of women studies have emerged as a critical area of inquiry due to its potential to alleviate poverty and promote gender equality globally (Devaraju et al., 2024; Mandal, 2024). In the 1970s, the Grameen Bank was a pioneering effort in microfinance evaluation, aiming to empower women, especially in developing countries (Rahman, 2013). The development of Microfinance institution services is not only linked to their income generation, but also to their participation in asset ownership and household decision-making (Mengstie, 2022). Microfinance has gained significant social and theoretical implications, as women constitute a majority of the poor and face systemic barriers to financial inclusion (Zhang & Posso, 2017). For instance, almost 80% of microfinance institutions' clients around the world are women, highlighting the sector's focus on women's empowerment (Rahman, 2013). Therefore, Shrestha (2024) said that the effectiveness of microfinance in transforming women's socio-economic status. Even though the widespread adoption of microfinance as a tool for women's empowerment, the literature reveals a complex and contested landscape (Datta & Sahu, 2022). While some studies report positive outcomes such as increased income, asset ownership, and autonomy (Akhter & Cheng, 2020), Others focus on the boundaries, including male control over loans, increased domestic burdens, and persistent patriarchal norms that constrain empowerment (Gautam & Kumar, 2019). The knowledge gap lies in understanding the multidimensional nature of empowerment and the contextual factors that influence the effectiveness of microfinance (Rao & Devi, 2023). Moreover, debates persist regarding whether microfinance alone is sufficient to empower women or if complementary interventions are necessary (Ahmed, 2013). The consequences of this gap are profound, as ineffective empowerment strategies may perpetuate gender inequalities and limit poverty reduction efforts (Swain & Wallentin, 2014). Studies report positive effects of Microfinance, such as improvement in income, improved decision-making power, and enhanced social status. However, some limitations highlighted include loan misuse, persistent male-controlled control, and limited influence on women's autonomy (Shohel et al., 2021; Ali & Hatta, 2012). Participation in microfinance contributes to improvement in income and savings, which potentially have significant impacts on the women's economic empowerment (Devaraju et al., 2024; Dumbuya & Munu, 2024; Ramazani & Irechukwu, 2024). Moreover, studies highlight the role of microfinance institutions in promoting entrepreneurship and enlightening household financial strength (Shrestha, 2024; Amoakohene et al., 2023). Even though these findings are not unanimous, due to the lack of significant improvement in income, microcredit is limited by the small amount of loans, repayment challenges, or loan mismanagement (Thapa & Amit, 2024; Hossain & Wadood, 2019; Al-Amin et al., 2013). Beyond financial outcomes, microfinance develops women's decision-making independence in household and business settings (Devaraju et al., 2024; Dumbuya & Munu, 2024; Thapa & Amit, 2024). Nonetheless, the extent of empowerment varies; while some women gain greater control over economic decisions, political empowerment, and community-level participation remain limited (Wulandari & Kassim, 2024; Nawaz, 2019). In patriarchal settings, male family members often control loan usage, thereby limiting women's autonomy and sovereignty despite their access to financial resources (Shohel et al., 2021; Ali & Hatta, 2012). In terms of social empowerment, microfinance fosters women's collaboration with their social environment, connection with peer groups, and political participation (Shrestha, 2024; Maghina et al., 2023; Nawaz, 2019). However, this social gain is often limited by cultural factors, particularly in contexts where rigid gender norms prevail, resulting in mixed or negligible impacts (Wulandari & Kassim, 2024; Shohel et al., 2021).

Lakmali and Mallika (2019) examined the impact of microcredit on women's empowerment in the Anuradhapura district. Perera (2020) examined the association between microfinance and women's empowerment by evaluating its impact on self-employment opportunities for rural women, as well as the effects of microcredit, savings, skill training, and education on women's empowerment. According to studies conducted in this area, it is not sufficient to merely identify actual performance regarding the relationship between microfinance and women's empowerment. Various microfinance programs are operating within the Anuradhapura District of Sri Lanka that focus on empowering women economically. Yet, there is still an immense requirement to conduct an in-depth impact analysis of such initiatives on women's empowerment within the district. This study aims to bridge the research gap in evaluating the extent to which microfinance interventions impact women's empowerment within the district of Anuradhapura. Specifically, it aims to illustrate the multidimensional aspects of women's empowerment, encompassing economic security, decision-making, education, health status, and overall well-being, through participation in microfinance activities. This study aims to provide policymakers, practitioners, and stakeholders with valuable insights on ensuring that microfinance programs are effectively designed and implemented to maximise their positive impact on the lives of women in the Anuradhapura district. The main objective of the study is *'To investigate the impact of microfinance on women's empowerment in Anuradhapura district'*

Literature Review

The studies in microfinance and women's empowerment present a multidimensional consideration, addressing income, social, political, and psychological aspects. Studies have documented an increase in income, asset ownership, decision-making autonomy, social networking, and self-confidence following participation in microfinance (Nawaz, 2019; Gautam, 2024; Amoakohene et al., 2023; Mengstie, 2022). Based on empowerment theory frameworks, which have enhanced conceptual clarity, offering structured explanations for empowerment pathways. Although studies often focus on economic empowerment, they frequently overlook the social, political, and psychological dimensions, resulting in an incomplete picture (Al-Amin et al., 2013; Chandradasa, 2019; Ali & Hatta, 2012). Further, the sustainability of women's empowerment over time is rarely examined, highlighting a critical research gap.

Another important and Related factor is cultural. The cultural factors significantly influence the results of women's empowerment, as socio-cultural norms, patriarchal power structures, and institutional contexts shape women's capability to benefit from microfinance (Shohel et al., 2021; Gaddekar, 2023). While few studies demonstrate that microfinance could challenge gender norms, even though some studies' findings reinforce existing inequalities. Regional variations in microfinance program effectiveness emphasise the need for specific program designs (Swain & Wallentin, 2014; Zhang & Posso, 2017). Yet, inadequate empirical work examines how deeply ingrained patriarchal norms, male household dominance, and community power structures pressure women's agency (Shohel et al., 2021). Moreover, research often fails to capture the heterogeneity of women's experiences across socioeconomic and geographic contexts (Tiwari et al., 2024).

Microfinance also facilitates entrepreneurship and self-employment, firming up women's economic independence. Moreover, outcomes remain uneven; loan diversion to non-productive uses, high interest rates, and limited access to larger credit facilities undermine potential benefits (Hossain & Wadood, 2019). Importantly, economic expansions do not automatically translate into greater control over financial resources or decision-making. While numerous studies report improved decision-making power within households and communities (Thapa & Amit, 2024; Dhungana et al., 2023; Gautam, 2024), empowerment often remains partial. Similarly, microfinance programs promote social empowerment by enhancing women's community engagement, social connections, and awareness of political issues (Nawaz, 2019; Vishwakarma & Mujoo, 2023; Habib & Jubb, 2012). Group-based lending models foster solidarity, communal action, and peer support (Holvoet, 2006), although political empowerment remains underexplored and inconsistently achieved (Al-Amin et al., 2013). Structural barriers, cultural restrictions, and weak policy frameworks limit women's involvement in decision-making at broader community and institutional levels (Gaddekar, 2023; Nawaz, 2019).

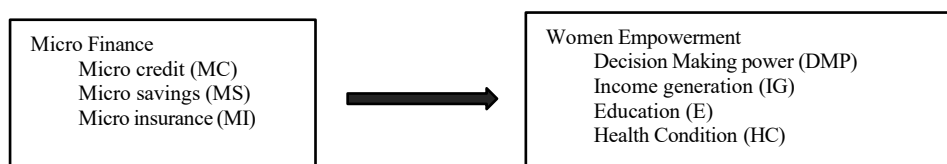
Collectively, the evidence suggests that while microfinance has significantly empowered women's economic, social, and psychological well-being, its effectiveness is highly context-dependent and constrained by cultural, institutional, and structural barriers. These findings underscore the need for integrated, comprehensive, and context-sensitive microfinance models that strike a balance between financial sustainability and long-term empowerment outcomes.

H1: *Microfinance significantly influences women's empowerment*

Methodology

The present study utilised a quantitative, positive approach, aligning to test relationships between Microfinance and Women's Empowerment. The study uses the three Divisional Secretariats in Anuradhapura District: Madawachchiya, Mihinthale, and Rambewa. Using a stratified sampling method, 50 women from each division who are benefiting from the Microfinance program were selected, ensuring equal representation. A total of 150 participants took part in the research.

Figure 1
Conceptual framework



(Source: Developed by authors based on literature (2025))

The data were analysed using SmartPLS (v4) through PLS-SEM. This method was selected due to its appropriateness for small to medium-sized samples, complex hierarchical models, and reflective-reflective measurement structures. The adoption of SEM permits simultaneous estimation of multiple relationships among constructs, providing a robust test of the hypothesised model and its predictive relevance

Findings and Discussion

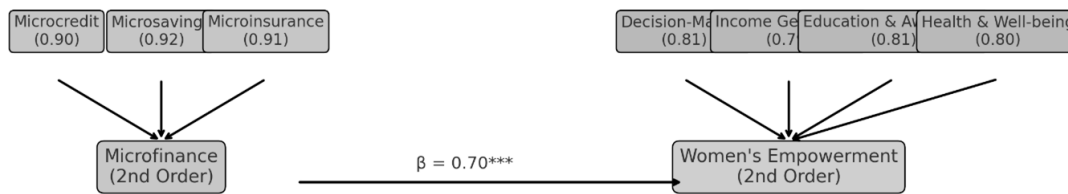
Table 1 expresses the measurement model of the assessment. All variable Composite Reliability (CR) and Average Variance Extracted (AVE) values ($CR > 0.70$ and $AVE > 0.50$) meet the reliability and validity thresholds. However, the initial HTMT analysis indicated overlap among the three microfinance components and, to a minor extent, among empowerment dimensions; this was addressed by adopting a second-order specification. After refinement (eliminating IG2 & E1), the reliability of IG and E improved significantly.

Table 1
Measurement model assessment

Constructs	Indicators	Loadings	CR	AVE
MC	MC1–MC3	≥ 0.70	0.812	0.519
MS	MS1–MS3	≥ 0.70	0.820	0.534
MI	MI1–MI3	≥ 0.70	0.817	0.530
DMP	DMP1–DMP3	≥ 0.70	0.795	0.564
IG	IG1, IG3	≥ 0.70	0.850	0.745
E	E2, E3	≥ 0.70	0.890	0.810
HC	HC1–HC3	≥ 0.70	0.761	0.516
Second-order Microfinance	MC, MS, MI	0.90–0.92	—	—
Second-order Empowerment	DMP, IG, E, HC	0.79–0.81	—	—

(Source: Authors, based on survey results)

Figure 2
SEM



(Source: Authors, based on survey results)

Table 2
Structural model results

Paths	β	t-value	p-value
Microfinance → Women's Empowerment	0.70	15.8	<0.001
R^2 (Women's Empowerment)	0.64	—	—
Q^2 (Predictive Relevance)	0.31–0.46	—	—
VIF (Collinearity)	<3.3	—	—

(Source: Authors, based on survey results)

Table 2 expresses the structural model results, indicating a significant positive effect of microfinance on women's empowerment ($\beta = 0.70$, $t = 15.8$, $p < 0.001$). This indicates that increased access to MC, MS, and MI substantially enhances women's empowerment across various dimensions, including DMP, IG, E, and HC. Sixty-four per cent of the variance is explained by the effect of microfinance on women's empowerment ($R^2 = 0.64$). Furthermore, the predictive relevance ($Q^2 = 0.31–0.46$) explains the model's robustness, while acceptable collinearity levels ($VIF < 3.3$) indicate no multicollinearity among the residuals. Therefore, the study's hypothesis, H1, is supported.

The findings confirm that MF has a significant impact on WE in the Anuradhapura District. MC and MS emerged as key factors, enabling women to achieve economic and social empowerment. These results are consistent with those of Devaraju et al. (2024) and Nawaz (2019), who found that gaining access to financial services enhances women's income and self-confidence. The study also supports Empowerment Theory, indicating that access to financial resources allows individuals to exercise agency and control over their decisions. Through participation in MF programs, women increased their ability to manage household finances and business operations, which aligns with the findings of Gautam (2024) and Amoakohene et al. (2023). However, despite profit, empowerment

remains partial due to socio-cultural constraints, such as male dominance and traditional gender norms, findings consistent with those of Ali & Hatta (2012) and Shohel et al. (2021). This suggests that financial inclusion alone cannot guarantee autonomy unless it is complemented by social and institutional transformation. Furthermore, MS increased financial discipline and resilience, while MI contributed to psychological security by protecting households from unexpected health or income shocks. This result mirrors Mengstie (2022) and Ramazani & Irechukwu (2024), who emphasised the stabilising role of savings and insurance in sustaining empowerment. In comparison, earlier Sri Lankan studies (Lakmali & Mallika, 2019; Perera, 2020) examined microcredit alone, whereas this study integrates multiple MF components and employs SEM to evaluate their combined effect. This multidimensional approach provides stronger empirical evidence for the holistic nature of empowerment.

Conclusion

The present study is an attempt to analyse the impact of microfinance on women's empowerment in the Anuradhapura District by examining three core services provided to the users of microfinance, especially women microcredit, micro savings, and microinsurance, and their impact on four empowerment dimensions: decision-making power, income generation, education and awareness, and health and well-being. The hypothesis of the study is tested using Structural Equation Modelling. The findings reveal that microfinance has a strong positive effect on women's empowerment, demonstrating its effectiveness as a tool for enhancing economic and social gains. These results are consistent with previous studies highlighting that access to financial assets contributes to improved household welfare, increased participation in community activities, and greater confidence in decision-making (Nawaz, 2019; Gautam, 2024; Mengstie, 2022).

Among the microfinance components, MS and MC emerged as the most powerful drivers of empowerment, fostering financial freedom, improving access to income-generating opportunities, and enhancing women's decision-making power within their households and communities. However, the analysis also shows that while economic empowerment is significantly reinforced, it does not automatically lead to full autonomy over resources due to persistent socio-cultural and institutional blockades, which is consistent with prior evidence that empowerment remains multidimensional and context-dependent (Ali & Hatta, 2012). Furthermore, these findings underscore the importance of designing microfinance interventions that extend beyond financial access. To sustain and improve empowerment gains, microfinance institutions provide financial literacy and capacity-building programs, enabling women to make informed financial decisions, manage borrowing effectively, and maximise the benefits of credit and savings. Furthermore, policymakers should develop inclusive and gender-sensitive policies to enlarge outreach to marginalised women and address structural inequalities that limit their participation in financial programs. Diversifying microfinance products, particularly by strengthening micro-insurance schemes, can further enhance women's safekeeping against economic and health-related vulnerabilities. Additionally, fostering community-based lending models and promoting self-help groups can enhance harmony, increase negotiation power, and facilitate collective decision-making, thereby creating stronger social capital and leadership prospects for women. To prevent loan diversion, excessive debt, and the exclusion of the most vulnerable groups, it is essential to conduct thorough impact assessments, continuously monitor empowerment outcomes, and adjust programs accordingly to the specific context. However, this study is limited to three DS divisions in Anuradhapura, which may affect the generalizability of the results to other regions. The cross-sectional design restricts the ability to capture long-term empowerment effects. Self-reported data may also be subject to perception bias. By integrating financial services with educational, social, and institutional reforms, MF can move beyond short-term financial relief to become a sustainable pathway for gender equality and inclusive economic development in Sri Lanka.

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CLIMATE CHANGE RISK, FIRM VALUE, AND FINANCIAL FLEXIBILITY: EVIDENCE FROM SRI LANKA

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Abstract

This study investigates the impact of Climate Change Risk (CCR) on Firm Value (FV) among listed companies in Sri Lanka, an emerging economy highly exposed to climate-related hazards. Specifically, it explores the moderating role of Financial Flexibility (FFL) in mitigating the effects of CCR on FV, recognising the growing importance of adaptive financial strategies in the face of environmental uncertainty. A quantitative approach was adopted, using panel data regression analysis based on secondary data collected from firms listed on the Colombo Stock Exchange (CSE) for the period 2019–2023. CCR was proxied by greenhouse gas emissions as a percentage of sales, while FV was measured using Tobin's Q. FFL was introduced as a moderating variable, with firm size, leverage, and profitability included as control variables. The data were analysed using STATA software. The results indicate that CCR does not have a statistically significant direct impact on FV. However, FFL significantly moderates the CCR–FV relationship, suggesting that firms with higher FFL are better positioned to manage climate-related disruptions. These findings highlight the strategic importance of financial resilience in mitigating environmental risks. For practitioners and policymakers, the study underscores the value of embedding FFL into corporate strategy as a buffer against long-term climate uncertainties. Future research should use larger, more diverse samples and include firm-specific variables like governance, innovation, and market position to improve external validity and deepen understanding of CCR and FFL impacts.

Keywords: Climate change risk, Colombo Stock Exchange, financial flexibility, firm value

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Proceedings of the 16th International Conference on Business and Information - ICBI 2025 © 2025 by The Faculty of Commerce and Management Studies, University of Kelaniya, Sri Lanka is licensed under CC BY-SA 4.0.

DOI:

Introduction

Background of the study

One of the key challenges that has been a key agenda item of corporate board discussion is climate change and its potential impact on businesses. In the annual Global Risk Report 2024, the World Economic Forum (WEF) named extreme weather events, critical changes to earth systems, biodiversity loss, and ecosystem collapse as the top global challenges that require urgent action to combat them (WEF, 2024). In 2024, natural disasters and severe weather events cost USD 417 billion in losses to the global economy (WJS, 2024). Additionally, a report from the Carbon Disclosure Project (CDP) reveals that 83% of the world's cities report significant climate hazards, with over half experiencing flooding (58%) and extreme heat (54%). Approximately two-thirds of these cities expect these hazards to become more intense and frequent (CPD, 2024). These risk factors can also be considered factors that can impact business enterprises' financial performance and long-term sustainability (IPCC, 2021).

Institutional and ecological evolution related to climate change is increasing pressures on business enterprises since it can affect their future corporate and business strategies (Stern, 2007). On the one hand, companies are directly (e.g. those producing fossil fuel and electricity) and indirectly (e.g. those consuming fossil fuels and electricity) responsible for Green House Gases (GHGs) emissions (Gasbarro et al., 2017). In highlighting the impact of business enterprises on global climate change, Patenaude (2010) highlighted that the sum of the emissions of the world's biggest companies is equivalent to the annual emissive contribution of the European Union (EU). This also uncovered that there is a huge role to play by business enterprises in mitigation. Many of the extant academic studies highlighted that companies are affected by the impacts of climate change particularly due to ecological changes, e.g. weather and climate events (Liu et al., 2024; Linnenluecke et al., 2012; Linnenluecke & Griffiths, 2010).

These climate changes pose significant threats to developing countries with unstable social, economic, and political structures. Furthermore, it was revealed that the climate crisis disproportionately hits the poor, as the lowest-income countries produce one-tenth of emissions but are the most heavily impacted by climate change (WEF, 2023). Being a tropical island in the Indian Ocean, Sri Lanka has consistently been placed among the top ten countries at risk of extreme weather events by the Global Climate Risk Index (UN, 2023). Furthermore, Sri Lanka as an island country where significant industries such as agriculture, tourism, and fisheries are highly vulnerable to climate risks with heat, rising sea levels, floods, landslides, and droughts. Local environmental mismanagement has exacerbated these risks. Thus, the local businesses operating in this vulnerable environmental setting are also threatened by the potential impact these climate risks may have on them. There is a need to assess the potential impacts of these risks on firm value (FV).

Business entities operating in Sri Lanka have to face this climate change risk (CCR) quite frequently as the country has drastic climate changes over short periods. It may sometimes have hefty rain or a very hot climate. Further, as businesses in Sri Lanka do not have very advanced technology as foreign countries, they emit harmful gases a lot when conducting their business operations, which are harmful to the environment. As a small island and a developing nation, Sri Lanka is highly vulnerable to the adverse effects of climate change. Consequences of climate change, such as temperature rise, rainfall variability and sea level rise, are critically affecting almost all economic sectors of the country. Occurrences of natural disasters due to extreme weather conditions, such as prolonged droughts, flash floods and landslides, deprive lives and livelihoods of people (United Nations Framework Convention on Climate Change [UNFCCC], 2023).

Although Sri Lanka is considered a low-carbon-emitting country, producing only around 1.02 CO₂e tonnes per person (Ministry of Environment, 2023), the economic significance of climate change risk remains substantial. The country's industrial base relies heavily on non-renewable energy sources such as coal and diesel for electricity generation and industrial operations. Many firms also depend on diesel generators during power shortages and use fossil fuels for business transportation, collectively contributing to local GHG emissions and operational inefficiencies. These factors, coupled with frequent climate-related disruptions, directly influence firms' costs, profitability, and asset values. Therefore, Sri Lanka represents an ideal setting to examine how firms operating in low-emission, but high-vulnerability economies manage and adapt to climate risks. Moreover, its context provides unique insights into transition risks faced by emerging markets where financial flexibility is a critical determinant of resilience under limited regulatory enforcement and constrained access to green financing.

Research problem

Existing literature has examined the relationship between CCR and FV primarily in developed economies, where climate disclosures and environmental regulations are more advanced. However, limited attention has been paid to emerging economies such as Sri Lanka, which, despite being a low-carbon emitter, faces significant exposure to climate-related disruptions due to its geographic and economic vulnerabilities. Industries like agriculture,

tourism, and manufacturing, are directly impacted by extreme weather events, energy shortages, and rising operational costs. Moreover, many Sri Lankan firms operate under resource constraints and limited technological capacity, making them more sensitive to climate-induced risks.

At the same time, financial flexibility (FFL) is gaining recognition as a critical determinant of corporate resilience, enabling firms to absorb shocks and invest in adaptation strategies. Yet, the moderating role of FFL in the CCR–FV relationship remains empirically underexplored in developing contexts. Therefore, this study addresses the lack of evidence on how CCR influences FV and how FFL mitigates this impact within Sri Lanka's vulnerable and resource-constrained business environment.

Contribution of the study

This study makes several key contributions to theory and practice. First, it extends the empirical understanding of climate finance in emerging economies by analysing how CCR affects firm value in Sri Lanka, an under-researched, climate-vulnerable market with unique structural constraints. By doing so, the study enriches the global discourse that has so far been dominated by evidence from developed economies. Second, the study contributes to the theoretical integration of Agency Theory, Capital Structure Theory, and Stakeholder Theory by demonstrating how FFL functions as a strategic resource that mitigates the adverse effects of CCR on FV. This multidimensional theoretical approach offers a nuanced understanding of financial resilience in the context of environmental uncertainty. Third, it provides practical insights for corporate decision-makers and policymakers. For firms, the findings highlight the importance of maintaining adequate liquidity and financial flexibility as part of climate risk management strategies. For policymakers, the study underscores the need to promote financial and regulatory frameworks that encourage sustainable investment and enhance firms' adaptive capacity to climate change.

Overall, this research contributes to the growing body of literature linking environmental risk management and corporate finance by positioning financial flexibility as a critical mechanism through which firms in developing countries can sustain value in the face of climate uncertainty.

Literature Review

Theoretical review

Agency Theory (Jensen & Meckling, 1976) explains how conflicts between managers and shareholders affect long-term strategic decisions. Managers tend to prioritise short-term performance metrics, while shareholders seek sustainable value creation. Investments in climate mitigation and adaptation are often perceived as costly by managers, resulting in underinvestment in sustainability initiatives. Firms with greater FFL, however, can mitigate these agency conflicts, as ample liquidity and low leverage enable managers to allocate funds toward environmentally responsible projects without compromising immediate financial targets (Almeida et al., 2014). Capital Structure Theory (Modigliani & Miller, 1958) provides another important lens. It posits that firms' financing mix determines their ability to absorb risks and fund investment opportunities. In a climate risk context, highly leveraged firms may face financial distress when external shocks occur, whereas financially flexible firms with higher internal reserves and lower leverage can adapt more effectively to unpredictable climate disruptions (DeAngelo & DeAngelo, 2007; Myers, 1977). Stakeholder Theory (Freeman, 1984) further explains that firms that proactively manage environmental risks strengthen their legitimacy and stakeholder relationships, thereby enhancing FV. Clarkson et al. (2008) found that environmental performance and transparent climate-related disclosures improve firm reputation and reduce regulatory pressure. FFL supports this process by equipping firms with the resources to meet stakeholder expectations, especially during periods of environmental uncertainty (De Jong et al., 2012). Together, these perspectives highlight that CCR poses financial and strategic challenges, but the extent of its impact depends on how firms deploy financial flexibility to navigate environmental and market pressures.

Climate change risk and firm value

Empirical evidence on the effect of CCR on FV remains mixed. Some studies have demonstrated a negative relationship, suggesting that firms exposed to higher climate risks experience lower valuations due to increased operational costs, environmental penalties, and reputational damage. Chapple et al. (2013) and Park and Noh (2017) found that companies with GHG emissions or inadequate environmental strategies suffer valuation discounts. Similarly, Graff Zivin et al. (2018) observed adverse stock market reactions to climate-related events, reflecting investor concerns about exposure to regulatory and transition risks.

In contrast, other studies have identified neutral or positive effects, particularly when firms adopt proactive climate strategies. Wang et al. (2014) and Liu et al. (2018) report that firms integrating sustainability into operations can

attract investors who value environmental responsibility, potentially enhancing firm reputation and FV. These findings indicate that CCR's influence on FV depends heavily on firm-level governance, industry exposure, and national regulatory frameworks.

Moreover, the bulk of prior research has focused on developed economies with established emission reporting standards (Matsumura et al., 2014). Evidence from emerging economies, where climate policies and disclosure mechanisms are evolving, remains limited. Given Sri Lanka's high exposure to climate events and the increasing emphasis on environmental accountability, exploring this relationship in such a context provides valuable insights. Accordingly, the following hypothesis is developed.

H1: Climate change risk (CCR) has a significant impact on firm value (FV).

Financial flexibility and firm value

Financial flexibility represents a firm's capacity to access and reallocate financial resources efficiently to respond to unexpected shocks and opportunities (DeAngelo & DeAngelo, 2007). High financial flexibility typically results from strong liquidity positions, low debt ratios, and access to external financing. Firms possessing such flexibility can withstand economic downturns, fund innovation, and maintain investment levels even under adverse conditions (Yung et al., 2015).

Empirical evidence generally supports a positive association between FFL and FV. Campello et al. (2010) and Almeida et al. (2014) observed that financially flexible firms are more resilient during crises, sustaining investments that preserve or enhance firm value. Similarly, Berežnicka (2024) noted that FFL enables firms to remain competitive by ensuring continuous investment during uncertainty. Erdogan (2020), however, found that the benefits of FFL can be limited in emerging markets, where firms face restricted access to capital markets and less efficient financial systems.

The literature thus indicates that while FFL enhances corporate resilience and long-term value, its influence is context dependent. In small and developing economies such as Sri Lanka, where firms often face financing constraints and economic volatility, understanding how FFL affects FV becomes especially relevant.

Financial flexibility as a moderator of the relationship between CCR and FV

Recent studies have begun to integrate FFL into climate finance research by examining its moderating role in the CCR–FV relationship. Naseer et al. (2024) demonstrated that firms with greater financial flexibility experience weaker negative effects of CCR on FV, as they can reallocate financial resources toward mitigation, compliance, or adaptation measures. Similarly, Huang and Chen (2021) found that financially flexible firms are more capable of investing in environmentally sustainable technologies, thereby reducing long-term exposure to climate risks. Teng et al. (2021) observed that FFL facilitates strategic decision-making during crises, enabling firms to maintain profitability and stability.

Conversely, firms with low financial flexibility may be unable to finance compliance costs, invest in resilience measures, or manage climate-related disruptions effectively. Bukalska and Pietrzak (2023) emphasize that FFL acts as a financial buffer, allowing firms to endure periods of uncertainty and regulatory change. The moderating effect of FFL has therefore gained increasing theoretical and empirical attention, though the evidence remains concentrated in developed economies.

In developing countries like Sri Lanka, where firms are typically more financially constrained and face volatile operating conditions, FFL may play an even stronger moderating role in the CCR–FV nexus. Thus, examining this relationship in such a context contributes to the broader understanding of financial resilience under environmental uncertainty. Based on this reasoning, the study proposes the following hypothesis.

H2: Financial flexibility (FFL) significantly moderates the relationship between climate change risk (CCR) and firm value (FV).

Research gap

The reviewed literature highlights three key patterns. First, while CCR is widely recognised as a driver of firm value, empirical findings are inconsistent ranging from negative to insignificant or positive effects depending on contextual and methodological differences. Second, FFL is generally associated with improved firm value, yet its role as a financial buffer against environmental risks has not been systematically examined in emerging economies. Third, most prior research has been conducted in developed countries with mature capital markets and strong climate disclosure mechanisms, leaving limited understanding of how firms in developing economies adapt financially to climate challenges.

This study contributes to closing this gap by examining the interplay between CCR, FFL, and FV among listed companies in Sri Lanka – an economy that, despite its low carbon emissions, remains highly vulnerable to climate-related hazards. The findings are expected to advance understanding of how financial flexibility can enhance firms' resilience to climate risks in contexts characterised by limited resources and regulatory support.

Methodology

Data and variables

This study employed secondary data, utilising publicly available information to conduct the analysis. Specifically, data were collected from the annual reports of the selected companies, which are published on the official website of the CSE. A balanced panel dataset spanning five years, from 2019 to 2023, was constructed for analysis. The collected data were analysed using panel regression techniques with the assistance of STATA statistical software. The population of this study comprises all 284 companies listed on the CSE in Sri Lanka as of 30th October 2024. Despite encompassing all 20 Global Industry Classification Standard (GICS) sectors represented on the CSE, the availability of sustainability reports and GHG emission disclosures was limited. Consequently, a purposive sample of 19 companies was selected from across the 20 GICS sectors based on the availability of relevant sustainability and GHG emission data, including disclosures under the three GHG scopes. The sample size was necessarily constrained to 19 companies due to the limited number of firms providing such disclosures in their annual reports.

Dependent variable

Firm Value: Firm value is used as the dependent variable, representing the market's overall assessment of a company's future profitability and growth potential. Following prior studies (e.g., Wang et al., 2014; Park & Noh, 2017), firm value is proxied by Tobin's Q, calculated as the ratio of the market value of equity plus total debt to total assets. Tobin's Q is widely recognised as a forward-looking measure that captures investors' perceptions of a firm's intangible assets, growth opportunities, and managerial performance, making it appropriate for evaluating how environmental and financial factors influence corporate valuation.

Independent variables

Climate Change Risk: CCR reflects the exposure of firms to transition and regulatory risks associated with greenhouse gas (GHG) emissions. In line with prior empirical work (Chapple et al., 2013; Matsumura et al., 2014; Liu et al., 2018), CCR is measured using GHG emission intensity, defined as the ratio of total GHG emissions to total sales revenue. This measure captures the emission burden relative to economic output, normalising for firm size and industry variation. GHG intensity is considered the most feasible and consistent proxy for CCR in Sri Lanka, where firm-level data availability is limited. It effectively represents the extent to which a firm's operations are carbon-intensive and thus exposed to potential transition risks from evolving environmental regulations and investor scrutiny.

Financial Flexibility: Financial flexibility is conceptualised as a firm's ability to access and deploy financial resources efficiently to manage unexpected shocks or investment opportunities. Following DeAngelo and DeAngelo (2007) and Almeida et al. (2014), FFL is measured through a composite approach combining two indicators: cash-to-assets ratio and leverage (debt-to-equity ratio). Firms with higher cash holdings and lower leverage are considered more financially flexible. To create a single indicator, standardised values of cash holdings and leverage (reverse-coded) were averaged, with higher values indicating greater financial flexibility.

Interaction Term: To test the moderating hypothesis, the interaction between CCR and FFL was included. This term captures whether the effect of climate risk on firm value varies depending on a firm's degree of financial flexibility.

Control variables

Several firm-specific and contextual variables were incorporated to account for alternative factors influencing firm value, consistent with prior research (Almeida et al., 2014; Erdogan, 2020; Teng et al., 2021).

Firm Size: Logarithm of total assets. Larger firms tend to have better access to capital markets and may benefit from economies of scale, influencing both CCR exposure and FV. **Firm Age:** Number of years since incorporation, controlling for firm maturity and experience effects. **Profitability:** ROA, representing a firm's operational efficiency. **Leverage:** Total debt divided by total equity, reflecting capital structure and risk level. **Liquidity:** Current ratio (current assets / current liabilities), capturing short-term financial stability. **Sector Dummies:** Industry-specific dummy variables control for heterogeneity in emission intensity and valuation patterns across sectors. **Crisis Dummy:** A binary variable equal to 1 for the years 2020–2023 (COVID-19 and economic crisis period) and 0 otherwise, to control for structural breaks affecting firm performance and valuation. These controls

ensure that the observed relationships between CCR, FFL, and FV are not confounded by firm heterogeneity, sectoral characteristics, or macroeconomic shocks.

Methodology and model specifications

This study adopts a positivist research philosophy, which emphasizes the use of measurement and logical reasoning, asserting that knowledge is derived from objective, observable, and quantifiable phenomena. Consistent with this paradigm, the study employs a deductive research approach, wherein the investigation begins with established theoretical frameworks and proceeds to empirically test these theories through systematic data collection and analysis. Accordingly, the study adopts a quantitative research methodology, as it aligns with the positivist stance and deductive reasoning by focusing on numerical data and statistical inference.

Model specifications

Below model shown is the regression model related to the regression type selected.

$FV_{it} = \alpha + \beta_1 CCR_{it} + \beta_2 (FFL_{it}) + \beta_3 (CCR \times FFL) + \beta_4 (FS_{it}) + \beta_5 (PR_{it}) + \beta_6 (LV_{it}) + \epsilon_{it}$ (1) Where, FV, CCR, FFL, CCR $\times$ FFL, FS, PR, LV denote Firm Value, Climate Change Risk, Financial Flexibility, Interaction Term, Firm Size, Profitability, Leverage respectively.

Empirical Results

The normality of the firm value (FV) variable was evaluated using the Shapiro–Wilk test, which indicated non-normal distribution ($p < 0.05$). Consequently, the FV variable was transformed into its logarithmic form to improve normality. Outliers in all study variables were examined through box plots, and except for firm size, all variables contained extreme values. These were treated using the winsorizing method to minimise the influence of outliers and ensure the robustness of subsequent analyses.

Summary statistics: Table 1 below summarises the descriptive analysis of the data set. The study consists of 95 observations with 19 companies and 5 time periods.

Table 1
Descriptive analysis.

Variables	Mean	Standard deviation	Minimum	Maximum
log_FV_w	-1.6516	1.2892	-4.7048	1.4256
CCR_w	.7440	.7253	0	2.2764
FFL_w	.5365	.2551	.02045	1.0260
FS	10.3585	1.5480	7.852	13.5205
PR_w	.15053	.1285	-.0324	.425
LV_w	.5419	0.2326	0.0847	.9870

(Source: Authors, based on survey results)

Variables such as the Log Value of FV, CCR, FS and LV have a greater variation between firms than within firms over time. This suggests that differences between firms in terms of size, financial structure, and profitability are more important than changes within firms over time. Variables such as the FFL, FS and LV show low within-group variation, suggesting that firms tend to maintain relatively stable financial characteristics over time. This could be a sign of long-term consistency in firm behaviour or strategy. Variables such as the CCR and Log Value of FV show substantial between-company variation, indicating that different firms have very different financial conditions. The PR variable shows moderate within-group variation, which could suggest that firms experience some fluctuations in profitability over time but are relatively stable across the sample. Conversely, FS appears highly stable within firms, which may indicate that firms do not frequently change in size or scale during the observed period.

Regression model

Given that this study incorporates a moderating variable, an interaction term was introduced between the independent variable, CCR, and the moderating variable, FFL. This interaction term, labelled as ‘interaction,’ was included before selecting the appropriate analysis model. Subsequently, both the Fixed Effect (FE) and Random Effect (RE) models were estimated separately. According to the Hausman test, the p-value for this study was 0.0247, which is below the 0.05 threshold. Consequently, the null hypothesis was rejected, indicating that the FE model was the more appropriate choice.

Following the selection of the FE model over the RE model, an additional step was required to confirm whether the FE model was preferable to the Pooled OLS model. To make this determination, an F-test was conducted. First, the Pooled OLS regression was estimated, followed by the FE regression. The F-test was then performed to compare the two models. Similar to the Hausman test, the null hypothesis in this case posited that the Pooled OLS model was more appropriate. To reject this hypothesis, the p-value needed to be below 0.05. Accordingly, the p-value obtained was 0.0001, which is well below 0.05. This result led to the rejection of the null hypothesis in favour of the alternative hypothesis, confirming that the FE model was the most suitable choice. Thus, based on the results of both the Hausman test and the F-test, the FE model was determined to be the most appropriate regression model for analysing this dataset.

Diagnostic tests

Time Fixed Effect: The Fixed Time Effect test is employed to identify if the dummies for all years are equal to zero. If so, no time fixed effects are required. However, the p-value of the test was significantly under 1%, indicating the acceptance of the null hypothesis. Accordingly, the premise that the coefficients for all the years are jointly equal to zero can be rejected. Therefore, the results depict that the model has to be included with time dummies.

Multicollinearity: To test multicollinearity, the correlation matrix was generated. Further, the Variance Inflation Factor (VIF) test was conducted. If the VIF values are greater than 10, it is said to have multicollinearity. According to the test output, the VIF values of all the variables, as well as the mean VIF value is less than 10, it was concluded that there is no multicollinearity exists in the variables.

Heteroskedasticity: The Wald test was used to check the heteroskedasticity. The Wald test output indicates the p-value at 0.0000, depicting heteroscedasticity. Accordingly, the robust standard error was included in the final regression model as the remedy for heteroscedasticity.

Final Regression Model Analysis: The FE model was employed for the final regression analysis. Additionally, time dummies and robust standard errors were incorporated to address identified issues.

Table 2 provides an overview of the applied model.

Table 2
Model overview

R-squared	0.5800
Prob > F	0.0000

(Source: Authors, based on survey results)

The within R-squared value indicates that 58.00% of the variation in firm value within companies is explained by the independent variables. This suggests a reasonable fit within companies, with a considerable portion of the variation in the dependent variable explained by the model. The between R-squared value indicates that only 5.88% of the variation between companies is explained by the model, indicating that most of the variation in firm value is within companies rather than across companies. The overall R-squared value suggests that overall, the model explains 8.27% of the total variation in firm value. Even though this is not a very high number it can be accepted as a moderate level. The p-value of the overall model is shown as 0.0000, which is statistically significant at 1% level. It indicates that at least one of the variables in the model has a statistically significant effect on firm value. Therefore, the overall model can be accepted as a good model.

The below Table 3 shows a summary of the coefficients and the p-values.

Table 3
Coefficients and significance of variables

Variable Name	Coefficient	Standard Error	P-Value
CCR	-0.1650	0.1152	0.169
FFL	0.0116	0.7433	0.988
interaction	0.7728	0.3386	**0.035
FS	-0.6092	0.4335	0.177
PR	1.4517	0.5454	**0.016
LV	1.4517	0.8849	0.193
Constant	3.4420	4.4599	0.450

(Source: Authors, based on survey results)

The following Table 4 shows the behaviour of the dependent variable, firm value on each year with compared to the baseline year, 2019.

Table 4
Coefficients and significance of year dummies

Year	Coefficient	Standard Error	P-Value
2020	-0.1811	0.0614	0.009
2021	0.4132	0.0935	0.000
2022	0.1847	0.1942	0.354
2023	0.4738	0.1903	0.023

(Source: Authors, based on survey results)

The negative coefficient suggests that firm value was lower in 2020 compared to the 2019 where this result is statistically significant. Next, 2021 shows a positive and statistically significant coefficient. It indicates that firm value was higher in 2021 than the baseline year, 2019. In 2022, the coefficient is positive; however, the effect is not statistically significant. Therefore, there is no significant evidence to show a significant change in firm value in 2022 relative to 2019. Moreover, in 2023, there is a positive and statistically significant coefficient. It suggests that the firm value was higher in 2023 compared to the baseline year, 2019.

Hypothesis testing

The hypotheses are developed as follows:

H1: There is a significant impact of CCR on FV.

Since the P-value of CCR was 0.169, the first hypothesis is not accepted. Therefore, there is no evidence to reject the null hypothesis, which says that there is no significant impact of CCR on FV has to be accepted. Hence, CCR does not impact on FV. There could be various reasons for rejecting this hypothesis; the small sample size, due to a lack of data availability, is the primary reason.

The second hypothesis of the study was,

H2: There is a significant moderating effect of FFL on the relationship between FV and CCR.

Since the P-value of the interaction term of CCR and FFL was 0.035 and it is significant, the second hypothesis can be accepted. Therefore, the null hypothesis is rejected. Hence, there is a moderating effect of FFL on the relationship between CCR and FV.

Findings and Discussion

The empirical findings reveal that CCR does not have a statistically significant direct impact on FV among listed companies in Sri Lanka, while FFL significantly moderates the CCR–FV relationship. These results provide both confirmation and divergence from prior literature and need to be understood within Sri Lanka's unique institutional and market environment.

The insignificant CCR–FV relationship contrasts with studies conducted in developed economies such as Park and Noh (2017) and Chapple et al. (2013), which found a negative association between CCR and FV, suggesting that firms with greater exposure to climate risk experience valuation penalties. In contrast, the present finding aligns more closely with Wang et al. (2014) and Liu et al. (2018), who reported that the link between CCR and FV can be weak or neutral when investors do not fully price environmental risks or when firms proactively manage sustainability initiatives. This inconsistency across contexts underscores the role of institutional maturity in shaping market responses to climate risk. In Sri Lanka, the limited enforcement of environmental reporting, the absence of carbon-pricing mechanisms, and the voluntary nature of ESG disclosures may prevent investors from incorporating CCR into valuation decisions. Consequently, climate risk remains a latent rather than a priced factor in the domestic equity market.

Investor sophistication also plays a decisive role. Unlike in advanced economies where institutional investors exert pressure for climate transparency, Sri Lanka's market is dominated by retail investors who focus on short-term returns and often lack awareness of environmental performance indicators. This behavioural tendency may explain why CCR is not statistically significant: market participants do not yet perceive climate exposure as material to firm performance. These findings therefore support the argument that in less developed financial systems, informational asymmetries and data gaps dilute the valuation relevance of CCR (Nguyen et al., 2020; Pradhan et al., 2024).

The significant moderating effect of FFL reinforces theoretical propositions derived from Agency Theory, Capital Structure Theory, and Stakeholder Theory. Consistent with De Angelo and De Angelo (2007) and Almeida et al. (2014), firms with higher financial flexibility possess greater internal capacity to respond to shocks, invest in adaptation measures, and sustain operations during environmental disruptions. This finding also mirrors Naseer et al. (2024), who demonstrated that FFL buffers the negative influence of CCR on FV in other emerging markets. The Sri Lankan evidence therefore, extends existing theory by confirming that even where climate risk is not fully priced by investors, FFL remains a key internal mechanism of resilience.

However, the strength of the moderating effect appears particularly pronounced in Sri Lanka because of contextual constraints. Access to external finance is limited, and the domestic capital market lacks diverse green financing instruments such as sustainability-linked bonds or credit facilities common in more mature economies. As a result, FFL becomes the primary means by which firms fund adaptation or efficiency projects. This observation is consistent with Erdogan (2020), who argued that financial flexibility yields disproportionately high value in emerging markets where external capital is scarce. It also complements Stakeholder Theory (Freeman, 1984), suggesting that financially flexible firms can meet stakeholder expectations for environmental responsibility without jeopardising short-term liquidity.

The findings further highlight how institutional weaknesses amplify the importance of internal financial capacity. Weak regulatory oversight, inconsistent climate disclosure standards, and unreliable firm-level data constrain the ability of both investors and regulators to assess environmental exposure. During data collection, only a small number of firms disclosed GHG emissions, and many provided partial or incomparable information. These reporting deficiencies likely contribute to the absence of a direct CCR–FV relationship and echo concerns raised in global studies regarding disclosure quality in frontier markets.

Overall, the study extends the literature by demonstrating that in markets characterised by low regulatory quality, limited investor sophistication, and disclosure gaps, CCR alone may not directly influence FV; instead, its financial consequences are mediated through firms' adaptive capacity and liquidity management. The Sri Lankan evidence therefore reinforces the notion that FFL functions as a context-specific resilience mechanism, bridging institutional shortcomings that delay the full integration of climate risk into market valuations. Strengthening mandatory disclosure frameworks, expanding sustainable-finance instruments, and enhancing investor awareness would likely narrow this gap and align future outcomes more closely with patterns observed in advanced economies.

Conclusion

This study aimed to explore the relationship between CCR and FV, with a particular focus on whether FFL moderates this relationship. A panel data set consisting of 19 companies and a time range of five years from 2019 to 2023 was considered. For the analysis, panel data regression was followed. The analysis used the FE regression model with robust standard errors to examine the impact of CCR on the FV and to examine the moderating effect of FFL on the relationship between CCR and the FV. The key findings from the regression model provide valuable insights into how firms' CCR and their ability to adapt financially influence FV. Further, three control variables, which are related to firm value, namely, FS, PR and LV, were considered. The overall model was considered significant and had a moderately high R-squared value. The independent variable, CCR did not show a statistically significant impact on the dependent variable of FV, while the interaction term FFL with the CCR showed that there is a statistically significant impact, and the relationship between CCR and FV is moderated by FFL. The control variables FS and LV did not have a significant impact on FV, while PR had a statistically significant impact on FV.

Implications: The findings from this study offer several key implications, particularly in the context of how CCR influences firm value and the potential role of FFL as a moderating factor. The study's findings show that CCR does not have a statistically significant direct effect on FV, challenging some of the existing literature, which suggests that firms exposed to climate-related risks may see a reduction in their market value. However, this result aligns with studies suggesting that investors may not yet fully price in climate risks or may view them as distant, uncertain, or insufficiently material to impact short-term valuations. The study suggests that FFL, even though not significantly affect FV directly, is playing a role in moderating the relationship between CCR and FV, with a statistically significant interaction term. This implies that firms with higher FFL may be better positioned to adapt to climate risks and possibly mitigate their negative impacts on market value.

Recommendations: During the data collection process for this study, it became evident that only a limited number of companies disclose climate risk information. The findings suggest that investors may not fully incorporate climate risks into firm valuations, possibly due to inconsistencies and a lack of transparency in climate risk disclosures. To address this issue, policymakers should prioritise strengthening corporate disclosure requirements,

particularly for industries highly exposed to climate change, such as energy, agriculture, and transportation. Moreover, the findings suggest that financial flexibility may be a key factor for firms to adapt to climate-related risks. Policymakers could consider providing incentives for firms to improve their financial flexibility and invest in climate adaptation by offering green financing options such as green bonds or green loans with favourable terms, or tax incentives for companies investing in climate-resilient infrastructure and sustainable practices.

Limitations: While this study offers valuable insights, it has certain limitations that should be addressed in future research. A limitation of this study is the small sample size, where the analysis is based on data from 95 observations across 19 companies, which could lead to concerns about the general applicability of the results. Further, sample of this size, particularly with such a small number of companies, may limit the statistical power to detect true relationships.

The above-mentioned limitation of a smaller sample size occurred because of the data limitations. Data on climate change risk, particularly firm-level data, is still relatively scarce, and the quality of available data can vary significantly across industries. In some cases, firms may not disclose relevant information on their exposure to climate risks, making it difficult to accurately assess and compare the effects of CCR on FV.

Another limitation was even though several relevant variables, such as FS, PR and LV were considered as control variables, there may still be unobserved factors that influence both FV and CCR, leading to omitted variable bias.

Suggestions for Future Research: Future studies should aim to include a larger sample of companies, expanding the analysis to multiple industries or even to global firms, to enhance the external validity of the results. Moreover, future studies should explore the role of additional control variables that could capture important firm-specific characteristics, such as corporate governance, innovation capacity, or market positioning, to spot the effects of CCR and FFL better.

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THE IMPACT OF EXCHANGE RATE MOVEMENTS ON STOCK MARKET VOLATILITY IN SOUTH ASIAN DIVERSE ECONOMIES

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Abstract

The relationship between exchange rate movements and stock markets reveals the interdependence of financial markets. The main aim of this study is to examine the impact of exchange rates on stock market volatility in three major economies in Asia: India, Sri Lanka, and Bangladesh. The study uses daily data from 2014 to 2023 of three major currencies of the three countries Indian Rupee, Sri Lankan rupee and Bangladeshi Taka against US dollar and stock market returns of Bombay Stock Exchange Sensitive Index (BSE SENSEX), All Share Price Index (ASPI), Dhaka Stock Exchange Broad Index (DSEX). Generalised Autoregressive Conditional Heteroskedasticity (GARCH) modelling and causality analysis are employed for the analysis. The findings of GARCH (1,1) model reveal that there is a significant negative impact of USD/INR and USD/LKR volatility on BSE SENSEX and ASPI, respectively, while the effect on DSEX is statistically insignificant. This suggests that equity markets in India and Sri Lanka are more vulnerable to currency fluctuations, potentially due to higher capital market integration and foreign investor exposure. In contrast, Bangladesh's weaker response may be due to less involvement in international markets compared to other two countries. These findings support the importance of accurate exchange rate forecasting and risk management strategies in emerging financial markets.

Keywords: Exchange rate movements, GARCH, granger causality test, South Asia, stock market volatility

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Introduction

Volatility is a common phenomenon in financial markets that can have a significant impact on traders, investors, and the economy. Understanding the causes and implications of stock market volatility is critical for making informed investing decisions, successfully managing risk, and establishing strong financial plans. Market volatility is defined as the rate at which the price of a stock or market indices increases or decreases for a given set of returns (O Norberg, 2024). The more significant and frequent the price changes, the more volatile the market is said to be. Various factors can influence volatility, including economic indicators, geopolitical events, company earnings reports, and investor sentiment. The impact of exchange rate movements on stock market volatility can be significant. A falling currency can improve export competitiveness, boosting export-oriented businesses while increasing expenses for import-dependent firms (Ramanayaka, 2019; K & Kao, 1990). These changes influence investor sentiment and market confidence, leading to increased volatility in stock prices. Overall, these movements lead to uncertainty and risk in the stock market. Understanding these dynamics is critical for making thorough investment decisions and managing risk. The stock market is considered as a key indicator of economic development. Developing markets are known for their high volatility risk due to extreme exchange rate fluctuations, and it can significantly impact economies that heavily rely on foreign currencies for trade and investment.

South Asia is considered as the fastest-growing sub-region globally, and it has reported an average annual growth of 7.0% since 2014 (Song, 2019). It's growth output remains stronger than other emerging markets and developing economies, largely due to India's robust economic expansion. South Asia's growth output is projected to reach 6.0%-6.1% in 2024-25, driven by robust growth in India and recovery from balance-of-payments challenges in Sri Lanka (World Bank, 2024). The region is diverse, with India, Pakistan, and Bangladesh as the dominant economies, and smaller countries like Bhutan, Nepal, and Sri Lanka with their unique development paths (Schwab, 2018). Furthermore, regional integration activities aim to promote economic cooperation, though progress has been limited due to geopolitical tensions. Despite this rapid economic progress, the financial markets of South Asian economies remain highly sensitive to macroeconomic shocks, particularly exchange rate fluctuations. While the relationship between exchange rate fluctuations and stock market volatility has been widely focused on developed markets (Md-Yusuf & Rahman, 2012), it remains under-researched in the context of developing economies, particularly in South Asia. Much of the existing research focuses on developed markets, where financial systems are more mature and market responses differ significantly from those in emerging regions. In contrast, South Asian economies are characterised by less mature financial systems, higher exposure to external shocks, and varying levels of capital controls, all of which can increase the effects of exchange rate volatility (Draz et al., 2019). Furthermore, research on emerging markets has a tendency to generalise results and ignore the diversity of South Asia, a region marked by diverse economic structures and policy environments. As a result, existing studies offer inconclusive and contradictory findings, lacking a region-specific focus that accounts for the diverse nature of South Asian financial markets (Chowdhury, 2024). This study addresses this gap by offering a novel, comparative analysis of how exchange rate movements impact stock market volatility across three major South Asian economies, each of which has a distinct economic structure and plays a significant role in international market participation. With significant inflows of foreign investment and trade in manufacturing and services, India is a significant player in the global economy. Bangladesh, which depends on remittances and worldwide demand, is a major exporter of clothing and is closely linked to global supply networks. Despite being smaller, Sri Lanka maintains close linkages with other countries through trade, remittances, and tourism, which makes all three economies extremely vulnerable to outside financial shocks. By focusing on intra-regional differences, it highlights the asymmetric effects of currency fluctuations on stock market volatility in countries with varying levels of economic development, trade exposure, and financial market maturity. This region-specific and comparative approach provides new insights that are not captured in broader emerging market studies, such as those by Khatri et al. (2017) and Rehan et al. (2019). Addressing this gap can offer novel insights for policymakers, investors, and academics seeking to better understand financial stability and integration in one of the world's most dynamic economic regions.

Accordingly, this study aims to investigate the impact of exchange rate movements on stock market volatility, focusing on three South Asian countries: India, Sri Lanka, and Bangladesh. The selection of these countries is based on geographic proximity, the diversity in market and economic conditions (World Bank, 2023), and the differences in exchange rate regimes (IMF, 2023). India, Bangladesh, and Sri Lanka have diverse economic features, with India having a diverse economy with technology, manufacturing, and agriculture sectors and a flexible exchange rate regime. Bangladesh is experiencing rapid expansion due to the textile and agricultural industries under a stabilised regime. Sri Lanka is heavily dependent on agriculture and tourism and has a floating exchange rate. This variety allows for a comprehensive analysis of how exchange rate movements impact stock market volatility across different economic contexts. (Lian et al., 2021). By evaluating these relationships, the study can provide valuable insights for governments, investors, and businesses to make decisions about currency

risk management and investment strategies. Since exchange rate volatility has a substantial impact on capital flows, trade balances, and overall economic performance, understanding these patterns is important for promoting financial stability and economic growth in the region.

Literature Review

The literature examining the impact of exchange rate movements on stock market volatility within South Asia's diverse economies has a limited regional focus. Given the varying degrees of market maturity, monetary policy frameworks, and exposure to external shocks among countries such as India, Pakistan, Bangladesh, Sri Lanka, and Nepal, a region-specific synthesis is essential. Prior studies have largely concentrated on developed economies or treated developing markets as a similar group, overlooking South Asia's unique vulnerabilities and exchange rate regimes.

Exchange rate movements

An exchange rate is the rate at which one currency can be exchanged for another between nations or economic zones. According to Backman (2006), exchange rate is defined as the price of one currency in terms of another currency. A country's exchange rate usually determined by the supply and demand in the foreign exchange market and is important in determining trade and capital flow dynamics. The rate of exchange is one of the most important macroeconomic variables in developing and developed countries. It affects inflation and causes changes in exports and imports thereby influencing price of commodities traded (Fapetu et al., 2017). The exchange rates movement is important in international finance and managers of multinational firms, international investors, importers and exporters and government officials attach enormous importance to it. Ozturk & Kalyoncu (2009), defined the exchange rate volatility as the risk associated with unexpected movements in the exchange rate. Volatile exchange rates make international trade and investment decisions more difficult because volatility increases exchange rate risk. A few factors, including as variations in inflation rates, interest rate differentials, political and economic stability, and market speculation, all have an impact on exchange rate volatility. The interaction of these variables results in a dynamic and frequently unpredictable currency market. According to Kilicarslan (2018), the rise in domestic investment, money supply and trade openness increase the real effective exchange rate volatility, while the rise in foreign direct investment, output, and government expenditures also reduce the real effective exchange rate volatility.

Stock market volatility

Stock markets have been identified as locations for engaging in economic transactions of buying and selling stocks or shares which are the ownership claims on businesses (Rjumohan, 2019). Through the primary market of stock exchanges, companies can issue shares to the public and get funds for business purposes. The secondary function of the stock exchange is to provide a platform for liquidity for buyers and sellers of the stocks that are listed in the stock market. In the secondary market of stock exchanges, retail and institutional investors buy and sell stocks. The price of a stock is largely determined by supply and demand. If demand is high, the price tends to go up, and if supply is high, the price tends to go down. Market volatility refers to the degree to which the price of a security or the index that it tracks changes over a period. It's important for investors and traders to understand market volatility to make informed decisions about their investments (Shiller, 1990). Investors who prefer to buy and hold a stock, rather than trade, may want to avoid volatile stocks, as volatility makes it harder to maintain the value of the investment. Volatility can either be measured by using the standard deviation or variance between returns from that same security or market index (Bhowmik, 2013).

Relationship between exchange rate movements and stock market volatility

Stock market volatility and exchange rates are closely interconnected, frequently reflecting underlying economic conditions and investor sentiment. The stock market and exchange rate relationship and individually both variables, get importance because they directly affect the economy of any country (Aslam, 2014). When the Exchange rate appreciates, since exporters will lose their competitiveness in the international market, the sales and profits of exporters will decrease, and the stock prices will decline. On the other hand, importers will increase their competitiveness in domestic markets. Unexpected or sudden changes in exchange rates can raise uncertainty and cause investors to reevaluate their risk tolerance and make portfolio adjustments, which in turn can exacerbate stock market volatility (Bamidele, 2024). According to Khan & Nawaz (2010), fluctuating currency rates discourage foreign direct investment because they make business decisions more ambiguous, which encourages producers to boost their long-term investments. The impact of exchange rate movements on stock market volatility has been a topic of interest in financial literature. Studies have explored the relationship between these two variables have found mixed results.

Hajilee and Al Nasser (2014) examined the impact of exchange rate volatility on stock market development across 12 emerging economies from 1980 to 2010. Using a bound testing approach to cointegration, the study estimated both short- and long-run models. Results showed that exchange rate volatility significantly affects stock market development in most countries over both time horizons. However, the magnitude and direction of the effect varied by country, highlighting the role of country-specific economic structures in shaping financial market responses to exchange rate risk. Muigai and Cherono (2019) examined the impact of exchange rate fluctuations on share prices of listed companies in Kenya. Using a longitudinal design and time series regression on daily data from 2008 to 2015, they analysed all 61 listed firms. Their findings revealed a significant negative impact of exchange rate volatility on share prices. The authors recommended policy measures to stabilise the exchange rate and advocated for the development of a derivatives market to help mitigate foreign exchange risk. Nkoro and Uko (2016) explored the relationship between exchange rate and inflation volatility and stock price volatility in Nigeria using quarterly time series data from 1986Q1 to 2012Q4. They employed GARCH(1,1) and extended GARCH-X models to estimate volatility. The study found a negative relationship between stock price volatility and both exchange rate and inflation volatility. Mechri et al. (2018) investigated the impact of exchange rate volatility on stock market fluctuations in two MENA countries. Study used period of 15 years data and incorporated multiple determinants of stock market indices not previously examined together. Using a GARCH model, the study found that exchange rate volatility has a significant effect on stock market movements. The study of Khatri et al. (2017) examined the relationship between exchange rates and stock market returns in four South Asian countries, India, Sri Lanka, Bangladesh, and Pakistan, using monthly data from July 2006 to June 2016. Applying Johansen co-integration, Granger causality, and VECM models, the study found no long-term relationship except for India. In the short run, a significant negative relationship was observed for Sri Lanka and Bangladesh. Aliyu (2010) empirically investigated the impact of exchange rate volatility on Nigeria's export trade using time series data. The study applied econometric models, and the findings indicated that exchange rate volatility had a significant negative impact on export volumes. The study conducted by Jawaid and Ul Haq (2012) examined the impact of exchange rate, interest rate, and their volatilities on stock prices in Pakistan's banking sector. Using cointegration and causality analyses, the study found a significant negative long-run relationship between exchange rate and short-term interest rate with stock prices, while the volatilities of both variables showed a positive and significant effect. Bidirectional causality was found between exchange rate and stock prices, and unidirectional causality from short-term interest rate to stock prices. Research of Rehan et al. (2019) analysed the relationship between exchange rates and stock prices across South Asian countries: Pakistan, India, and Sri Lanka, using data from 2007 to 2016. Employing co-integration and error correction models (ECM), the study found no significant relationship in Pakistan and India, while both short- and long-term linkages were observed in Sri Lanka. The findings suggest that exchange rates can serve as a useful indicator for stock market investment in Sri Lanka, but not in Pakistan and India. Rahman and Uddin (2009) examined the dynamic relationship between stock prices and exchange rates in Bangladesh, India, and Pakistan using monthly data from January 2003 to June 2008. Employing Johansen cointegration and Granger causality tests, the study found no long-term cointegrating relationship and no causal relationship between stock prices and exchange rates in any of the three countries. The findings suggest that these financial variables operate independently in the South Asian context.

Balikai and Mustari (2022) examined the relationship between currency exchange rate volatility and stock market performance in India. Using monthly data from January 2010 to June 2021, the study employed Real Broad Effective Exchange Rate (RBEER) as the independent variable and the S&P BSE Index as the dependent variable. Several econometric tools, including Pearson correlation, ADF and PP unit root tests, Q-Q normality test, and Granger causality test, were applied. The findings revealed a low positive correlation between RBEER and the S&P BSE Index and established a bidirectional Granger causality between the two variables. The study of Kennedy and Nourzad (2016) empirically analysed the impact of U.S. dollar–euro exchange rate volatility on U.S. stock market volatility using weekly data from January 1999 to January 2010. Applying a GARCH(1,1) model and controlling for various macroeconomic factors, they found that exchange rate volatility had a positive and statistically significant effect on stock return volatility. Additionally, Perera (2016) investigated the impact of exchange rate volatility on stock market return volatility in Sri Lanka using daily data from January 2010 to December 2015. The study applied a GARCH model to examine the relationship between exchange rate fluctuations and the All Share Price Index (ASPI) returns of the Colombo Stock Exchange. Results showed that Euro exchange rate volatility had a positive and significant effect on ASPI volatility, while the volatilities of the US Dollar and British Pound were negative and insignificant. The study emphasises that exchange rate volatility should be considered in capital market investment decisions in emerging markets.

Overall, the reviewed literature demonstrates a diverse and often context-specific relationship between exchange rate volatility and stock market behavior across both developed and emerging economies. While several studies (e.g., Muigai & Cherono, 2019; Nkoro & Uko, 2016; Perera, 2016) confirm a significant impact of exchange rate fluctuations on stock market volatility or returns, others (e.g., Rahman & Uddin, 2009; Rehan et al., 2019) report weak or no long-term associations, particularly in South Asian contexts. Methodologies like GARCH models,

cointegration analysis, and Granger causality tests are widely used, highlighting both short-run and long-run dynamics. Also findings of emphasize the importance of country-specific economic structures in shaping these relationships, reinforcing the need for localized empirical investigations (Hajilee & Al Nasser, 2014)

Methodology

Data and variables

India, Sri Lanka and Bangladesh is selected as the sample countries of the Study. The selected countries represent a range of economic conditions, including differences in GDP, market capitalization, and the market capitalization of listed domestic companies as a percentage of GDP (Table 1). Additionally, each country has its own exchange rate regime, providing a diverse set of data for research - India with a flexible regime, Bangladesh with a stabilized arrangement and Sri Lanka with a floating system.

Table 1
Countries' Range of Economic Conditions

	GDP (Current US\$ Millions)	Market Capitalization (USD Millions)	Market Capitalization of Listed Domestic Companies (% of GDP)
India	3,549,918.92	3,603,482.44	107.5
Bangladesh	437,415.33	42,894.83	9.3
Sri Lanka	84,356.86	10,598.22	14.3

(Source: Adapted from <https://data.worldbank.org/> (Data for most recent years 2022/2023)

Exchange rates: Indian Rupee, Sri Lankan rupee and Bangladeshi Taka against US dollar are the independent variables and stock market returns of Bombay Stock Exchange Sensitive Index (BSE SENSEX), All Share Price Index (ASPI), Dhaka Stock Exchange Broad Index (DSEX) are considered as the dependent variables. Daily data is collected from January 2014 to December 2023. Standard deviation calculation is used as the volatility measurement.

Model specifications

All analyses were performed after both exchange rate and index data were converted to log returns. This transformation ensures data stationarity and is commonly used in financial time series analysis to increase model dependability and interpretability. To ensure the reliability of time series analysis, stationarity tests were conducted on the data series. This step is essential to verify that the statistical properties of the series such as mean, and variance remain constant over time. The Augmented Dickey-Fuller (ADF) test is employed to detect the presence of unit roots and determine the stationarity of variables. The Granger causality test is conducted to determine the directional relationship between exchange rate volatility and stock market returns. It helps to identify whether one time series can statistically forecast another, thereby providing insights into the lead lag dynamics between the variables.

To analyze the volatility dynamics of exchange rates and stock market returns, the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model proposed by Engle & Bollerslev (1986) is employed. GARCH (1,1) model is used, as it effectively captures the time-varying volatility often observed in financial time series. This model assumes that the current period's variance depends on both the previous period's squared error (ARCH term) and the previous period's variance (GARCH term), making it ideal for modelling volatility clustering. The model is particularly suited for this study as it not only captures volatility but also helps assess how shocks in one variable affect the volatility of another over time.

The model is as follows:

$$R_t = \mu + \varepsilon_t \quad \dots\dots\dots (1)$$

$$\sigma_t^2 = \omega + \alpha_1 \varepsilon_{t-1}^2 + \beta_1 \sigma_{t-1}^2 \quad \dots\dots\dots (2)$$

Where:

R_t is the stock returns calculated by taking the natural logarithm at time t

μ is the intercept

ε_t is the error term

σ_t^2 is the conditional variance at time t.

ω is a constant term.

α_1 is the coefficient for the lagged squared error.

β_1 is the coefficient for the lagged conditional variance.

Findings and Discussion

Descriptive statistics and time plots

The descriptive statistics indicate that all return series, both stock indices and exchange rates have mean values close to zero, reflecting the typical behaviour of financial time series. Standard deviations suggest volatility in all series, particularly in BSE SENSEX and ASPI among the stock indices, and USD/LKR among the exchange rates. The distributions are highly non-normal, and it further confirms by extreme kurtosis and significant skewness. A strong positive skewness is observed in USD/LKR and negative skewness in BSE SENSEX and ASPI. The Jarque-Bera test strongly rejects normality for all variables at the 5% level of significance, confirming the presence of fat tails and asymmetry. These findings highlight the volatile and non-linear nature of the data and support the application of GARCH-family models, which are well-suited for modelling time-varying volatility.

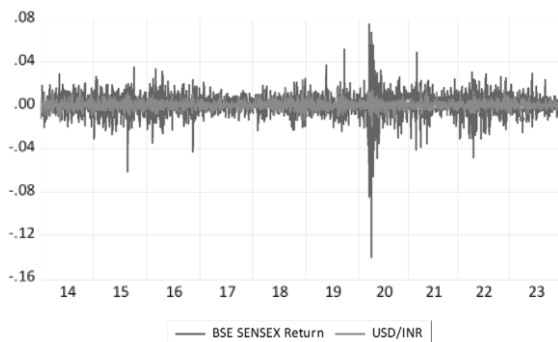
This is further confirmed by the Figures 1,2, and 3. The three plots display the co-movement of stock market returns and corresponding exchange rate returns for India (BSE SENSEX & USD/INR), Bangladesh (DSEX & USD/BDT), and Sri Lanka (ASPI & USD/LKR). Across all three countries, stock market returns show visibly higher volatility and more frequent extreme movements compared to exchange rate returns, which appear more stable and tightly clustered around the zero line. Stock markets of India and Bangladesh exhibit significant negative spikes during certain periods, highlighting abrupt market shocks. In contrast, exchange rate movements in India and Bangladesh are relatively smoother, suggesting managed or more stable currency regimes. However, according to the plot of Sri Lanka, it shows increased volatility in both series, particularly in the latter half of the period.

Table 2
Descriptive statistics

	BSE SENSEX	USD/INR	DSEX	USD/BDT	ASPI	USD/LKR
Mean	0.000448	0.000117	0.000152	0.000136	0.000231	0.000355
Median	0.000585	0.000000	0.000139	0.000000	0.000000	0.000000
Std.Dev.	0.011114	0.003349	0.008872	0.004441	0.010884	0.005883
Skewness	-1.288571	0.289981	-0.513840	1.805439	-0.458810	6.316851
Kurtosis	20.36495	6.104059	32.23665	59.86502	22.52929	144.2576
Jarque-Bera	32770.15	1060.307	91004.11	345229.1	40644.33	2138716.
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

(Source: Authors, based on survey results)

Figure 1
BSE SENSEX and USD/INR



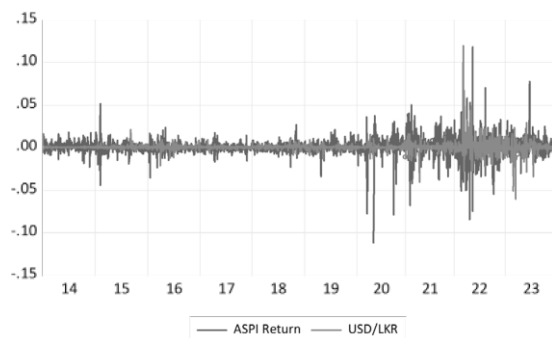
(Source: Author Compilation)

Figure 2
DSEX and USD/BDT



(Source: Author Compilation)

Figure 3
ASPI and USD/LKR



(Source: Author Compilation)

Stationarity test

According to the ADF test results summarised in Table 3, the p-value of all the series are less than the alpha value of 0.05, rejecting the null hypothesis of a unit root, confirming that all return and exchange rate series are stationary at 5% level of significance. Hence, the data do not exhibit a time-dependent trend or evolving variance, making them suitable for time series analysis such as Granger causality and GARCH modelling.

Table 3
Augmented dickey-fuller test results

Variable	t-Statistic	Probability
India Stock Return	-15.65071	0.0000
India Exchange Rate	-25.07979	0.0000
Bangladesh Stock Return	-18.53944	0.0000
Bangladesh Exchange Rate	-9.115256	0.0000
Sri Lanka Stock Return	-13.63197	0.0000
Sri Lanka Exchange Rate	-7.883570	0.0000

(Source: Authors, based on survey results)

Granger causality test

The results of the Granger causality test in Table 4, reveal distinct dynamics between exchange rate movements and stock returns. Accordingly, exchange rates significantly Granger causes stock returns in India by is rejecting the null hypothesis at 5% level of significance but there is no reverse causality was found, as stock returns do not Granger cause exchange rates. There is no significant causal relationship exists in either direction between exchange rate and stock market returns in Bangladesh. In contrast, Sri Lanka exhibits a significant bidirectional causality, with both exchange rate causing stock returns and stock returns causing exchange rate fluctuations. These findings underscore the country-specific nature of exchange rate and stock market interactions.

Table 4
Granger causality test results

Description	F-Statistic	Probability
India: Exchange Rate → Stock Returns	18.9121	7.E-09
India: Stock Returns → Exchange Rate	0.27755	0.7577
Bangladesh: Exchange Rate→Stock Returns	0.64906	0.5226
Bangladesh: Stock Returns→Exchange Rate	1.46491	0.2313
Sri Lanka: Exchange Rate→Stock Returns	6.76720	0.0012
Sri Lanka: Stock Returns→Exchange Rate	9.31020	9.E-05

(Source: Authors, based on survey results)

GARCH (1,1) model results

Table 5 summarizes the results of GARCH (1,1) model for the three countries in the study. As per the results coefficient of USD/INR and BSE SENSEX is significantly negative, implying that the exchange rate volatility has a significant negative impact on stock market volatility in India. Similarly, exchange rate volatility of Sri Lanka also exhibits a significant negative impact on its stock market volatility. However, the coefficient of DSEX and USD/BDT is negative but statistically insignificant. That is exchange rate volatility of Bangladesh impact negatively but insignificantly on its stock market volatility. Furthermore, for all three markets, both the ARCH and GARCH terms are positive and significant, with summation of values are close to 1 (India: $0.102 + 0.870 = 0.972$; Bangladesh: $0.095 + 0.917 = 1.012$; Sri Lanka: $0.116 + 0.896 = 1.012$). This indicates strong volatility persistence, that is past shocks continue to influence current volatility for extended periods. Such high persistence suggests that volatility clusters are prevalent in these markets, meaning periods of high volatility are likely to be followed by more volatility.

Table 5
Results of GARCH (1,1) model

	Exchange Rate	Exchange Rate (Mean)		GARCH (-1)		RESID (-1) ^2	
		Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
BSE SENSEX	USD/INR	-0.722328	0.0000	0.870093	0.0000	0.102119	0.0000
DSEX	USD/BDT	-0.029763	0.2278	0.916724	0.0000	0.094509	0.0000
ASPI	USD/LKR	-0.109487	0.0000	0.895984	0.0000	0.116379	0.0000

(Source: Authors, based on survey results)

Conclusion

Changes in the global financial and business environments have led to increase interest in the impact of exchange rate movements on stock market return volatility. The interconnection of currency fluctuations and stock market performance is especially crucial in emerging countries. This study examined the impact of exchange rate volatility on stock market volatility in three major South Asian economies: India, Bangladesh, and Sri Lanka, using daily data and GARCH (1,1) modelling. According to the results, there is a significant unidirectional causality from exchange rate to stock returns in India which reflects a market where currency movements are primarily driven by broader economic factors, while a significant bidirectional causality is found in Sri Lanka most likely as a result of its more open and smaller financial system, where investor sentiment and capital flows influence exchange rate and stock market movements. However, there is no causal link is found for exchange rate volatility and stock market volatility in Bangladesh. This may be due to strict capital controls, lower financial integration and limited foreign investment, which insulate its stock market from exchange rate volatility. The findings of GARCH (1,1) reveal that there is a statistically significant negative impact of exchange rate volatility on stock market volatility for India and Sri Lanka, indicating that depreciation in local currency adversely affects market performance. In contrast, the impact of exchange rate volatility on stock market volatility for Bangladesh is statistically insignificant, suggesting that the exchange rate plays a limited role in influencing its stock market returns. Moreover, GARCH (1,1) estimations demonstrated strong volatility persistence across all three markets, with the sum of ARCH and GARCH terms approaching one. This suggests that past shocks continue to influence current market volatility, a common characteristic in emerging financial markets. These results confirm that

financial markets in these economies are sensitive to volatility shocks, though the nature and strength of the relationship between exchange rates and stock returns vary by country.

These findings highlight the importance of maintaining currency stability, especially in markets like India and Sri Lanka where stock market performance is sensitive to exchange rate fluctuations. Policymakers in these countries should closely monitor currency movements and help investors manage exchange rate risk. To assist investors in managing risk, policymakers should consider about expanding derivative markets, strengthening exchange rate stability, and encouraging currency hedging tools. For Bangladesh, the weak linkage suggests a relatively insulated market, but continued monitoring is essential considering increasing global financial integration. Although Bangladesh's existing insulation protects the country from outside shocks, authorities should continue to be on the lookout and progressively be ready for further financial openness by strengthening regulatory frameworks and creating risk management mechanisms.

However, this study only focuses on the stock market indices and exchange rates, without accounting for other macroeconomic variables such as interest rates, inflation, or capital flows that may also influence market volatility. Additionally, the analysis is restricted to three countries and a specific time frame, which may limit the generalizability of the results. Future research could extend this analysis by considering the above-mentioned limitations.

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THE IMPACT OF FIRM ATTRIBUTES ON AUDITOR SELECTION: A STUDY OF LISTED COMPANIES IN SRI LANKA

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Abstract

This study examines the impact of firm attributes on auditor selection for companies listed on the Colombo Stock Exchange (CSE) in Sri Lanka, excluding the banking sector. Sri Lankan law requires all listed companies to appoint an independent auditor to audit their financial statements. This provides an opportunity to examine differences in auditor preferences where this decision makes a difference in the quality of the audit. This research aims to evaluate the impact of firm attributes on auditor selection and assess the relationship with the decision to select an auditor. The study uses a quantitative research method using secondary data from annual reports for the period 2019 to 2023. A binary logistic regression model is used to analyse the impact of profitability, Firm age, complexity, and leverage in auditor selection. The dependent variable is a binary indicator that distinguishes the Big 3 auditors from other auditors. Correlation analysis and logistic regression revealed significant relationships between firm attributes and auditor choice. Profitability and Complexity have a significantly positive impact on the selection of a Big 3 auditor, while leverage has a negative impact on this choice. Meanwhile, firm age does not show a significant impact on the choice of auditor. This study provides important insights into the impact of firm attributes on the demand for high-quality audits in an emerging market with mandatory audit requirements. The findings are important for regulators, enforcement agencies, and investors, as they identify the role of firm-specific factors in shaping the dynamics of auditor selection. The contribution of this research to the literature is in the extension of the understanding of audit choice determinants in a regulated market, emphasising the importance of empirical evidence derived from audited financial statements.

Keywords: Auditor selection, firm age, firm attributes, firm complexity

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Proceedings of the 16th International Conference on Business and Information - ICBI 2025 © 2025 by The Faculty of Commerce and Management Studies, University of Kelaniya, Sri Lanka is licensed under CC BY-SA 4.0.

DOI:

Introduction

The selection of auditors is an important aspect of corporate governance. Especially companies listed on the stock exchange. The type of auditor chosen can affect the quality of financial reporting and investors' confidence in a company's financial health. The auditor's choice is a strategic decision demonstrating the firm's dedication to transparency and superior financial reporting quality. The Big 4 audit companies have historically been regarded as the benchmark in auditing, owing to their international presence, substantial resources, and corresponding proficiency in managing intricate audits. However, recent developments within the market dynamics narrow down to, among others, the consolidation of PwC with Deloitte in this study's context, the Big 3 auditors to KPMG, EY, and Deloitte. A firm may decide on whether to select a Big 3 auditor or other auditors based on various firm-specific factors that determine the choice. The choice of auditor depends significantly on the firm's profitability. Firms perceived to be highly profitable are always scrutinised closely both by investors and the regulatory authorities for this reason, their audit processes must be more valid and strict. Studies have shown that more profitable companies are more likely to hire the services of Big 3 auditors since these auditors are perceived to have superior skills to provide a high level of assurance to investors and other stakeholders (Gul et al., 2009).

The high audit fees associated with Big 3 auditors are often justified by their higher credibility and investor trust. The complexity inherent in the scale of operations, geographic diversity, and financial reporting responsibilities of an entity underscores key factors driving auditor choices. The corporate landscape in Sri Lanka poses specific challenges and prospects regarding the selection of auditors. The CSE has a range of diversified companies from all sectors, each having its own auditing requirements. In this framework, the choice of auditors becomes a strategic decision reflecting compliance with regulatory requirements and ensuring greater accountability for a company. Previous studies on the selection of auditors have primarily centred on developed capital markets such as the United States, the United Kingdom, and Australia, where the structures of audit markets and regulatory frameworks are well-established (Francis & Wang, 2008; Knechel et al., 2016). In contrast, emerging markets like Sri Lanka have not been thoroughly researched, even though they feature distinct ownership structures, varying levels of enforcement, and unique corporate governance practices (DeFond & Zhang, 2014). This contextual variation underscores how the characteristics of firms may impact auditor selection in ways that differ from findings in more developed economies. This study would add to the auditor selection literature evidence on how firm-specific attributes such as profitability, age, complexity, and leverage affect the auditor selection decision between a Big 3 and other auditors. The methodological contribution of the study is the use of a custom-built binary logistic regression model for the quantitative approach in the study. This framework advanced the rigor of research into these relationships in a comprehensive model. From a practical perspective, the findings are relevant and useful for regulatory bodies, policymakers, audit committees, and corporate management of Sri Lanka.

Literature Review

The firm attributes

Firm attributes are those factors that considerably influence most business outcomes, including the choice of auditors. Such features include many aspects, such as the size of the entity, classification of the industry, frameworks of governance in place, and complications in operations. Knowing how these factors play their role in choosing auditors is vital to achieving audit quality and compliance. Total assets, revenue, or the number of employees commonly measure the size of a firm. Firm size significantly influences auditor selection since larger companies, due to their complexity and interest to the public, usually attract the attention of larger auditing firms (Singh et al., 2023). Also, a company's size is very often connected with operational complexity. Large companies have more diversified activities and possess a wider variety of financial instruments, which require auditors' special experience and expertise. Thus, the auditor selection process in larger organisations frequently entails evaluating the auditors' proficiency in managing complex accounting matters, including derivative instruments and foreign taxation (Darmawan, 2023).

Auditor selection can have a significant impact on financial reporting quality and compliance. The nature or industry in which the organisation is engaged is another critical factor that predisposes the choice of auditors. Almaharmeh et al. (2024) found that family-owned enterprises prefer to select auditors with whom they have relationships for the longest time and very close ones, since these would eventually have a great impact on their decision-making choices. Thus, these findings indicate that this reliance on long-term relations has raised problems regarding auditor independence, and an investigation of potential conflicts of interest is absolutely necessary. Transparency is also what helps ensure that auditors are selected based on merit and competence rather than personal connections (Carcello et al., 2011). Therefore, strong governance frameworks would contribute to creating public confidence in financial reporting and improving audit quality. Technology integration into businesses has an impact on the choice of an auditor. Companies utilising the latest technologies, such as artificial

intelligence and data analytics, would choose auditors who possess the ability to use these technologies to enhance the efficiency and effectiveness of audits (Alles, 2015).

Agency theory, Signalling Theory and their influence on auditor selection

The theoretical foundation of this study lies primarily in Agency Theory and Signalling Theory. Agency Theory offers a fundamental framework for comprehending the dynamics of auditor selection. In substantial organisations, the separation of ownership from management may result in conflicts of interest, especially when managers prioritise personal objectives over the interests of shareholders. This conflict increases when management manipulates financial statements to create a positive image, possibly damaging to shareholders (Chow, 1982). Guedhami et al. (2013) emphasise that enterprises with political connections frequently select Big 4 auditors to enhance their transparency and credibility, thereby mitigating concerns that political views could result in mismanagement or the improper use of company resources. This finding is consistent with Agency Theory, which posits that firms select highly qualified auditors to reassure external investors about the reliability of their financial disclosures. The Signaling Theory suggests that companies communicate their quality to stakeholders through observable behaviours (Spence, 1973). Choosing a well-regarded auditor acts as a positive indication to investors and regulators regarding a firm's dedication to high-quality reporting and corporate governance (Titman & Trueman, 1986; Knechel et al., 2016). Together, these theoretical frameworks support the study's hypotheses that both profitability and complexity have a favourable impact on the selection of a Big 3 auditor, whereas leverage has a detrimental effect due to cost considerations.

Methodology

Data and variables

The data used in this study was secondary data from the annual reports, which were obtained from publicly available and reliable sources of companies listed in CSE 2019-2023. Therefore, the analysis period extends from 2019 to 2023, offering a five-year framework for assessing trends in auditor selection. Such a dataset creates a powerful basis for analysis and can correctly reflect the specific characteristics of firms. The target population of this study will include all firms listed in CSE from 2019 to 2023, excluding firms in the banking sector. The banking sector will be excluded from this work on the assumption that banks are mainly audited by the Big 3 auditors, and their inclusion might introduce bias into the analysis. The study encompasses the complete population of non-banking companies listed on the CSE, resulting in an effective sample of approximately 260 firms, therefore eliminating the need for sampling. The use of demographic data ensures representativeness and generalisation to the whole population of companies in Sri Lanka. The inclusion and exclusion criteria were established to guarantee the dependability and accuracy of the statistical analysis. By concentrating solely on non-banking publicly listed companies with comprehensive financial disclosures, the research avoids biases linked to regulatory requirements regarding auditor appointments and inconsistencies due to missing data. This methodology enables the results to better represent decision-making at the firm level with respect to auditor selection, rather than being influenced by industry-specific factors or compliance-related issues. As the study assesses the entire population, its biases related to sample selection are eliminated, along with a far better understanding of the determinants affecting the auditor selection.

Dependent variable

Auditor choice: It is a widely used measure to explain how companies trade off the relative importance of audit quality and cost, together with reputation, in decisions about auditors. The data analysis in this study applies to binary logistic regression, where the choice of auditor is either Big 3 auditor or other auditor as the dependent variables.

Independent variable

This study focuses on four independent variables profitability, firm age, complexity, and leverage that are expected to impact on the auditor choice, which has been dichotomised as a Big 3 auditor or other auditors. The variables profitability (measured by ROA), leverage, firm age, and complexity were selected based on agency theory, which emphasizes that audits serve as a monitoring mechanism to alleviate conflicts between principals (e.g., shareholders and creditors) and agents (e.g., managers), thereby reducing agency costs arising from information asymmetry and moral hazard (Jensen & Meckling, 1976). The reason is, the independent variable profitability has been added in the framework to test if the financially successful firms choose Big 3 reputed audit firms, just to ensure credibility and stakeholder trust. Less profitable firms may not mind saving on costs and, therefore, could be more willing to choose smaller audit firms. Another important variable is that of the firm's age. Older, well-established firms may desire Big 3 auditors because of their experience and perceived assurance of audit quality. Younger firms, still focusing on managing growth and costs, may desire less expensive, smaller

auditors. The variable Complexity is a proxy for the complexity of the operations of a firm. The complexity is usually proxied by the number of subsidiaries, joint ventures, and associates. Firms with higher complexity may require a greater degree of audit expertise, which, generally, Big 3 auditors are better equipped to provide. Finally, leverage is considered to be the debt-to-total assets ratio, and it is also considered to be an influencing factor.

Model specifications

This study tries to explain the auditor selection methods in Sri Lankan listed companies by analysing the influence of these variables. In this regard, a quantitative research approach is utilised whereby binary logistic regression and regression analysis are applied to analyse the associations of factors with the stated outcome of auditor selection. The basis for the choice of binary logistic regression is to model the probability that a company will choose a Big 3 auditor, given its characteristics. It predicts how business qualities impact the likelihood of choosing a Big 3 auditor, a common method in auditor choice studies, and gets beyond the linearity and normalcy issues that Ordinary Least Squares has. This paper investigates the relationship between firm attributes and the choice of auditors by applying a regression model. Using a regression model, this study tries to assess the effect that independent variables return on assets (ROA), firm age (AGE), firm complexity (COMPLEX), and leverage (LEV) would have on the likelihood of choosing Big 3 auditors or other auditors (AUDIT).

The standard representation of the regression equation is,

$$Audit_i = \beta_0 + \beta_1 ROA_i + \beta_2 AGE_i + \beta_3 COMPLEX_i + \beta_4 LEV_i + \epsilon_i$$

- Audit_i is the dependent variable indicating the firm's choice of a Big 3 auditor or other auditors (1 for Big 3, 0 for another auditor).
- ROA_i is the Return on Assets for firm i, quantifying its profitability.
- AGE_i denotes the number of years since the incorporation of firm i, signifying its age.
- COMPLEX_i denotes the complexity of firm i, quantified by the count of subsidiaries or business segments.
- LEV_i denotes the leverage of firm i, quantified by the debt-to-total-assets ratio.
- $\beta_0, \beta_1, \beta_2, \beta_3, \beta_4$ are the coefficients that indicate the strength and direction of the association between the independent variables and the dependent variable.
- ϵ_i (the error term) signifies all additional factors influencing auditor selection that are not accounted for by the independent variables. This word represents the random variance or unaccounted components within the model.

This equation predicts the likelihood of a company selecting a Big 3 auditor based on its profitability (ROA), age, complexity, and leverage. The error term ϵ_i signifies the discrepancy between actual and projected auditor selections, attributable to additional factors excluded from the model.

Findings and Discussion

Descriptive analysis

The analysis of all variables using descriptive statistics for the years 2019 to 2023 is shown in Table 1.

Table 1
Descriptive statistics

Variable	Mean	Min	Max	Median
ROA	0.036920	-0.308667	0.407190	0.027555
COMPLEX	3.849612	0.000000	52.00000	1.000000
LEV	0.418282	0.000143	1.469140	0.412481
AGE	1.562014	0.903090	2.195900	1.568202

Note(s): ROA: Return on Assets, COMPLEX: Number of subsidiary joint ventures and associates, LEV: Total debt-to-total assets, AGE: Company age.

(Source: EViews Output)

Descriptive statistics reveal considerable financial and operational diversity among non-banking firms listed on the Colombo Stock Exchange. Average profitability (ROA) is 3.7%, ranging from Ceylon Tobacco PLC's 40.7% to Colombo Dockyard PLC's -30.9%, with higher ROA firms more likely to select Big 3 auditors to signal strength, while lower ROA firms may opt for lower-cost audits. Organisational complexity (mean = 3.85 subsidiaries/joint ventures/associates) varies widely, with conglomerates such as John Keells Holdings PLC and Aitken Spence PLC having 52 subsidiaries; such complexity often leads to Big 3 auditor engagement for their expertise in complex consolidations. Average leverage is 41.8%, with highly leveraged firms tending to choose Big 3 auditors to enhance stakeholder confidence, whereas low-leverage firms may avoid the higher costs. Firm age (log mean = 1.56) spans both young and long-established companies, with older firms more inclined toward Big 3 auditors for credibility and compliance, while younger firms often choose smaller auditors due to budget and regulatory constraints.

Normality Test

Table 2
Normality test

Labels	Normality	
	Skewness	Kurtosis
ROA	0.636243	5.647337
COMPLEX	3.925936	23.19713
LEV	0.286940	2.204917
AGE	0.004574	3.105763

Note(s): ROA: Return on Assets, COMPLEX: Number of subsidiary joint ventures and associates, LEV: Total debt-to-total assets, AGE: Company age.

(Source: EViews Output)

In normality evaluation, the values of skewness and kurtosis provide useful information about how the individual independent variable is normally distributed. The normality can be sufficiently approximated within the range from -2 to +2 for the value of skewness and from -7 to +7 for the value of kurtosis, as specified in the guideline (Binti Yusoff & Bee Wah, 2012). Within this research study, variables ROA, LEV, and AGE are within satisfactory ranges, considering skewness values of 0.636, 0.287, and 0.004, respectively, with kurtosis values of 5.647, 2.205 and 3.105. These statistical attributes point out that both variables are very close to being normally distributed and are ready to undergo any other statistical analysis as they are.

However, Complexity, as measured by the number of subsidiaries, joint ventures, and associates, has a skewness of 3.926 and kurtosis of 23.197, both far beyond the acceptable limits. The reason for this lack of normal distribution might be the impact of a few highly complex firms that raise the upper limit, while most of the companies have much simpler organisational structures. Such skewed distributions may affect auditor choice because highly complex clients typically request Big 3 auditors who have the resources to address complex audit needs. In this study, the dependent variable will be binary, showing the choice of auditor selection. When data is binary, testing for normality is not necessary because its binary nature automatically restricts the distribution characteristics. More importantly, focusing on normality for independent variables raises greater robustness of the subsequent regression models in providing reliable insights into how profitability, complexity, leverage, and age relate to auditor choice.

Correlation analysis

Table 3

Correlation matrix

Variables	AUDIT	ROA	LEV	COMPLEX	AGE
AUDIT	1	0.103928	-0.124604	0.146887	0.023995
ROA	0.103928	1	-0.262614	0.020684	0.058090
LEV	-0.124604	-0.262614	1	0.004037	-0.150450
COMPLEX	0.146887	0.020684	0.004037	1	0.175818
AGE	0.023995	0.058090	-0.150450	0.175818	1

Note(s): AUDIT: Auditor selection (Big3 auditor or other auditor) ROA: Return on Assets, COMPLEX: Number of subsidiary joint ventures and associates, LEV: Total debt-to-total assets, AGE: Company age.

(Source: EViews Output)

The correlation matrix reveals only weak relationships between auditor selection (AUDIT) and firm-specific factors. Profitability (ROA) shows a slight positive correlation (0.1039), while leverage (LEV) has a weak negative correlation (-0.1246), suggesting more leveraged firms may avoid Big 3 auditors to reduce costs. Complexity (COMPLEX) has the strongest, though still weak, positive correlation (0.1469), indicating that firms with more complex operations are somewhat more likely to hire Big 3 auditors. Company age (AGE) shows almost no relationship (0.0240), implying that auditor choice is largely independent of firm age.

Regression Analysis

Table 4

Binary logistic regression

Variables	Coefficient	Probability
ROA	2.286740	0.0102
COMPLEX	0.164062	0.0000
AGE	-0.398909	0.2651
LEV	-0.963002	0.0006
McFadden R-squared	0.068222	
LR statistic	77.74846	
Prob (LR-statistic)	0.000000	

(Source: EViews output)

The study finds that profitability (ROA) and complexity significantly and positively influence auditor selection, aligning with prior research that financially strong and operationally complex firms tend to hire Big 3 auditors for credibility and expertise. Leverage shows a significant negative relationship, suggesting highly leveraged firms opt for lower-cost auditors, consistent with agency theory. In contrast, company age is insignificant in predicting

auditor choice, differing from earlier studies but reflecting Sri Lanka's unique market dynamics, where cost, regulation, and local conditions may outweigh reputation. These findings are consistent with earlier research, although they are influenced by Sri Lanka's unique circumstances, including its high levels of post-crisis debt, conglomerate structure, and requirement for foreign investment.

Big 3 auditor selection is positively impacted by profitability and complexity, which is consistent with research by DeFond and Zhang (2014), Knechel et al. (2008), and Piot and Janin (2007). These consequences are more pronounced in Sri Lanka because of the need to draw in foreign investment and the predominance of conglomerates. While the insignificance of firm age contrasts with Kyriakou and Dimitras (2019), Sri Lankan firms prioritise current financial performance over historical reputation, and the negative impact of leverage support by reflecting heightened cost sensitivity amid high debt levels. The logistic regression analysis shows significant relationships between firm attributes and the likelihood of selecting a Big 3 auditor. The McFadden R^2 of 0.06822 indicates that 6.8% of the variance in auditor selection is explained. R-square is not a reliable indicator for the assessment of goodness-of-fit in panel data models. In the cross-sectional and panel data, the R-square value tends to be lower as compared to time-series data. The low value of R-square in panel data arises because of the presence of heterogeneity across the cross-sections. Therefore, in panel data analysis, greater reliance could be placed on the individual significance of the variables and the overall significance of the model. Hence, this study will concentrate on the overall significance and the individual significance of each independent and control variable rather than solely on R-square. The overall significance of the model is reflected in the LR statistic, which is 77.74846, and a probability value of 0.000000.

Conclusion

This study investigates the influence of firm attributes on auditor selection among all listed companies in Sri Lanka, excluding the banking sector, for the period 2019-2023. One important gap in the literature was identified, especially related to how those attributes influence auditor choice across various industries in Sri Lanka. This study fills this gap by considering all the nonbanking listed firms, as banks are uniformly audited by Big 3 firms, giving a proper overview of auditor selection dynamics in the country's corporate sector. The regressions tested the following specific hypotheses regarding the influence of profitability, leverage, company age, and complexity on auditor selection, the results confirm that the profitability, complexity, and leverage factors significantly affect the auditor choice, while age has no substantial impact. Results are important for firms, policymakers, and auditors to understand the auditor selection process in the Sri Lankan context. The study's limitations include its exclusive reliance on secondary data from annual reports, its exclusion of the banking industry, and its exclusive focus on data from 2019-2023. Bias may result from the omission of unobserved variables when using a binary logistic model. Furthermore, the results could not apply outside of Sri Lanka's particular regulatory and economic context. Investors should consider these insights when assessing the quality of governance and risk profiles of companies. These findings suggest that, in formulating policy, factors driving auditor choice across industries are recognised and policy is drawn up that creates incentives for firms to choose auditors based on audit quality, especially in high-risk sectors. Fostering a regulatory environment to encourage the selection of reputed auditors will help policymakers in enhancing corporate governance and transparency and increasing investor confidence in all listed companies across Sri Lanka. Therefore, it's obvious that to increase openness and stakeholder trust, managers should use complexity and profitability as justifications for hiring Big 3 auditors. To improve governance and investor trust in Sri Lanka, auditors can address cost issues connected to leverage to draw in debt-heavy companies, and regulators can provide incentives for high-quality audits in lucrative and complicated industries. Future studies could expand by contrasting Sri Lanka with other developing markets and adding elements like ownership and board composition. Deeper, industry-specific insights might be obtained by extending the time frame, incorporating qualitative techniques, and examining the banking industry.

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IMPACT OF FINANCIAL LITERACY AND GENDER ON INVESTMENT INTENTION OF UNDERGRADUATES: WITH SPECIAL REFERENCE TO FINAL YEAR, FINANCE UNDERGRADUATES IN WESTERN PROVINCE STATE UNIVERSITIES

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Abstract

In a volatile emerging economy like Sri Lanka, cultivating an investment culture among educated youth is a national imperative. This study addresses a critical empirical gap by investigating the determinants of investment intention in this unique context, moving beyond research from stable, developed nations. It focuses on final-year finance undergraduates, a litmus test group, to explore whether intensive, specialised education can reduce traditional gender differences in financial attitudes, a question that has not been answered in the region. We conducted a quantitative survey with 150 finance undergraduates from state universities. We gathered data using a structured questionnaire with adapted validated scales and analysed it with a multiple linear regression model to test the study's hypotheses. The regression analysis yielded a strong model ($F(1,148) = 227.456$, $p < .001$), accounting for 60.3% of the variance in investment intention (Adjusted $R^2 = 0.603$). The findings showed that financial literacy is a strong and significant positive predictor of investment intention ($\beta = 0.741$, $p < .001$). In contrast, gender did not have a statistically significant impact ($p = .886$). The most important contribution of the study is the clear evidence that specialised financial education can make gender an irrelevant factor in investment intention among a highly educated group. This suggests that the often-cited gender gap in investment may stem from knowledge and confidence issues rather than being an inherent trait. These results offer a clear recommendation for policymakers: to create a new generation of informed investors, policies should focus on practical, inclusive, and gender-neutral financial literacy programmes.

Keywords: Financial literacy, gender, investment intention, Sri Lanka, undergraduates

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Proceedings of the 16th International Conference on Business and Information - ICBI 2025 © 2025 by The Faculty of Commerce and Management Studies, University of Kelaniya, Sri Lanka is licensed under CC BY-SA 4.0.

DOI:

Introduction

Financial literacy is a crucial skill for navigating today's complex financial landscape. It involves the knowledge, abilities, and mindset required to manage personal finances effectively (Mandell, 2008). The key areas include budgeting, saving, investing, and risk management (Dwiastanti, 2017). This knowledge provides individuals with the tools to make informed decisions and secure their financial futures (Chen & Volpe, 1998; Dwiastanti, 2017).

As Sri Lanka's future workforce, university undergraduates are crucial to the country's economic development. Financial literacy enables individuals to manage their finances effectively and make informed investment choices. This capability supports economic growth and job creation (World Bank, 2020). However, despite Sri Lanka's high overall literacy rate of 93.63% (World Bank, 2022), only 57.9% of adults are financially literate, and among graduates, this drops to a concerning 14.9% (Central Bank of Sri Lanka, 2021). This gap between financial knowledge and its practical application is a challenge that this study aims to address (Hastings & Mitchell, 2011; Yusoff et al., 2016).

Gender is also a significant factor affecting financial behaviour and investment intentions (Lusardi & Mitchell, 2008). Studies reveal a gender gap in financial literacy and investment choices (Hanna & Lindamood, 2010; Pytkkanen & Smith, 2015). In Sri Lanka, women have historically faced challenges in accessing financial resources. A 2022 Central Bank survey revealed that male financial literacy scores were slightly higher than those of females (CBSL, 2021). Since women represent the majority of undergraduates (UGC, 2019), it is crucial to understand how gender influences investment intentions in a society striving for gender equality and financial inclusion (Bucher-Koenen et al., 2017).

This study tackles a significant empirical gap in behavioural finance literature. While there are strong theoretical links between financial literacy and investment intention, there is little empirical evidence to support these theories in two key, under-examined situations. First, there is a lack of data from the unique economic environment of Sri Lanka, a volatile emerging market where investment behaviours may differ from stable, developed economies. Second, and more importantly, the current theories have not been adequately tested on the group of final-year finance undergraduates. This group has the highest level of financial education among their peers, yet there is limited data on their investment intentions. As a result, the important question of whether intensive education can reduce traditional gender-based differences in financial attitudes remains unverified in this region. This study addresses this gap by providing the first focused, empirical evidence at this important intersection, thus testing established theories in a new and relevant context.

Despite Sri Lanka's relatively high literacy rate, only 57% of adults are financially literate according to a Central Bank survey. While undergraduates aged 18-24 have a decent financial literacy rate of 12.81%, their actual investment behaviour is quite low.

Table 1
Financial literacy score by age group

Age group	Financial knowledge score	Financial attitude score	Financial behaviour score	Overall financial literacy score
18-29	5.33	2.85	4.63	12.81
30-59	5.08	2.65	4.59	12.31
60 and above	4.63	2.49	3.91	11.04

Source: Central bank (2022)

This research examines a knowledge gap in understanding how university students utilise financial literacy. Despite having basic knowledge, many students struggle to apply this knowledge to real-life investment and risk management actions (Central Bank of Sri Lanka, 2021; Yusoff et al., 2016). The impact of financial literacy education on investment intentions remains understudied (Duflo & Saez, 2003; Hastings & Mitchell, 2011; Lusardi & Mitchell, 2011). Additionally, some studies highlight gender differences in investment strategies (Jayasooriya & Perera, 2016). Other research suggests that financial knowledge plays a larger role than gender alone. This study will explore how these variables interact among Sri Lankan undergraduates.

The results of this study make important contributions to both practice and theory. In practice, the data on undergraduate investment intentions is vital for policymakers and educators in Sri Lanka. It addresses low financial literacy and supports economic stability by promoting youth investment (Central Bank of Sri Lanka, 2021). Moreover, the research enhances social equity by examining gender differences and contributing to the development of inclusive financial education programs. In theory, this study is essential for broadening the limited research on the connection between financial literacy and gender, particularly in developing economies.

Literature Review

This literature review lays the groundwork for the study by examining the links between financial literacy, gender, and investment intentions. It aims to identify current knowledge and highlight the gaps this research will address, thereby contributing to discussions on promoting financial well-being and gender equality. The conceptual framework is based on the sub-variables of financial knowledge, skills, and attitudes.

Financial literacy and its impact

Financial literacy refers to the knowledge, skills, and attitudes needed for effective financial decision-making (OECD, 2005). Research indicates a strong, positive correlation between financial literacy and personal financial well-being (Lusardi & Mitchell, 2014). Higher education and income levels are often linked to better financial knowledge (Hastings et al., 2013; Lusardi & Mitchell, 2014). This leads to more responsible financial behaviours such as managing debt wisely (Chen & Volpe, 1998), using credit effectively, and planning for the future, including retirement savings (Lusardi & Tufano, 2009). The field has also integrated behavioural economics, examining how to manage biases to improve savings (Thaler & Benartzi, 2004) and how socioeconomic factors, such as gender, affect financial knowledge (Lusardi & Mitchell, 2011).

Gender and its social influence

Gender is a social construct that includes roles, behaviours, and expectations (Krieger, 2003). Cultural norms and values significantly shape these gender roles (Eagly & Johnson, 1990). Gender impacts various areas, from family responsibilities to career dynamics and ongoing discrimination in workplaces as well as educational imbalances (Buchmann & DiPrete, 2006). In leadership and entrepreneurship, Social Role Theory suggests that gender influences leadership styles and presents unique challenges for women, such as biases in securing venture capital (Eagly & Johnson, 1990). Research also highlights the ongoing struggle for work-life balance, which affects both genders but often places a greater burden on women (Williams & Boushey, 2010). There are also gender gaps in technology use, which influence digital participation (Hargittai & Shafer, 2006).

Investment intention and its drivers

Investment intention is a person's deliberate plan to invest money to achieve financial goals (Kahneman & Tversky, 1979). It is affected by risk tolerance, financial knowledge, and income (Fernandes et al., 2014). A higher risk tolerance usually aligns with bolder investment strategies. In a broader economic context, investment intention is crucial for financial well-being and economic growth, particularly in emerging economies such as Sri Lanka (Central Bank of Sri Lanka, 2021). Studies from countries such as India and Poland demonstrate that enhancing financial literacy is crucial for boosting investment (Babu & Reddy, 2014). An individual's investment intention is a strong indicator of future financial behaviour (Lusardi & Tufano, 2015; Van Rooij et al., 2011), as clear goals lead to better resource management.

Interplay of financial Literacy, gender, and investment intention

Financial literacy significantly predicts investment behaviour, showing a positive link between financial knowledge and investment participation (Lusardi & Mitchell, 2006; Hung et al., 2009). This holds true in Sri Lanka, where financial literacy programs have effectively influenced investment behaviour, especially among students (Jayasooriya & Perera, 2016). The relationship is complex; some studies indicate that increased financial knowledge can lead to a more cautious, risk-averse approach to investing as individuals become more aware of risks (Van Rooij et al., 2011).

Gender is another critical factor affecting investment intentions. In many societies, including Sri Lanka, cultural norms have traditionally assigned different financial roles to men and women, resulting in gender differences in investment choices. Women often prefer more conservative investments, which reflects a higher risk aversion. However, as women gain more opportunities, these gender-based differences are decreasing (Fernando & Abeysekera, 2016). Research suggests that financial literacy can effectively bridge this gap, as financial education seems to empower women (Hastings & Mitchell, 2011).

Theoretical frameworks

The research is guided by two main theories:

Theory of Planned Behaviour (TPB): Ajzen (1991) explains that intention is influenced by attitude, subjective norms, and perceived behavioural control. Within this framework, financial literacy plays a crucial role in perceived behavioural control. It boosts an individual's confidence and ability to make informed investment choices (Hastings et al., 2017). A positive attitude and a strong perceived sense of control influence the intention

to invest (Kim & Smith, 2018). The TPB is also helpful for examining how gender affects investment intention, as financial literacy can empower women, narrowing gender gaps (Brown & Kim, 2019).

Social Role Theory (SRT): According to SRT (Eagly, 1987), social roles and expectations shape behaviour. Applying this to investment, individuals in roles that promote financial independence, like entrepreneurship, may have a stronger intention to invest (Silva & Fernando, 2018). In contrast, those in traditional roles may be more cautious. SRT also suggests that societal views of masculinity and femininity can lead to different investment patterns, with men expected to take more risks than women. The effect of SRT can vary by cultural context; in collectivist societies, cultural norms may encourage family-oriented financial responsibility. This framework is well-suited for understanding how gender roles relate to investment intentions among a specific group, like undergraduates.

Methodology

The study used a Proportionate Stratified sampling method, organised by gender according to the University Grants Commission's 2018/2019 report, which indicated a 64% female and 36% male enrolment. In this study, the sample size is selected from the target population of 539 final-year finance undergraduates in Western Province state universities in 2023. The sample size of this study comprises 225 undergraduates from the final year, majoring in finance, from the University of Kelaniya, University of Colombo, University of Sri Jayawardanapura, and University of Moratuwa. The sample size is undergraduates, calculated with a 95% confidence level and a margin of error of 6.85% using the sample size calculator (2023). Although the calculated sample size was 225, we collected 150 responses. The sampling frame included all individuals in the target population (Creswell, 2014).

Investment intention is the dependent variable. It refers to a person's planned willingness to invest financial resources for returns or specific financial goals (Kahneman & Tversky, 1979). It is an important factor in actual investment behaviour and is vital for financial decision-making and wealth building (Hanna & Lindamood, 2010). This study considers this variable crucial for an undergraduate's financial future.

The independent variables are financial literacy and gender. Financial literacy includes the knowledge, skills, and attitudes necessary for making informed financial decisions (OECD, 2005). The study looks at three areas: Financial Knowledge (understanding basic concepts such as interest rates and inflation) (Fernandes et al., 2014), Financial Skills (applying knowledge to everyday decisions) (Lusardi & Mitchell, 2011), and Financial Attitudes (beliefs and feelings about finances) (Hastings & Mitchell, 2011). Gender is defined as a social construct involving roles and expectations (Krieger, 2003). In Sri Lanka, gender norms are shaped by traditional values. Research suggests that Sri Lankan women might favour safer investments due to being more risk-averse.

A structured questionnaire has been developed in this study to measure the independent variables of Financial Literacy and Gender, along with the Dependent variable of Investment intention. This has been developed based on previously validated studies to ensure the accuracy of the survey. In operationalisation, financial literacy is considered under its three main components: Financial Knowledge, Financial Skills, and Financial Attitudes, each considered separately. In order to measure Financial Literacy, a scale developed by referring to OECD/INFE, International Survey of Adult Financial Literacy (2020) is used in the form of a five-point Likert scale. This special toolkit is designed to measure, collect, and compare the financial literacy of different countries worldwide. To measure Investment intention, a scale developed by Mayfield et al. (2008) in their study on Investment Management and Personality Type is used, in the form of a five-point Likert scale.

From the existing literature, two hypotheses were developed:

H1: There is a significant relationship between financial literacy and investment intention among final-year finance students in the Western Province of Sri Lanka. (Lusardi & Mitchell, 2008).

H2: There is a significant relationship between gender and investment intention among final-year finance students in the Western Province of Sri Lanka. (Graham and Kumar, 2006).

Multiple linear regression (MLR), a component of inferential data analysis, is used to model the relationship between a dependent variable and two or more independent variables (Field, 2013). It allows researchers to analyse the impact of multiple predictors on the outcome variable, unlike simple linear regression, which involves only one predictor variable. The model is expressed as;

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \epsilon$$

where Y is the dependent variable, X values are independent variables, β_0 is the intercept, β_1 , β_2 , ..., β_n are the regression coefficients, and ϵ is the error term. It involves estimating the regression coefficients, assessing their

significance, and evaluating the overall fit of the model using techniques like analysis of variance (ANOVA) or the coefficient of determination (R-squared). MLR is used in various study fields, including economics, social sciences, and natural sciences, and enables researchers to analyse complex relationships and make predictions based on multiple factors (Kutner et al., 2004).

Findings and Discussion

Initially, an explanatory data analysis is carried out through a data cleansing process, where missing data and outliers are removed from the responses. Secondly, assumptions are tested, and the goodness of the data is measured through validity and reliability tests. Next, exploratory data analysis and descriptive data analysis were conducted. Finally, inferential data analysis is conducted, and hypotheses are tested to interpret the study's results.

Summary statistics: The summary statistics for the dependent, independent, and control variables are presented in Table 2.

Table 2

Descriptive statistics: Normality - Skewness and Kurtosis

			Statistic	Std. Error
FINLI	Mean		3.91	.041
T	95% Confidence Interval for Mean	Lower Bound	3.83	
		Upper Bound	3.99	
	5% Trimmed Mean		3.92	
	Median		4.00	
	Variance		.235	
	Std. Deviation		.485	
	Minimum		3	
	Maximum		5	
	Range		2	
	Interquartile Range		1	
	Skewness		-.410	.205
	Kurtosis		-.328	.407
INVINT	Mean		3.75	.056
	95% Confidence Interval for Mean	Lower Bound	3.64	
		Upper Bound	3.86	
	5% Trimmed Mean		3.76	
	Median		3.67	
	Variance		.444	
	Std. Deviation		.667	
	Minimum		2	
	Maximum		5	
	Range		3	
	Interquartile Range		1	
	Skewness		-.149	.205
	Kurtosis		-.614	.407

(Source: Author's compilation)

The descriptive statistics for gender, financial literacy, and investment intention provide important insights into the characteristics of the sample. The mean scores show that, except for gender, all variables scored above 3 on a 5-point scale. This suggests a general trend toward higher scores among respondents. The mean gender value is 1.28, with a median of 1 and a low standard deviation of 0.450. This indicates a notable skew in the sample, where most respondents were female (coded as 1). This is reflected in the high concentration of data around this number.

Financial literacy among the undergraduates seems to be relatively high, with a mean score of 3.91 and a median of 4. This suggests that many in the sample have a strong understanding of financial concepts. However, the moderate standard deviation of 0.485 shows there is some variability in the scores, meaning there is a range of financial literacy levels within the group.

For Investment Intention, the mean score is 3.75, with a median of 3.67. This points to a moderate level of investment intention among finance undergraduates. The standard deviation of 0.667 is also moderate, suggesting a significant spread of scores around the average. This variability may stem from different individual attitudes and preferences toward investing. The gap between high financial literacy and moderate investment intention suggests that while the undergraduates have the knowledge, their willingness to invest might be affected by other factors not included in this measure.

Table 3
Multicollinearity

Model	Coefficients ^a					Collinearity Statistics	
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Tolerance	VIF
1 (Constant)	.831	.439		1.894	.060		
Gender	.016	.108	.011	.144	.886	.974	1.026
FINLIT	.741	.100	.539	7.384	.000	.974	1.026

(Source: Author's compilation)

According to the significance values in the coefficient table, it can be concluded that the gender of final-year finance university undergraduates does not significantly predict or explain variations in investment intention, leading to the rejection of the hypothesis. However, the significance value in financial literacy is substantial, predicting a positive relationship that supports the accepted hypothesis. Therefore, the regression equation for this study will be,

$$\text{Investment Intention} = 0.831 + 0.741 \times \text{FINLIT} + \varepsilon$$

The findings revealed that financial literacy emerged as a statistically significant predictor, with a positive coefficient of 0.741 ($p = 0.000$), indicating that, on average, a one-unit increase in financial literacy is associated with a 0.741-unit increase in investment intention, while holding other variables constant. However, gender did not exhibit a significant relationship with investment intention ($p = 0.886$), and thus was excluded from the final model. The overall model demonstrated statistical significance ($p = 0.000$), indicating that financial literacy plays a pivotal role in shaping the investment intentions of finance undergraduates, aiming to enhance their future investment decisions.

Table 4
Regression analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.537 ^a	.289	.278	.566

a. Predictors: (Constant), FINLIT, Gender

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17.832	2	8.916	27.814	.000 ^b
	Residual	43.917	137	.321		
Total		61.749	139			

a. Dependent Variable: INVINT

b. Predictors: (Constant), FINLIT, Gender

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.831	.439		1.894	.060
	Gender	.016	.108	.011	.144	.886
	FINLIT	.741	.100	.539	7.384	.000

a. Dependent Variable: INVINT

(Source: Author's Compilation)

This study employs a multiple linear regression model to predict the dependent variable based on multiple independent variables and has successfully met the prerequisites and assumptions of multiple linear regression. The R Square represents the proportion of the variance in the dependent variable of investment intention (R^2) that

can vary by the independent variables of financial literacy and gender. The R^2 of 0.289 implies that 28.9% of the variability in investment intention is accounted for by the financial literacy and gender included in the model. At the same time, the significance level (p-value) in the AVOVA table displays a.000 b indicating that the overall regression model is statistically significant, where at least one of the predictors is contributing significantly to the prediction of investment intention. Additionally, according to the coefficient table, the significance value (p-value) for the constant is 0.060, which is greater than the conventional significance level of 0.05, suggesting that the constant (intercept) is not statistically significant. This indicates that the estimated investment intention, when all predictor variables are zero, is not significantly different from zero. The causation of this is due to the significance of gender being 0.886, which is higher than the acceptance criteria it indicates that there is no statistically significant relationship between gender and investment intention. However, the significance of financial literacy was displayed as 0.000, indicating that financial literacy is highly statistically significant in predicting the investment intentions of university undergraduates. Refer to Table 4 for the results of the regression analysis.

Conclusion

This study adds to the understanding of financial literacy and investment intentions among Sri Lankan undergraduates. The findings underscore the crucial role of financial literacy in influencing investment decisions. The substantial influence of financial literacy on investment intentions, as indicated by the study, highlights the importance of incorporating targeted financial literacy programs into university curricula. This aligns with existing research suggesting that improved financial literacy is associated with more informed financial decision-making (Kutner et al., 2004). The integration of comprehensive financial education initiatives can empower students with the necessary skills to navigate complex financial landscapes, fostering a generation of financially savvy individuals capable of making well-informed investment decisions. In light of the non-significant impact of gender on investment intentions, there is a need for gender-neutral financial education programs. While gender differences in financial decision-making have been explored in various contexts, the findings of this study suggest that, among the sampled university undergraduates in Sri Lanka, gender does not significantly influence investment intentions. Consequently, financial literacy initiatives should be designed to cater to the diverse needs of all undergraduates, irrespective of gender, ensuring equitable access to financial knowledge.

Moreover, considering the moderate level of investment intention among the sampled undergraduates, universities and policymakers may benefit from fostering a culture of investment awareness and engagement. Creating platforms for students to access information, workshops, and practical experiences related to investment can help grow financial markets and increase students' confidence in actively participating in investment activities. This aligns with the broader goal of promoting financial well-being and economic empowerment among university students.

As a part of future research actions, a deeper exploration of the specific components of financial literacy that exert the most influence on investment intentions can provide more targeted insights. This could involve examining the impact of knowledge in areas such as investment instruments, risk management, and financial goal setting on students' investment decisions. Additionally, investigating other potential factors that may influence investment intentions, beyond those considered in this study, could further enrich the understanding of the complex relationship of variables in financial decision-making among undergraduates in Sri Lanka.

In summary, the study's recommendations emphasise the importance of adopting a proactive approach to enhancing financial literacy and promoting investment awareness, with the ultimate goal of empowering a new generation of financially capable individuals. The study identified five main limitations that affected its findings on financial literacy and investment intention among undergraduates in Sri Lanka. First, the sample included only final-year finance students. This may lead to selection bias, which could overestimate the financial literacy levels of the overall youth population (Lusardi & Mitchell, 2014). Second, social desirability bias may have influenced the results. Participants often share idealised behaviours instead of their actual actions. Third, the absence of standardised measures made it hard to compare this study with previous research. Finally, the emphasis on quantitative data was noted as a limitation. It likely overlooked important qualitative details and context regarding investment intentions.

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ANALYSING THE IMPACT OF ESG SCORE ON EQUITY PORTFOLIO PERFORMANCE: A COMPARATIVE STUDY OF HIGH AND LOW ESG PORTFOLIOS: EVIDENCE FROM THE US EQUITY MARKET

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Abstract

This study aims to find out whether there is a significant difference between high and low environmental, social & governance (ESG) equity portfolios in the United States equity market. High and low ESG portfolios are constructed using the constituents of the S&P 500 index from 2018 to 2022, based on the ESG scores gathered from the Bloomberg database. ESG scores are ranked in descending order for each year, where the top 10% is considered the highest ESG portfolio and the bottom 10% is considered the lowest ESG portfolio. Portfolio return is calculated under both equal-weighted and value-weighted approaches. The comparison of the portfolios is done using three portfolio performance measurements: the Sharpe ratio, the Treynor ratio, and the Jensen alpha. According to the results under both equal-weighted and value-weighted approaches, a high ESG portfolio does not significantly outperform a low ESG portfolio. The findings of this study have several implications for investors, researchers, and policymakers. Findings suggest that investing in ESG concerned stocks may not significantly outperform the other but also does not underperform either. Therefore, this is a win-win situation for investors, where they can earn a marginally high return while also integrating sustainability and ethical considerations into their investment decisions. This study contributes to academic literature by finding that there is no significant difference between high and low ESG equity portfolios.

Keywords: ESG equity portfolio, portfolio performance, sustainable investing, US equity market

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Introduction

Best-performing entities usually attract stakeholders. In earlier times, performance was measured in terms of the entity's financial performance. However, in today's world, this notion has shifted to measuring a company's performance through non-business operations activities such as economic, environmental, and social sustainability performance (Uthayakumar, 2021). With growing awareness of today's environmental and social concerns, investors are allocating more resources to sustainable investment. These investments were further increased during the COVID-19 pandemic (Jacobsen, 2021). A survey conducted by Morgan Stanley has revealed that 82% of the respondents are willing to increase their capital allocation towards sustainable investing in their portfolio (Morgan Stanley, 2024). Rather than only profit-seeking businesses, the current environment is focused on establishing businesses that centre on people, planet and profit (3Ps) (Zehir & Aybars, 2020). This transition has sparked the researcher's interest in evaluating the integration of ESG and the financial performance of companies. The United States has two main equity stock exchanges: NASDAQ and the New York Stock Exchange. (NYSE). According to Statista (2018), these two equity stock exchanges account for approximately 60% of the global stock market, making the United States equity market the largest in the world. In the United States, 84% of individual investors are interested towards sustainable investments (Morgan Stanley, 2024).

Since the 1990s, studies have measured the value of research-based ESG integration through various quantitative parameters, including returns, volatility, and portfolio performance (Sherwood & Pollard, 2017). Certain research has also addressed the United States equity market. Some researchers have concluded that ESG portfolios outperform non-ESG portfolios (Goyal & Aggarwal, 2014). Additionally, some researchers have concluded that non-ESG portfolios outperform ESG portfolios, or that the evidence does not support a significant difference between ESG and non-ESG portfolios (Fulton et al., 2012; Zehir & Aybars, 2020). These inconclusive results underscore the need for further research on these topics. There has been limited research comparing ESG-related portfolio performance in the world's largest equity market. Therefore, this study aims to address the existing empirical gap in comparing high- and low-ESG portfolios of the world's largest equity market using both equalweighted and value-weighted approaches. Accordingly following research questions and objectives were set.

RO1: To compare the portfolio performance of equally weighted high and low ESG equity portfolios in US equity market.

RO2: To compare the portfolio performance of value-weighted high and low ESG equity portfolios in US equity market.

Literature Review

ESG investment is a key global trend. Previous studies have emphasised that investors are more attracted to good ESG-performing companies because they believe these companies are sustainable, have more resources for future development, and spend time optimising their activities (Egorova et al., 2022). Traditional Modern Portfolio Theory emphasises that investors only seek to maximise their economic returns. However, in the current context, investors consider more factors, such as responsible governance, environmental considerations, and ethical business values, when making investment decisions. Moskowitz (1972) argued that companies with more socially responsible investments have superior financial performance compared to other companies, whereas Friedman (1970) contended that ESG criteria would generate additional costs for the firm, ultimately weakening the company's financial performance. Research on ESG funds and conventional funds during the Great Recession period has concluded that ESG funds outperformed conventional funds during the recession period (Nofsinger & Varma, 2014).

Lins et al. (2017) evaluated 1,673 non-financial enterprises in the US market between August 2008 and March 2009 by assessing their strengths and challenges across five categories: community, diversity, employee relations, environment, and human rights. A regression analysis revealed that firms with high CSR ratings outperform those with poor scores in financial terms. A study conducted in 2017 to measure the effect of ESG integration into emerging market equities has shown that ESG strategy integration provides higher returns at a significantly lower risk than non-ESG MSCI Emerging Market indices (Sherwood & Pollard, 2017). A study conducted analysing the performance of ESG stock portfolios and market portfolios based on the Indian stock market has stated that ESG stock portfolios outperform blue-chip and market portfolios. Despite higher returns ESG stock portfolio contains higher systematic and total risk than the other two portfolios. The researcher has concluded that socially responsible investors can achieve higher returns by investing in ESG stocks compared to the market (Goyal & Aggarwal, 2014).

Research analysing the returns of socially responsible investment (SRI) portfolios using negative, positive, and best-in-class screens for the period of 1992-2004 has also provided similar results. The research has employed KLD SRI Ratings (formerly MSCI ESG ratings) to rate business organisations and has created value-weighted

portfolios that are rebalanced annually. The high-rate portfolio includes the top 10% of equities, while the low-rate portfolio contains the worst 10%. This research concludes that a negative screening portfolio performs worse than both positive and best-in-class screened portfolios. The study has also found that using equal-weighted portfolios instead of value-weighted portfolios does not significantly alter the results (Kempf & Osthoff, 2007).

Another study, conducted using Refinitiv's ESG ratings, analysed the STOXX Europe 600 Index from 2011 to 2020 to determine whether high portfolios with ESG leaders outperform low portfolios with ESG laggards. The researcher constructed decile portfolios based on companies' ESG scores, defining a positive screening strategy. To compare portfolio performance, various risk and return measures have been calculated. The returns have been tested using various performance benchmark models, including the CAPM and Fama-French 3- and 5-Factor models. The findings provide supporting evidence for an outperformance in the high portfolio, based on the ESGC score. However, the remaining ratings (ESG, E, S, and G) indicate better success in the low portfolio. Furthermore, the results indicate that low-risk portfolios have higher levels of downside risk (Jacobsen, 2021).

A study examining the relationship between ESG scores and the risk and return of stocks in Nordic countries (Sweden, Denmark, Norway, and Finland) has shown that there are no abnormal returns for the long-short ESG portfolio across the full sample in the CAPM, Fama-French three-factor model, Carhart, and Fama-French five-factor models. The same results are held for each country separately. Hence, they have found no evidence to support the notion that companies with a high ESG score lead to higher stock returns. However, the study shows that high ESG scores provide better preparation for market shocks (Uthuslien & Andréasson, 2023). When comparing all ESG and non-ESG disclosures, the non-ESG portfolios have achieved higher Sharpe ratios compared to ESG portfolios. ESG and non-ESG portfolios constructed based on market capitalisation have also dictated similar results, with non-ESG portfolios outperforming ESG portfolios. As the third criterion, they have created only ESG portfolios, valuing them based on the ESG disclosure score. In the third scenario, lower ESG score portfolios have obtained higher returns compared to higher ESG portfolios (Kazakou et al., 2022).

By analysing previous empirical studies, it can be observed that many studies have been conducted to examine the difference and impact of ESG and traditional portfolios. However, the majority of the studies haven't concluded precise results, outlining the need for further research. Additionally, although research has been conducted focusing on the US market, none of the studies have compared portfolio performance using risk-adjusted measurements via a paired t-test. This highlights the existing gap in analysing the equal-weighted and value-weighted performance of high- and low-ESG portfolios in the US equity market. By addressing this gap, this research is based on analysing equally weighted and value-weighted high- and low-ESG portfolios in the US equity market.

Methodology

This research employs a quantitative research design which emphasises the objective study of observable social phenomena. Adhering to the positivist research philosophy, this study employs a deductive approach. This is based on comparative types of research where returns of two generated portfolios are compared to analyse the difference. All calculations were performed using Microsoft Excel, and the formulas used were extracted from previous literature (Sandu, 2023).

Population and sample selection

This research aims to compare high- and low-ESG portfolios in the United States equity market. Since there are two equity exchange operators in the United States, the S&P 500 index was selected for this research because it represents equity stocks from both stock exchanges. Therefore, the population is 503 constituents, including the S&P 500 index. The sample would be decided based on the availability of the ESG scores; therefore, a convenience non-probability sampling technique is used to identify the sample. ESG scores for 499 companies were gathered, which is considered the sample for the analysis. The period from 2018 to 2022 (five years) is selected as the time frame (Kiran & Tadoori, 2023; Sandu, 2023).

Data collection method

All the calculations are based on secondary data. The necessary data required for the analysis are listed below, along with the sources used for the data collection.

- ESG scores – The primary data for the analysis is the ESG score, because the portfolio construction is based on this data. ESG scores were collected via the Bloomberg data platform.
- Daily stock returns – Portfolio returns were calculated based on daily stock returns, which was gathered from investing.com. (Anil, 2019)
- Stock returns were measured using the following formula: $RR_{ss,tt} = \frac{P_{PPPP}^{PPPP}(tt - t_1)}{P_{PPPP}^{PPPP}(t_1)}$

- Portfolio returns were calculated using the following formula: $RR_{pp,tt} = \frac{1}{nn} \sum_{ss=1}^{nn} w_{ss} RR_{ss,tt}$
- Annualised average stock returns were calculated using the following formula: $RR_{aannnn} = (\prod_{ss=1}^{nn} (1 + RR_{ss}))^{nn} - 1$
- Market capitalisation – Market capitalisation was collected for every company in the portfolio for each year. The data was gathered via the Bloomberg platform. (Jacobsen, 2021)
- 3-month Treasury bill rate – U.S three-month Treasury bill rate was considered as the risk-free rate which was collected from Federal Reserve Bank of St. Louis. (Sandu, 2023)
- Market return – Russell 3000 index was taken as a proxy for market return, since it represents 98% of investable stocks in the US equity market. (LSEG, 2024) The daily index return was collected from Nasdaq.com.

Data Analysis

Data analysis was conducted mainly in three stages.

Portfolio Construction: Four portfolios are generated based on ESG scores. Once the data is collected, the data will be ranked each year in descending order based on the ESG scores. The top 10% will be considered as the High ESG portfolio, and the bottom 10% will be considered as the Low ESG portfolio. Daily stock returns were gathered for each company, and the annualised average stock return was used to calculate the portfolio return. The annualised stock return is used to account for differences in the number of days for which returns are available across companies. Portfolio returns will be calculated for each portfolio for each year using two weightage methods: equally weighted and market capitalisation-based value-weighted approach.

Portfolio Performance Measurement: According to prior researchers, the Sharpe ratio, Jensen Alpha, and Treynor ratio are used to measure the performance of each of the four portfolios. These ratios are calculated for each year separately (Sandu, 2023; Zehir & Aybars, 2020). The risk-free rate was calculated using the average of each year's three-month Treasury bill rates. Additionally, the market return was calculated by averaging the daily index returns of the proxy index (Verma & Hirpara, 2016).

Portfolio Performance Comparison: The evaluation of portfolios involves both descriptive and comparative analyses, utilising Stata software. Descriptive statistics are utilised to compute metrics such as average return, risk (standard deviation), skewness and kurtosis for all four portfolios. These statistics will provide insights into the distributional characteristics of returns across the portfolios. Given that the study focuses on comparing two specific portfolios, a nominal comparison was conducted to recognise the difference in portfolio performance measurements and annual returns over the years. After analysing the portfolios nominally, to check whether these differences are significant, a statistical analysis was done using the paired t-test.

Hypothesis development

H1: *The portfolio performance of an equally weighted high ESG portfolio does not significantly outperform the portfolio performance of an equally weighted low ESG portfolio.*

H2: *The portfolio performance of the value-weighted high ESG portfolio does not significantly outperform the portfolio performance of the value-weighted low ESG portfolio.*

Findings and Discussion

Descriptive statistics

When analysing the descriptive statistics of the annual portfolio returns of the equal-weighted high ESG portfolio and the equal-weighted low ESG portfolio, it can be observed that both portfolios have a positive average performance. However, a comparison of mean values reveals that an equally weighted high ESG portfolio generates a higher return than the equally weighted low ESG portfolio. The equal-weighted high ESG portfolio has a higher standard deviation of 0.0060048, compared to the equal-weighted low ESG portfolio's standard deviation of 0.0011972. These results suggest that while the equal-weighted high ESG portfolio offers higher returns, it also entails greater risk due to increased variability in returns.

Similarly, value-weighted portfolios, including both high- and low-ESG portfolios, exhibit positive mean values. However, the value-weighted high ESG portfolio has a higher average return of 0.0012554, compared to the value-weighted low ESG portfolio's mean return of 0.0008738. When analysing the standard deviation and variance, the value-weighted high ESG portfolio exhibits higher variability of returns around the mean, resulting in greater fluctuations and increased risk. Both the value-weight ESG portfolios are negatively skewed, indicating

a long left tail with lower values. Both portfolios consist of a platykurtic kurtosis, which is below the mesokurtic kurtosis of 3.

Analysis of both equal-weighted portfolios' and value-weighted portfolios' annual returns indicated that the high ESG portfolio outperforms the low ESG portfolio's return. Corresponding to the nominal analysis, a paired t-test was conducted to check whether there is a significant difference between high ESG portfolios and low ESG portfolios (Anil, 2019). However, in both equal-weighted and value-weighted portfolios, the p-value is greater than 0.05 the indicating that the mean difference is not statistically significant.

Table 1

Paired T-Test results for annual portfolio returns

	Equal-weighted high and low ESG portfolios	Value-weighted high and low ESG portfolios
Mean difference	0.0029211	0.0003816
P value	0.3858	0.4155

(Source: Author's Compilation)

Discussion of findings

Table 1

Summary of equal-weighted high and low ESG portfolio results

Measure	Mean difference	P value
Sharpe ratio	Positive	Insignificant
Treynor ratio	Negative	Insignificant
Jensen alpha	Positive	Insignificant

(Source: Author's compilation)

Overall, the equal-weighted high ESG portfolio has outperformed the equal-weighted low ESG portfolio. However, this is not statistically significant. Therefore, the findings will be consistent with the null hypothesis that an equal-weighted high ESG portfolio does not significantly outperform an equal-weighted low ESG portfolio.

Table 2

Summary of value weighted high and low ESG portfolio result

Measure	Mean difference	P value
Sharpe ratio	Positive	Insignificant
Treynor ratio	Positive	Insignificant
Jensen alpha	Positive	Insignificant

(Source: Author's compilation)

Overall, the value-weighted high ESG portfolio has outperformed the value-weighted low ESG portfolio. However, this is not statistically significant. Therefore, the findings will be concluded similar to the null hypothesis value weighted high ESG portfolio does not significantly outperform value weighted low ESG portfolio.

This conclusion is consistent with a previous empirical study comparing the monthly average returns of ESG stock portfolios with those of blue-chip stock portfolios and market portfolios in the Indian stock market. The study found that the ESG stock portfolio generated positive mean differences, although the difference was not statistically significant (Anil, 2019). Additionally, another study that analysed SRI portfolios generated through negative, positive, and best-in-class screening approaches compared the portfolio performances under both equalweighted and value-weighted approaches and found no significant difference in the conclusions drawn under either approach (Kempf & Osthoff, 2007). Contrary to these results, some research has concluded that low ESG portfolios outperform high ESG portfolios (Kazakakou Powaski et al., 2022; Sandu, 2023). A similar type of research was not able to be found for the US equity market. Therefore, the findings of the current study are consistent with those of Anil (2019) and Huq, Jutila, and Sameland (2022).

Conclusion

This study examined whether high ESG portfolios significantly outperform low ESG portfolios, selecting constituents of the S&P 500 index, categorised under both equal-weight and value-weight approaches. The findings revealed that, in terms of annual portfolio mean returns, both equal-weighted and value-weighted high ESG portfolios outperformed the respective low ESG portfolios. However, this high return comes with greater risk. In terms of variance and standard deviation, both equal-weighted and value-weighted high ESG portfolios have higher values, indicating high volatility in the portfolio returns.

In terms of risk-adjusted performance, equal-weighted portfolio Sharpe and Jensen alpha ratios were in line with the results of the annual portfolio returns, where the equal-weighted high ESG portfolio outperformed equal-weighted low ESG portfolio. However, the Treynor ratio provided a contradictory result, where the equal-weighted low ESG portfolio outperformed the equal-weighted high ESG portfolio. The conclusion was taken based on the overall result, where an equal-weighted high ESG portfolio outperforms equal-weighted low ESG portfolio. Similar results were observed in the value-weight portfolio as well, where, in all three risk-adjusted measurements, the high ESG portfolio outperformed the low ESG portfolio.

To check whether these differences are significant or not a paired t-test was conducted for both equal-weight and value-weighted portfolios. Both in terms of annual returns and risk-adjusted measurements, the p-value was insignificant. This means that even though the high ESG portfolio outperforms the low ESG portfolio, the difference is marginal. This illustrates the complexity of evaluating ESG portfolio performance amid diverse and volatile market conditions. Additionally, it demonstrates that ESG investment decisions are more inclined towards ethical and long-term strategic considerations rather than short-term financial gains. Ultimately, this research contributes to the academic literature by comparing high-ESG and low-ESG portfolios generated using constituents from the S&P 500 index. Further, this study contributes to the final findings that a high ESG portfolio outperforms a low ESG portfolio, but with an insignificant difference.

Implications and recommendations

The result of this study shows that high ESG portfolios marginally outperform low ESG portfolios. This suggests that investing in ESG stocks may not significantly outperform the others, but it also does not underperform. Therefore, this is a win-win situation for investors, who can earn a marginally higher return while also integrating sustainability and ethical considerations into their investment decisions. Additionally, for policymakers, this research encourages them to develop standardised ESG frameworks and metrics to assess and improve the transparency of ESG strategies. For researchers with a global momentum in sustainability, this research would serve as a guide to further explore the impact of ESG-integrated strategies on financial markets.

Limitations

It is worth noting that the overall research design and approach employed in this study limit the extent to which the findings can be applied. Firstly, the period analysed was limited to 5 years. Additionally, this context is limited to the United States market. Further, the analysis is based on the ESG scores provided by a single data provider. This is an important limitation because previous empirical studies have mentioned that researchers' results vary depending on the data provider they have selected (Jacobsen, 2021)

Suggestions for future research

Future research can be based on multiple stock markets and longer time horizons. Also, future research can be based on analysing data provided by two or more ESG data providers. This can add knowledge to the context of the reliability of ESG scores provided by the data providers. This research is limited to statistical measurements, whereas future researchers can conduct additional statistical testing to gain deeper insights into this matter. Additionally, this research is based on the entire U.S. equity market. Future research could be conducted by analysing the high- and low-ESG portfolios within a specific sector.

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ANALYSING THE CORRELATION BETWEEN COLOMBO STOCK EXCHANGE RETURNS AND CRYPTOCURRENCY RETURNS

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Abstract

This research examines the dynamic relationship between returns from the Colombo Stock Exchange (CSE) and cryptocurrency, utilising proxies such as BTC/USD daily returns and the All-Share Price Index (ASPI) daily returns. The primary objective of this study is to investigate whether cryptocurrencies offer diversification potential for Sri Lankan investors. Therefore, this research fills a critical empirical gap by being the first to apply the Dynamic Conditional Correlation Generalised Autoregressive Conditional Heteroskedasticity (DCC-GARCH) model to the Sri Lankan context. The study employs the DCC-GARCH model to analyse time-varying correlations using daily data from 2015 to 2023. A quantitative approach was used with secondary data obtained from Investing.com and analysed in EViews 8. The study shows a weak correlation between ASPI returns and BTC/USD returns, typically around zero, indicating their structural independence. However, during economic shocks like the COVID-19 pandemic, correlations spiked, reflecting investor behaviour, but reverted to near-zero levels post-pandemic. On average, the correlation coefficient remained close to zero, confirming minimal co-movement. Although both markets show persistent volatility, the study concludes that Sri Lankan investors can only profit from limited diversification due to their weak link. Regulatory restrictions and restricted exposure to cryptocurrencies further underscore this. These findings provide practical implications for portfolio diversification and regulatory oversight. The study contributes to the limited regional literature by empirically quantifying the dynamic link between stock and crypto markets in Sri Lanka.

Keywords: ASPI daily returns, Bitcoin, DCC-GARCH, Sri Lanka, time-varying correlation

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Proceedings of the 16th International Conference on Business and Information - ICBI 2025 © 2025 by The Faculty of Commerce and Management Studies, University of Kelaniya, Sri Lanka is licensed under CC BY-SA 4.0.

DOI:

Introduction

The relationship between CSE returns and cryptocurrency returns has generated considerable attention from Sri Lankan financial analysts, researchers, and investors. The stock market has traditionally been the primary avenue for investors seeking to accumulate long-term wealth. It is a vital component of a well-diversified investment portfolio due to its historical performance, regulated nature, and inherent stability (Markowitz, 1952). On the contrary, the emergence of cryptocurrencies led by the introduction of Bitcoin in 2009, brought forth a decentralised and frequently volatile asset class that has captured the interest of investors and technologists alike (Bianchi, 2023). The increasing integration of these financial sectors makes it relevant to investigate the relationship between stock returns and cryptocurrency prices worldwide (International Monetary Fund [IMF], 2022; Wątopek et al., 2023). On the other hand, cryptocurrencies oppose traditional monetary systems and support blockchain technology, decentralisation, and transparency (Bianchi, 2023). Conducting a thorough analysis of the current body of research is necessary to investigate the theoretical and practical consequences of this relationship. Some research indicates that there is no relationship between stock returns and cryptocurrency prices, while other studies propose that a relationship may exist, albeit rarely, particularly when considering macroeconomic or market attitudes. These opposing viewpoints highlight the subtleties and complexity that come with examining their relationship.

The popularity and adoption of cryptocurrency have grown rapidly worldwide, including in Sri Lanka. Among Sri Lankan young investors, cryptocurrency investment has become an emerging trend. Additionally, many young investors are assembling well-thought-out portfolios that combine cryptocurrencies with traditional asset types, such as stocks, in the CSE (Evans Rozario et al., 2020). Therefore, it's essential to understand the relationship between stock market performance and the cryptocurrency market to maximise their returns while mitigating risk to a lower level. Despite numerous studies examining this dynamic relationship in developed and developing countries, a significant empirical gap exists regarding the Sri Lankan context. No prior research has employed the Dynamic Conditional Correlation Generalised Autoregressive Conditional Heteroskedasticity (DCC-GARCH) model to investigate the relationship between CSE returns and cryptocurrency returns, leaving a methodological gap that this study seeks to address. Furthermore, this study uniquely compares the pre- and post-COVID-19 periods within the Sri Lankan context to identify how the pandemic reshaped investor sentiment, regulatory policies, and market volatility in both the CSE and cryptocurrency markets. This comparison provides a strong justification for the selected time frame, as the pandemic period marked a structural change in Sri Lanka's financial environment. Accordingly, this research aims to investigate whether a dynamic correlation exists between cryptocurrency returns and CSE returns, and how this relationship behaves during periods of market turbulence. Through a detailed analysis of the relationship dynamics and an attempt to shed light on the nature of their interactions, this research aims to fill this gap.

The organisation of this paper is as follows. Section 2 provides a review of relevant literature. Section 3 details the data sources and variables employed in the study. Section 4 describes the methodology and models employed. Section 5 presents the experimental findings; a discussion of the results and Section 6 concludes the paper.

Literature Review

Overview of the stock market

Stock markets facilitate the exchange of ownership in publicly listed companies and play a vital role in channelling funds between investors and businesses (Mishkin & Eakins, 2021). As regulated and transparent trading platforms, stock exchanges enhance liquidity and price discovery in financial systems (Pagano & Roell, 1996; World Federation of Exchanges [WFE], 2023). According to Modern Portfolio Theory (Markowitz, 1952), the interrelationship among asset returns determines diversification potential, making stock markets a central component of investment portfolios. Major exchanges such as the NYSE, NASDAQ, and TSE serve as global benchmarks for equity performance (WFE, 2023), while in Sri Lanka, the CSE performs a similar function in mobilising domestic capital. The All-Share Price Index (ASPI) serves as a comprehensive measure of market performance and is therefore utilised in this study as the primary indicator of stock market returns (O'Sullivan et al., 2019).

Blockchain and cryptocurrencies

A blockchain is a decentralised ledger that records transactions on a peer-to-peer network, allowing participants to verify exchanges without a central authority (PricewaterhouseCoopers, n.d.). Cryptocurrencies, created and stored electronically on blockchain networks, use cryptographic algorithms to authenticate transactions and control the supply of monetary units. The first and most prominent cryptocurrency, Bitcoin, introduced by Satoshi Nakamoto in 2009, remains the best-performing digital asset in the market. Although blockchain technology has

found applications in areas such as tokenisation, fund transfers, and supply chain management, both cryptocurrencies and their underlying systems are still evolving in terms of financial integration and regulatory development (Coursera Staff, 2023).

Relationship between stock market returns and cryptocurrency returns

The relationship between cryptocurrency and stock market returns has become a growing focus in global financial research. Prior studies provide mixed evidence regarding the strength and direction of this linkage. Niyitegeka and Zhou (2023) identified an increase in conditional correlations between Bitcoin and equity markets during the first and second quarters of 2020, indicating contagion effects in times of financial turmoil. Similarly, Kim et al. (2020) found that correlations among Bitcoin, gold, and S&P 500 returns are time-varying and intensify during crises, such as the COVID-19 pandemic. These results align with Contagion Theory, which posits that financial linkages strengthen under market stress.

In contrast, studies such as Bhullar and Bhatnagar (2020) observed no long-run causal relationship between Bitcoin prices and Asian stock indices, suggesting structural independence across markets. Salisu et al. (2019) reported that Bitcoin enhances stock-return predictability in developed economies, implying potential integration, while Sami and Abdallah (2020) found divergent effects across MENA (Middle East and North Africa) markets. Collectively, these findings confirm that stock–crypto interdependence is market-specific and time-varying.

From a theoretical perspective, Modern Portfolio Theory (Markowitz, 1952) emphasises that weak correlations between asset classes offer diversification benefits, whereas Contagion Theory explains the short-term surge in correlations that occurs during shocks. However, empirical evidence from Sri Lanka remains absent. Building on this gap, the present study examines whether the correlation between ASPI and BTC/USD returns is time-varying and whether correlation spikes occur during crisis periods such as the COVID-19 pandemic, using the DCC-GARCH framework.

Gaps identified through the literature review

Insufficient Empirical studies in the context of Sri Lanka: Most studies have been conducted in developed and emerging markets in regions such as Europe, America, the MENA region, and East Asian countries like China. Although research has been conducted on South Asian countries, such as India, there are no empirical studies specifically focused on Sri Lanka. Building on previous international evidence, this study explicitly tests whether the correlation between ASPI and BTC/USD returns is time-varying and whether correlation spikes occur during financial crises, such as the COVID-19 pandemic. This focus provides both empirical and methodological novelty within the Sri Lankan context. In particular, no study has employed the DCC-GARCH model to examine the relationship between CSE returns and cryptocurrency returns, leaving both a contextual and methodological gap that this study seeks to address.

Emerging Market Dynamics: Empirical research is necessary to understand how the distinct features of developing countries, such as Sri Lanka, influence the correlation between stock market returns and cryptocurrencies. From a theoretical standpoint, Contagion Theory explains how correlations intensify during crises, while Modern Portfolio Theory highlights the diversification potential when correlations remain weak. This dual framework motivates the present study's investigation of Sri Lanka's market behaviour before and after the COVID-19 pandemic.

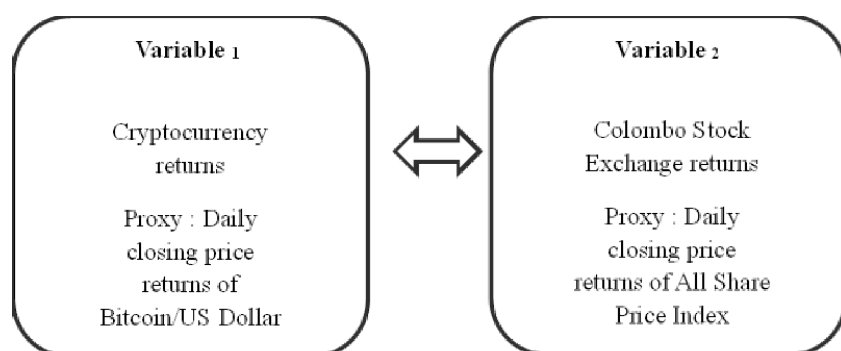
Investor Demographics and Behaviour: Empirical research can shed light on the characteristics and investing habits of Sri Lankans, as well as how they engage with cryptocurrencies in contrast to conventional equities.

Methodology

Conceptual framework

The data used in the study consist of the daily closing price returns of Bitcoin/Tether as a proxy for cryptocurrency returns and the daily closing price returns of the All-Share Price Index as a proxy for the Colombo Stock Exchange returns (Niyitegeka & Zhou, 2023). Every variable and proxy used is in accordance with the existing literature, which has been thoroughly reviewed.

Figure 1
Conceptual framework



((Source: Developed by authors based on literature))

Population and sample selection

Although the population of the cryptocurrency returns consists of all the cryptocurrencies available in the market, we have utilised only the Bitcoin/Tether returns to conduct this study due to the high market capitalisation.

Data collection method

The study utilises daily data from January 1, 2015, to December 31, 2023, to provide a clear picture of the movement of market returns and a significant statistical generalisation. Data was collected from investing.com To achieve more stationary time series data and facilitate detrending, the daily composite price indices were converted into natural logarithmic returns (Niyitegeka & Zhou, 2023), which are stated as follows:

$$R_t = [\ln(P_t) - \ln(P_{t-1})] \times 100 \dots \dots (1)$$

P_t represents the period t closing price index P_{t-1} represents the period $t-1$ closing price index. The formula $[\ln(P_t) - \ln(P_{t-1})]$ needs to be multiplied by 100 due to numerical problems in the estimation part. This will not affect the model, as it scales linearly.

Research design

This study adheres to a positivist philosophy, focusing on objectively measuring reality through observation and data collection. It uses a deductive approach, beginning with theory and testing it against real-world evidence. By applying a quantitative method, the research systematically analyses numbers to uncover how returns from the CSE relate to those from cryptocurrencies.

Data analysis technique

To conduct this study, the DCC GARCH model is preferred over other multivariate GARCH models because it allows for time-varying correlations in addition to the properties of conditional variances. As a result, the current study can decide whether correlations between two return series are time-varying and change over time in response to market conditions (stable versus turbulent periods) (Ampountolas, 2022).

Dynamic conditional correlation GARCH model

The GARCH (1,1) model assumes that volatility depends on the last period's conditional volatility. It is expressed as follows:

$$r_t = \mu_t + \varepsilon_t \dots \dots \dots (2)$$

$$\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \beta \sigma_{t-1}^2 \dots \dots \dots (3)$$

1st equation is the mean equation, and 2nd equation is the conditional variance equation. α_0 is a constant term, σ_t^2 is the volatility at time t , ε_{t-1}^2 is the squared error term of the previous period, and σ_{t-1}^2 is the volatility of the previous period. The presence of clustering would be indicated by statistically significant positive parameter estimates α_1 and β (with the constraint $\alpha_1 + \beta < 1$), with the rate of persistence being defined by how close $\alpha_1 + \beta$ is to unity. The constraint $\alpha_1 + \beta < 1$ enables the process to remain stationary, with the upper limit of $\alpha_1 + \beta = 1$ representing an integrated process (Niyitegeka & Zhou, 2023).

1st equation (Mean equation) must be ‘White Noise’ which means its error term should be serially uncorrelated. Therefore, by using the Durbin-Watson test and/or the Lagrange Multiplier test, the mean equation must be tested for autocorrelation. Lagged values of the dependent variable should be added to the right side of Equation 5 until serial correlation is eliminated, should autocorrelation be detected. To confirm the necessity of proceeding to estimate GARCH models, the appropriate mean equation should also be tested for the Autoregressive Conditional Heteroscedastic effect (Chinzara & Aziakpono, 2009).

Multivariate GARCH models are typically used to study the relationship between equity markets, as the volatilities of financial series are known to move slowly or synchronously across markets. Except for the fact that multivariate GARCH models provide additional equations for the time-varying movements of covariances, they are essentially identical to their univariate counterparts. The literature has presented several multivariate GARCH formulations; the DCC GARCH models are the focus of this section (Niyitegeka & Zhou, 2023).

To capture the dynamic time-varying of conditional covariance, Engle (2002) introduced the DCC GARCH model. It is a dynamic model with a time-varying mean, variance, and covariance of return series r_t (Niyitegeka & Zhou, 2023).

$$r_t = u_t + \varepsilon_t \dots \dots \dots (4)$$

$$\varepsilon_t | \Omega_{t-1} \rightarrow N(0, H_t)$$

Equation 4 is used to obtain the conditional variance of each return from the residuals of the mean equation:

$$h_{i,t}^2 = \alpha_0 + \sum_{j=1}^{p_l} \alpha_j \varepsilon_{i,t-1}^2 + \sum_{j=1}^{q_l} \beta_j \sigma_{i,t-1}^2 \dots \dots \dots (5)$$

Where, $\sum_{j=1}^{p_l} \alpha_j + \sum_{j=1}^{q_l} \beta_j < 1$

Then, the multivariate conditional variance H_t is estimated as follows:

$$H_t = D_t R_t D_t \dots \dots \dots (6)$$

where H_t the conditional covariance matrix of R_t , D_t represents a $(k \times k)$ diagonal matrix of time- varying standard deviations obtained from the univariate GARCH specifications given in 6th formula, and R_t is the $(k \times k)$ time-varying correlations matrix derived by first standardizing the residuals of the mean 5th formula of the univariate GARCH model with their conditional standard deviations derived from 6th formula, to obtain

$$\eta_{it} = \frac{\varepsilon_{it}}{\sqrt{h_{it}^2}} \text{ (Niyitegeka \& Zhou, 2023).}$$

Formulas 7 and 8 are used to estimate the conditional correlation parameters employing the standardised residuals.

$$R_t = (diag(Q_t))^{-\frac{1}{2}} Q_t (diag(Q_t))^{-\frac{1}{2}} \dots \dots \dots (7)$$

$$Q_t = (1 - \theta_1 - \theta_2)Q^- + \theta_1 \eta_{t-1} \eta'_{t-1} + \theta_2 Q_{t-1} \dots \dots \dots (8)$$

where Q^- is the standardised residuals' unconditional covariance. The Q_t does not generally have ones on the diagonal, so it is scaled as in formula 6 above to derive R_t , which is a positive definite matrix. As a result, the conditional correlations in this model are dynamic or change over time. It is assumed that θ_1 and θ_2 from formula 8 are positive scalars such that $\theta_1 + \theta_2 < 1$ (Niyitegeka & Zhou, 2023).

Finally, by following the equation, the conditional correlation coefficient ρ_{ijjj} between two market returns, i and j can be expressed:

$$\rho_{ij} = \frac{q_{ij,t}}{\sqrt{q_{ij,t} q_{jj,t}}}, i, j = 1, 2, \dots, n, \text{ and } i \neq j \dots \dots \dots (9)$$

This can be expressed in typical correlation form by putting $Q_t = q_{ij,t}$ as follows:

$$\rho_{ij} = \frac{(1 - \theta_1 - \theta_2)q_{12}^- + \theta_1 \eta_{1,t-1} \eta_{2,t-1} + \theta_2 q_{12,t-1}}{\sqrt{[(1 - \theta_1 - \theta_2)q_{11}^- + \theta_1 \eta_{1,t-1}^2 + \theta_2 q_{11,t-1}] [(1 - \theta_1 - \theta_2)q_{22}^- + \theta_2 \eta_{1,t-1}^2 + \theta_2 q_{22,t-1}]}} \dots \dots \dots (10)$$

Hypotheses development

This hypothesis, that there is a correlation between cryptocurrency returns and CSE returns, served as the basis for this study, which was grounded in a conceptual framework and a literature review. This reflects the expectation that movements in one market may be associated with corresponding changes in the other, indicating potential interlinkages between these two investment domains.

Findings and Discussion

In this study, DCC-GARCH (1,1) was applied to examine the dynamic relationship between the daily returns of the ASPI and the daily returns of BTC/USD. The output from DCC-GARCH (1,1) was based on a two-step estimation procedure. First, univariate GARCH models were estimated for each of the time series: ASPI daily returns and BTC/USD daily returns. In the second step, the model dynamically estimates the conditional correlations between the two series over time.

Univariate GARCH outputs

For ASPI, the mean constant of -0.034708 ($p = 0.0100$) points to a slight but statistically significant downward drift, possibly reflecting persistent inefficiencies or structural issues in the market. Volatility dynamics exhibit a low baseline level (0.009442, $p = 0.0007$), strong sensitivity to recent shocks (ARCH = 0.190836, $p = 0.0000$), and high persistence (GARCH = 0.820708, $p = 0.0000$), indicating that periods of high or low volatility tend to persist. In contrast, BTC/USD recorded a mean constant of 0.194023 ($p = 0.0110$), indicating a modest but significant upward drift, consistent with its growth-oriented and speculative nature. Its baseline volatility was much higher (0.971679, $p = 0.0017$), sensitivity to short-term shocks was lower (ARCH = 0.134292, $p = 0.0000$), yet persistence remained strong (GARCH = 0.824856, $p = 0.0000$). Both models converged quickly (30 iterations for ASPI, 21 for BTC/USD), exhibited highly significant coefficients, and produced negative R-squared values typical of volatility models. The Akaike and Schwarz criteria, which support the models, confirmed that they effectively capture the conditional variance patterns in both markets.

DCC-GARCH output

Table 1 presents the summary results of the DCC-GARCH model estimation.

Table 1

Summary table of the DCC Output

	Coefficient	Standard Error	Z-Statistic	P-Values
Theta 1 (α)	-0.003763	0.004702	-0.800354	0.4235
Theta 2 (β)	0.975743	0.034104	28.61051	0.0000

Convergence achieved after 29 iterations

Stability condition: Theta (1) + Theta (2) < 1 is met

(Source: EViews 8)

Estimation results show that the DCC model converged successfully after 29 iterations, confirming the adequacy of the optimization process. Moreover, the coefficient on parameter Theta 1 (α) which represents the short-term shocks of correlation dynamics, has a coefficient of -0.003763 with a p-value of 0.4235, indicating that it is not statistically significant. This would suggest that short-term fluctuations in correlation do not play a significant role in explaining the relationship between the ASPI and BTC/USD returns. On the other hand, the parameter Theta 2 (β), which captures persistence in the long-run, is highly significant with an estimate of 0.975743 and a p-value of 0.0000. This result indicates that the relationship between ASPI and BTC/USD returns are more dominated by long-term trends than by short-term, immediate changes. Based on the findings, the null hypothesis that there is no correlation between BNB and STI is thus disproved.

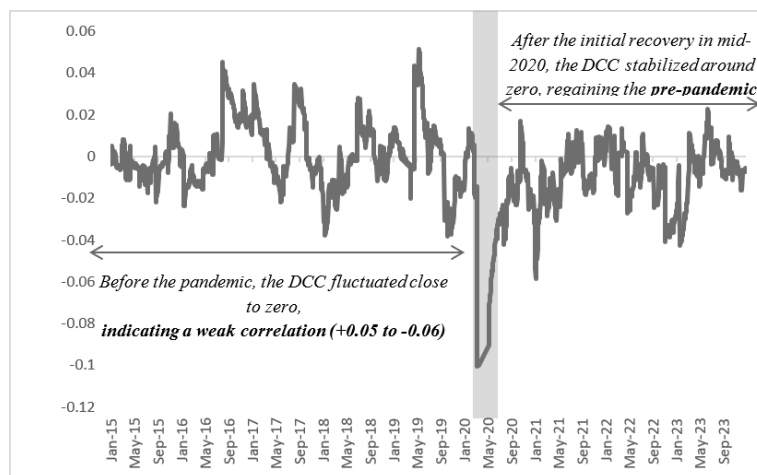
Discussion

The DCC matrix shows that the association between ASPI and Bitcoin returns is generally weak and consistent, with brief disruptions during world crises. The results demonstrate how robust their independent dynamics are, which is corroborated by the interaction of the DCC model's Theta 1 and Theta 2 parameters. Theta 1, which represents the short-term correlation response to shocks, is as important, even if Theta 2 predominates and

emphasises the long-term persistence of correlation. While the correlation responds to short-term market fluctuations, the equilibrium between these parameters guarantees that it eventually returns to its long-term state. The potential of ASPI and Bitcoin as complementary investment possibilities in portfolio development is further supported by this dynamic. For risk management and strategic asset allocation, it is crucial to understand the impact of both short-term and long-term persistence variables, particularly in an era of increasing market integration and uncertainty. Together with Theta 2's stabilising impact, Theta 1's capacity to record instantaneous reactions guarantees the longevity of their historically shaky relationship.

Figure 2

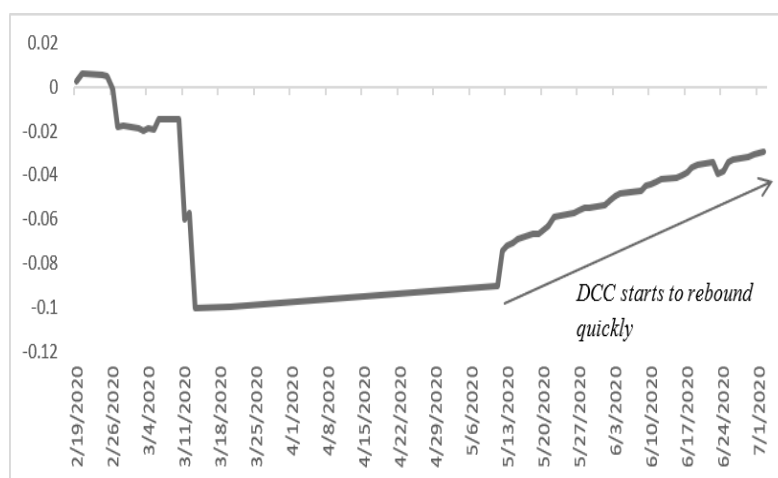
Dynamic conditional correlation matrix



(Source: EViews 8)

Figure 2

Dynamic conditional correlation matrix



(Source: EViews 8)

Conclusion

This study examined the dynamic relationship between stock market returns, as measured by the ASPI of the CSE, and cryptocurrency returns, specifically represented by Bitcoin. The study employed the DCC-GARCH model to examine how the associations between these two asset classes evolved over time, particularly during various economic conditions, such as the COVID-19 pandemic. The results show a weak and time-varying link between cryptocurrency returns and ASPI returns. The association hangs near zero, according to the Dynamic Conditional Correlation (DCC) model, indicating a weak and erratic connection between these markets. Nonetheless, there are times when a noticeable difference is evident, especially during the early stages of the COVID-19 pandemic.

Extreme differences in investor behaviour and market dynamics brought on by global economic uncertainty were reflected in the correlation's brief decline to a negative value of -0.1 during this time. In this approach, the COVID-19 pandemic offered a special case study. Bitcoin demonstrated traits of a speculative asset during the period of exceptional volatility in global markets, responding quickly to shifts in investor mood and worldwide liquidity. Meanwhile, in a market with very little exposure to international financial trends, the ASPI's behaviour was influenced by regional economic upheavals, governmental regulations, and investor hesitancy. This period's brief negative correlation highlights how exogenous shocks can intensify the disparities across these asset types. The DCC-GARCH model proved resilient in capturing the changing relationship over time, despite these discrepancies. The correlation's ultimate recovery to almost zero values after the epidemic emphasises how fleeting these dramatic occurrences are in terms of their ability to affect long-term market behaviour. Notably, Theta 2's dominance in the DCC model was crucial in preventing the correlation from remaining negative for an extended period. The Central Bank of Sri Lanka's (CBSL) regulatory position is one element that may have contributed to the overall weak association observed throughout the time period in this study. Citing concerns about market volatility, a lack of regulatory protections, and the potential for abuse for illicit purposes, the CBSL has consistently discouraged investing in cryptocurrencies (Risks of Using and Investing in Cryptocurrency | CBSL, n.d.). It's possible that this legal framework reduced Sri Lankan investors' exposure to cryptocurrencies, which in turn decreased market interaction. The overall weak correlation between the ASPI and Bitcoin points to few prospects for diversification advantages in the Sri Lankan setting. The relationship may not be strong enough to offer substantial benefits to investors looking to utilise Bitcoin as a diversification asset or as a hedging tool for local equity portfolios. The DCC-GARCH model's capture of this correlation's dynamic character, however, suggests that the link is not totally static and may vary in response to shifts in investor behaviour, market structure, or regulatory regulations. In conclusion, the results indicate a relationship between cryptocurrency returns and CSE returns, although the Dynamic Conditional Correlation remains modest. The study's null hypothesis, which posited no association between the two asset classes, was rejected by the observed correlation, even though it was weak. This finding suggests that the weak and time-varying correlation between ASPI and BTC/USD returns presents only limited diversification opportunities for Sri Lankan investors, particularly during periods of market stability.

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PERSPECTIVES OF EMPLOYEES IN THE MEDIUM-SCALE APPAREL INDUSTRY ON BEST PRACTICES INSTITUTED TO OVERCOME SLOW PERFORMANCE WITHIN THE ECONOMIC CRISIS: A SPECIAL REFERENCE TO ABC COMPANY

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Abstract

Sri Lanka's apparel industry is one of the strongest performers in Sri Lanka's economy, generating significant foreign exchange earnings and creating employment opportunities. The ongoing economic crisis in the country has significantly impacted the industry, with increased production costs, restricted foreign exchange availability, and low external demand. This study examines workers' perceptions of best practices implemented to improve organisational performance during an economic recession and the challenges employers faced in implementing them. The mixed-method cross-sectional study consisted of combining a structured questionnaire survey of 164 workers with qualitative interviews of nine senior managers. Descriptive statistics and thematic meaning of qualitative data were performed using SPSS. Empirical evidence suggests that staff tend to have a positive attitude towards process improvement best practices, technology incorporation, and improvements in working conditions; however, they are limited by economic uncertainty, weak governance, and constrained resources. This study contributes to the body of crisis management research by examining the relationship between labour attitude and organisational resilience strategies in the context of emerging economies. Recommendations include improved communication, cost-cutting strategies, and policy intervention as a vehicle for realising sustainable performance during economic crises.

Keywords: Best practices, economic crisis, employee perspectives, medium-scale apparel industry, Sri Lanka

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Proceedings of the 16th International Conference on Business and Information - ICBi 2025 © 2025 by The Faculty of Commerce and Management Studies, University of Kelaniya, Sri Lanka is licensed under CC BY-SA 4.0.

DOI:

Introduction

Background of the study

The medium-scale apparel industry in Sri Lanka is a significant pillar of the nation's economy, contributing notably to employment and export revenue. Over 500 employees per firm are employed in this industry, which accounts for a significant portion of Sri Lanka's apparel exports. According to the Sri Lanka Export Development Board, in 2022, the country's clothing industry generated nearly US\$5.4 billion in earnings from exports, with the medium-scale sector contributing nearly US\$4.3 billion. The sector also remains a sizable source of employment, particularly for women, given that over 60% of employees in the industry are female. It is estimated that directly, there are around 300,000 workers employed in the apparel industry, and a further 600,000 workers are indirectly benefitted by rural development and economic growth.

The medium-scale garment industry has thrived due to several factors. Government investment promotion programs and tax incentives have served to create a favourable business climate. Secondly, Sri Lanka has a skilled and comparatively low-cost labour force, as well as a strategic location that facilitates access to large international markets. Additionally, the industry has had preferential access to international markets under free trade agreements. The majority of companies in the industry have also adopted best practices, including sustainability programs, technology investments, product diversification, and design and production innovations. These strategies have enabled the industry to remain competitive in the international market (Wijekoon et al., 2022).

The economic crisis affecting Sri Lanka has, however, had a harsh impact on the apparel industry. The most severe crisis since the country gained its independence has resulted from a combination of rising foreign debt, incompetent policy decisions, and external threats such as the COVID-19 pandemic and the Easter bombings in 2019. These events have had a huge effect on economic stability and foreign exchange reserves (Raiser, 2023). Therefore, the apparel sector has faced significant challenges, including shortages of raw materials, increased production costs, declining global demand, currency devaluation, and reduced earnings from exports. Clothing exports declined by 15.2% in 2022 compared to the previous year. The majority of small and medium-sized garment factories had to reduce production, cut wages, or shut down altogether (Apparel Resources News, 2023).

The Free Trade Zone Manufacturers' Association stated that nearly 50% of small and medium-sized garment factories will shut down by the end of 2023 due to declining revenues and rising costs. Fashion investors have also been noted to incur a 25% decline in income, compelling some companies to adjust their base or undertake severe measures, such as retrenchment and shorter working hours. The financial crisis has made it all the more difficult for Sri Lanka's garment exporters to stand out overseas, as price competition remains the primary driver of global trade (Sri Lanka Mirror).

In this context of adversity, industry players have urged medium-scale garment firms to adopt best practices that ensure efficiency, competitiveness, and a sustainable long-term future. Best practices, in this context, refer to methods that have been rigorously tested to enhance business performance. These include ethical labour, innovation in technology, green initiatives, and effective supply chain management. Although these practices have the potential to enhance performance, most medium-scale fashion enterprises in Sri Lanka are unable to effectively apply them due to limited financial resources. This research aims to investigate employees' views on the application of best practices in performance enhancement during economic recessions, as well as employers' challenges in implementing them.

Research objectives

The primary objective of this research is to investigate the perspectives of medium-scale apparel employees on the role of best practices in enhancing business performance during economic downturns. Specifically, the study aims to:

RO1: Identify the economic and governance challenges that medium-scale apparel industry employees face during the economic crisis.

RO2: Investigate the difficulties that employers encounter when introducing best practices to employees.

RO3: Analyse the economic and governance best practices that medium-scale apparel industry employees have adopted to enhance performance.

Research questions

RQ1: What are the economic and governance challenges that medium-scale apparel industry employees face during the economic crisis?

RQ2: What challenges do employers encounter when introducing best practices to employees?

RQ3: What economic and governance best practices have medium-scale apparel industry employees adopted to improve performance?

Literature Review

Theoretical framework

The study draws on two converging theoretical frameworks: Crisis Management Theory and Organisational Resilience Theory. Organisational Resilience Theory posits that an organisation's capacity to bounce back from shocks, weather stress, and continue to operate under pressure is a result of its internal organisation, leadership, and workers' motivation (Lengnick-Hall et al., 2011). In the economic crisis situation in Sri Lanka, apparel companies' capacity to maintain operating performance and stimulate workers is a key factor in these forces of resilience.

Crisis Management Theory, as conceptualised by Mitroff and Anagnos (2001), offers a framework for examining how organisations are prepared for, respond to, and recover from crises through proactive and reactive approaches. With the theoretical foundation in place, the research will examine how best practices, such as technological advancements, open communication, and employee welfare, are utilised as instruments of crisis preparedness and recovery. Collectively, these theories shed light on the best practice notion that employees are the linchpin of sustaining performance in uncertain situations. This theoretical premise is based on the conceptual foundation that connects organisational strategy and individual perception within an economic dislocation context.

Empirical review

Sri Lanka's apparel industry is one of the country's most significant sectors, generating high foreign exchange earnings and contributing to employment growth. However, the industry faces significant challenges, particularly in terms of sustainability. Fashion industry sustainability is not only about maintaining economic growth, but also about addressing environmental and social challenges, which have become more apparent during economic crises, such as the COVID-19 pandemic and the ongoing economic downturn. This review integrates pathfinding research on sustainability practices in Sri Lanka's apparel industry, their impacts on organisational performance through crises, and their ability to trigger sustainable growth.

Weerasinghe et al. (2023) highlighted a study aimed at establishing the impact of sustainability practices on the organisational performance of Sri Lankan apparel firms during the COVID-19 pandemic and economic crisis era. Economic resilience, social fairness, and acting ethically were the most imperative areas of sustainability, which had a significant impact on enhancing organisational performance, according to the study. Economic resilience encompassed measures such as resource management, market diversification, and technological investments, all of which enabled the firms to remain in business despite the financial strain caused by the pandemic. Social equity and best practices, such as employee training, occupational health and safety, and stakeholder engagement, also helped keep the show on the road. Contrary to expectations, corporate governance and environmental performance did not play a positive role during crisis periods, as firms were more concerned with short-term survival than with long-term sustainability practices. These findings reflect the intricacy of sustainability practices during economic crisis periods, in that while some practices have immediate impacts on short-term performance, others require a conducive economic environment to function effectively.

Continuing the analysis of green technology adoption, Pathirana and Yarime (2017) investigated the challenges faced by small and Medium-sized Enterprises (SMEs) in the Sri Lankan garment industry in adopting energy-efficient technologies (EETs). Based on their study, they found that the biggest obstacles to the mass adoption of energy-efficient measures in the industry were financial and information-related constraints. The profitable SMEs faced rising utility bills and labour shortages, which contributed to their financial woes. Pathirana and Yarime (2017), proposed a model that brings together several different stakeholders, SMEs, government, financier providers, and industry associations, into cooperation. By offering simplified access to financial facilities and expanding the information coverage of energy-saving technologies, the model can help SMEs overcome obstacles and adopt more eco-friendly business practices. Not only does this promise environmental sustainability, but it also enhances the competitiveness of the apparel industry. Ali and Opatha (2008) examined the influence of performance appraisal and performance business on Sri Lankan garment firms.

Performance appraisal systems that were systematic were among the driving forces behind business performance, according to their work. Organisations that had formal performance appraisal (PA) systems had better chances of seeing improvement in performance. Although their study did not directly examine sustainability, it indirectly supports the idea that systemic human resource practices and performance appraisal are critical to the development of a sustainable organisational culture. The study's implications suggest that sustainable business practices, such as employee training and development, can be a key factor in the overall success of apparel firms, particularly during challenging times.

Consistent with this research, Jayarathne et al. (2021) explained how competitive ability can enable sustainable practice in the Sri Lankan garment industry.

Six capabilities, organisational climate, operating flexibility, technical competence, partnership and alliance, knowledge sharing, and learning ability, enable firms to adopt and embrace sustainable practices in their research. Such capabilities are necessary to enable firms to develop innovative solutions that meet the new sustainability requirements and remain competitive. The researchers had assumed that promoting a quality work culture, investing in technology, and fostering continuous learning were essential to achieving goals. They further hypothesised that firms need to collaborate with supply chain players to enable easier knowledge sharing and improved sustainability practices. This research collectively embodies the dynamic relationship between complex organisational performance and sustainability practices in the Sri Lankan apparel business.

Although economic and social sustainability practices hold extreme significance in the context of a crisis, adopting technology and implementing energy-efficient practices can be arduous endeavours, particularly for SMEs. The contribution that performance management systems play in encouraging the development of a sustainable organisational culture cannot be undervalued either. Collectively, the findings create an imperative for an integrated approach to sustainability that balances economic, social, and environmental concerns with the specific challenges faced by business firms during economic downturns.

Methodology

Research design

The study employed a cross-sectional, descriptive, mixed methods design to explore staff attitudes towards best practices in sustaining performance during Sri Lanka's economic crisis. The statistical description of staff responses and the emergence of patterns were enabled by the quantitative element, while the qualitative interviews provided depth in analysing managerial meanings and issues in these circumstances. The dual strategy provided breadth and depth based on Creswell's (2014) integration principles of mixed methods.

Conceptual framework

Figure 1
Conceptual framework



(Source: Author Compilation)

Data collection tools

Most of the data was collected with the assistance of two principal tools: a semi-structured questionnaire and interviews.

Questionnaire: Based on organisational best practices literature (Ali & Opatha, 2008; Jayarathne et al., 2021), the instrument contained 25 Likert-scale items in economic and governance dimensions. The instrument was pre-tested for reliability and clarity among 10 employees.

To guarantee content validity, two scholars and one practitioner scored the measures. Construct validity was ensured by loading items into theoretical organisational resilience measures. Reliability was established through Cronbach's Alpha

($\alpha = 0.84$), supporting internal consistency of the items. Triangulation of quantitative and qualitative data strengthened the robustness of the methodology.

Sampling and participants

The sample for the study was 1,002 employees of the ABC Company. Using the Krejcie and Morgan (1970) formula, 164 workers were selected using stratified random sampling to represent production, quality, and engineering departments. Nine managers were also purposively selected for the qualitative aspect.

Data analysis

Quantitative data was analysed in SPSS v26 using descriptive statistics (means, frequencies) and correlation analysis to identify patterns or relationships between variables. Qualitative interview data were coded and examined thematically based on Braun and Clarke's (2006) six-step guide, which allowed dominant themes of challenge, implementation problem, and staff engagement to be established. The resulting convergence permitted a rich description of perception and practice within the firm.

Data Analysis

Demographic analysis

Table 1
Demographic analysis

Factor	Category	Frequency	Percent	Valid Percent	Cumulative Percent
Gender	Female	134	77.5%	77.5%	77.5%
	Male	39	22.5%	22.5%	100%
Age	18 – 20	28	16.2%	16.2%	16.2%
	21 – 25	57	32.9%	32.9%	49.1%
	26 – 30	55	31.8%	31.8%	80.9%
	31 – 35	15	8.7%	8.7%	89.6%
	36 or above	18	10.4%	10.4%	100%
Educational Level	Primary	21	12.1%	12.1%	12.1%
	Ordinary Level	90	52.0%	52.0%	64.2%
	Advanced Level	52	30.1%	30.1%	94.2%
	Graduate	6	3.5%	3.5%	97.7%
	Post Graduate	4	2.3%	2.3%	100%
Service Period	Less than 1 year	40	23.1%	23.1%	23.1%
	1 – 5 years	71	41.0%	41.0%	64.2%
	6 – 10 years	44	25.4%	25.4%	89.6%
	11 – 15 years	14	8.1%	8.1%	97.7%
	More than 15 years	4	2.3%	2.3%	100%
Distance	5 km or below	48	27.7%	27.7%	27.7%
	6 km – 15 km	76	43.9%	43.9%	71.7%
	16 km – 25 km	43	24.9%	24.9%	96.5%
	26 km – 35 km	5	2.9%	2.9%	99.4%
	36 km or above	1	0.6%	0.6%	100%
Department	Cutting	18	10.4%	10.4%	10.4%
	Engineering	10	5.8%	5.8%	16.2%
	FGW	4	2.3%	2.3%	18.5%

	Production	86	49.7%	49.7%	68.2%
	Quality	28	16.2%	16.2%	84.4%
	RMW	14	8.1%	8.1%	92.5%
	Technical	4	2.3%	2.3%	94.8%
	Training School	8	4.6%	4.6%	99.4%
	MOS	1	0.6%	0.6%	100%

(Source: Author Compilation)

The demographic insights from a study examining high performance in the medium-scale apparel sector highlight important traits of the workforce that can greatly shape views on best practices. The sample is largely comprised of women, making up 77.5%, and tends to be fairly young, with most workers falling within the 21 -30 age range. These hints at a workforce that's likely more receptive to flexible working setups and new technologies.

Most of the employees have a basic education, with many reaching Ordinary or Advanced Levels, while only a few holds advanced degrees. This educational gap might influence how well they adopt and grasp intricate performance improvement techniques. Moreover, a significant portion of the workforce is relatively new in the field, with 41% having between one and five years of experience, which could offer a fresh viewpoint on operational issues.

The majority of employees, approximately 49.7%, are employed in the Production department, making it a key focus for pursuing efficiency gains. Additionally, the fact that most employees live close to their workplace, with a typical commute of 6 to 15 kilometres, could play a role in their job satisfaction and overall engagement. All these demographic factors, gender, age, education level, length of tenure, commuting distance, and department, are crucial to consider when crafting and executing strategies to enhance performance, particularly during challenging economic times.

Findings and Discussion

The survey results offer a comprehensive understanding of how medium-scale apparel workers and their management perceive practices designed to mitigate slow performance during an economic crisis. The discussion synthesises employee attitudes toward both economic and governance-oriented practices, as well as management's strategic outlook, revealing a pervasive theme of communication gaps that undermine otherwise positive perceptions and concerted efforts.

The findings highlight a strong consensus among employees on the importance of economically oriented practices, particularly in the adoption of technology. The vast majority of employees, at 92.1%, identified the implementation of new technology as a critical step to navigate economic challenges, linking it to enhanced productivity and efficiency. This positive perception is further reinforced by the acknowledgement that technology has increased service efficiency and saved time. However, this enthusiasm is tempered by underlying concerns, as some employees expressed worries that new technologies could be used to manage or reduce labour costs, a sentiment echoed in research on the impact of automation on traditional roles (Bessen, 2019). This nuance suggests that while the workforce is ready for technological advancement, management must be transparent about its purpose to build trust and avoid resistance. The study also reveals significant deficits in employee awareness regarding other key economic strategies. For example, a large majority of employees, 81.7%, were either unaware or unclear about the company's investments in research and development (R&D). Similarly, 81.7% of the workforce was uninformed about the organisation's use of electronic media for business activities. This lack of awareness points to a breakdown in internal communication, which can disengage employees from innovation-related activities and hinder long-term performance improvement. Current literature emphasises the positive impact of employee awareness on new products and process development (Ganter & Hecker, 2013) and the crucial role of digitalisation during economic crises (Deloitte, 2020). Although many employees understood the rationale behind market expansion drives, a significant portion (41.5%) remained unsure or uninformed, indicating a failure to effectively communicate the strategic rationale behind these initiatives (Kotler & Keller, 2022). In contrast, environmental practices such as recycling and repackaging were widely supported (89.6%), indicating that they are a well-communicated and accepted business practice. However, a knowledge gap still exists, as a portion of the workforce remains unclear on how these practices translate into tangible cost savings, reinforcing the need for transparent cost-benefit justifications to garner full employee support (Porter & Kramer, 2011).

Shifting to governance-oriented practices, the study found a generally positive perception of initiatives such as training and development. An overwhelming 96.9% of employees acknowledged the company's commitment, with a majority linking these programs to improvements in service efficiency through skill development and behavioural changes. However, even in this area of high awareness, a notable 18.9% of employees were uninformed, highlighting a need for

more inclusive communication. Perceptions of working conditions, health, and safety were also positive, with 93.9% of employees recognising this focus, which contributes to increased morale. The company's provision of healthcare coverage was also well received; however, a small percentage (9.7%) of employees remained uninformed about its benefits, again highlighting a communication gap. The recruitment of people with disabilities (PWDs) was widely known (87.8%), but a significant number of employees were unaware of the rationale behind this initiative. Conversely, a major disconnect was identified in the area of stakeholder engagement, where only 25% of employees believed an action plan was necessary, with an overwhelming 75.1% being uninformed about the organisation's stance on the matter. This highlights the urgent need for transparent communication to clarify the crucial role of stakeholder engagement in navigating economic challenges. Finally, while salary and incentive distributions were perceived as consistent and positive by over 90% of employees, many were unclear about the underlying policies and reasons, suggesting a need for more explicit communication to enhance employee trust and morale.

From a management perspective, the study highlights a complex landscape of challenges. While there was a consensus on the severity of issues like rising costs and reduced demand, views on foreign currency shortages and currency depreciation were more mixed. Management-proposed solutions included finding new suppliers, utilising local materials, and targeting new customers and product approaches. A crucial alignment was found between management's strategies and employee perceptions, as management emphasised the need for new technology adoption and employee development programs to mitigate negative effects. However, management also identified hurdles such as potential employee resistance and budget restrictions, underscoring the importance of improving internal communication to successfully implement these strategies. The collective findings suggest that while medium-scale apparel companies are actively pursuing best practices, their effectiveness is often hampered by a lack of transparent and comprehensive communication. To strengthen economic resilience and performance, management must not only formulate sound strategies but also actively engage and inform employees, fostering a culture of shared understanding and commitment. This holistic approach, integrating strategic actions with robust communication, is key to building an informed and resilient workforce capable of weathering economic crises.

The findings suggest that technological adjustments, process reengineering, and employee training are among the best practices for achieving top performance during an economic downturn. This aligns with Organisational Resilience Theory, which prioritises flexibility and proactive learning (Lengnick-Hall et al., 2011). According to Pathirana and Yarime (2017), limited finances and poor information flows remain the most significant constraints. Employees' attitudes reflect an exceptionally high sense of work health and safety programs, but an exceptionally low sense of R&D expenditure and strategic objectives reflect poor in-house communications. Employees' participation and integrity are the primary determinants of maintaining trust and morale in crisis scenarios, as suggested by Kotler and Keller (2022).

Policy-wise, as training systems and fair compensation are being designed, doubts about the intention and applicability in policy-perception discord manifest. This aligns with Porter and Kramer (2011) in proclaiming that shared value creation is founded upon clear communication of organisational purpose to all.

Management interviews corroborate these findings, citing economic stress, exchange rates, and staff resistance as significant implementation impediments. These findings support the use of Crisis Management Theory, where adjustment of response will take precedence most of the time. Companies must adopt best practices in long-term planning instead of relying on short-term survival tactics to achieve resilience.

Conclusion and Recommendation

The study provided real-world observations of employees' attitudes and administrative processes in a medium-sized apparel company during an economic crisis. It recognised a class of employees who were most receptive to innovations, such as adopting technology and recycling, and were very sensitive to quality assurance. It also indicated key gaps in communication, particularly in investment in research and development (R&D) and electronic media in buying and selling. Additionally, although employees welcomed innovative marketing strategies, they were unaware of their specific targets. Results emphasise the importance of transparency and effective communication among employees and management, fostering enhanced comprehension and alignment of corporate objectives.

With regard to governance, employees valued and savoured training courses, health and safety initiatives, and employee wellness programs, which they believed extensively contributed to the enhancement of service efficiency and spirit. Yet, there were some staff members in doubt regarding certain policies, such as the distribution of systematic incentives and medical insurance coverage. This highlights the need for effective communication and involvement to ensure that workers are fully aware and appreciate these forms of governance. Overall, while workers were willing to adopt company

practices, a gap still exists due to a lack of knowledge about certain practices, which hinders complete acceptance and implementation.

Views from management also emphasised the problems faced by the company during economic recessions, including significant expenses, low demand, reduced production, and foreign currency shortages. Despite some cost-cutting strategies, customer purchasing processes, and technology-based solutions being implemented, issues related to implementation, such as employee resistance, lack of resources, and ill-defined policies, emerged as barriers. Apart from that, currency devaluation problems, changes in overtime policies, and reductions in services have brought about concerns regarding workers' morale and the overall maintenance of performance. These observations indicate not only the effectiveness of crisis management methods but also that they entail employees' acceptance through quality decision-making practices and involvement.

While addressing such an issue, research recommends opening channels of communication to facilitate company policy and strategic decision-making regarding simplifying and streamlining. Open discussion forums, refresher sessions from time to time, and employee involvement in decision-making can increase awareness and acceptance among employees. Moreover, continued training programs must focus on reskilling employees with the necessary competencies to align with market trends. Greater inclusivity and employee well-being programs can also boost morale and productivity. Additionally, anticipatory cost-reduction strategies, diversification of supply chains, and stakeholder engagement must be implemented to enhance operational resilience. Through cultivating a culture of transparency, participation, and flexibility, medium-sized fashion companies are better positioned to cope with economic uncertainties and prepare for long-term sustainability.

Future research directions

The findings of this current study provide fertile ground for investigating employees' attitudes towards best practices in maintaining organisational performance during economic crises in Sri Lanka's garment industry. However, several avenues for future studies remain to further develop theoretical richness and practical utility.

Subsequent studies would then be in a position to adopt a comparative multi-industry study design, extending beyond the fashion industry, to other industries such as tea, rubber, tourism, or the banking industry. It would place researchers in a position to ascertain whether communication at workplaces, process innovation, and optimal practices for transparency, which have been found to arise in such studies, are transferable across other economic contexts.

Second, while the current study employed a cross-sectional research design, subsequent research could opt to use a longitudinal study design to examine how organisational practices and attitudes towards them change over different stages in a crisis (pre-crisis, mid-crisis, and recovery). Longitudinal data of this kind would provide additional insights into the long-term flexibility and sustainability of best practices.

Third, causal relationships among variables such as worker commitment, crisis management procedures, and organisational performance can be tested empirically in future research using more advanced statistical techniques (i.e., multiple regression, SEM, or PLS modelling). This would extend beyond descriptive findings to build predictive or explanatory models of resilience.

Fourth, cross-cultural comparative studies are possible with other developing countries of South Asia or Southeast Asia that are facing similar macroeconomic shocks. This would enable one to determine whether cultural or institutional factors influence crisis management practice.

Fifth, further qualitative research would study organisational learning, leadership behaviour, and emotional resilience as mediator variables of best practices and resulting performance. This would again narrow the theory in organisational behaviour and crisis management.

Finally, future researchers can take a policy track option wherein they can examine how country-level policies, government intervention, and global supply chain pressures impact the strategic decision-making of medium-scale garment firms. Organisational and policy levels of analysis would provide a rich description of competitiveness and resilience in unstable economies.

Lastly, as underscored in this research, future studies must strengthen their theoretical foundations, increase their empirical scope, and enhance their methodology to provide meaningful crisis management practices for emerging economies.

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THE FACTORS INFLUENCING THE INTENTION TO USE DIGITAL WALLETS: EVIDENCE FROM COMMERCIAL BANK CUSTOMERS IN THE WESTERN PROVINCE, SRI LANKA

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Abstract

This study examines factors influencing the intention to use digital wallets, based on evidence from commercial bank customers in Sri Lanka's Western Province. Banks must assess customer acceptance to improve services and stay competitive as digital payment options develop worldwide. Employing a quantitative methodology, the study utilised an online survey for data gathering from a convenience sample of 385 customers of commercial banks in the Western Province of Sri Lanka. Research results indicate that perceived ease of use, usefulness, and social influence positively impact digital wallet use. The intention to utilise digital wallets was strongly correlated with perceived ease of use and social influence. The relationship between perceived security and use of digital wallet was found to be insignificant. Additionally, perceived trust only moderates the relationship between digital wallets use and perceived ease of use. This study revealed several practical aspects that could help Western Province banking organisations and financial institutions navigate the digital wallet market, including enhancing usability with convenience, leveraging social influence, conducting comprehensive geographic studies, implementing targeted marketing strategies, and developing user-friendly innovations.

Keywords: Commercial bank, intention to use, perceived trust, Sri Lanka, digital wallet

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Proceedings of the 16th International Conference on Business and Information - ICBI 2025 © 2025 by The Faculty of Commerce and Management Studies, University of Kelaniya, Sri Lanka is licensed under CC BY-SA 4.0.

DOI:

Introduction

The rapid growth of technical innovation has influenced numerous industries globally, with the banking sector being significantly impacted (Jayasiri et al., 2015). The incorporation of information technology has facilitated online banking services, optimised internal procedures, and enhanced client experiences, particularly during the COVID-19 epidemic, which expedited technological adoption within banks. Concurrently, digital payment technologies have proliferated, with "digital wallet" referring to applications that enable applicants to do financial operations such as purchasing, payments, and online transactions. Digital wallets serve to create smooth links to consumers' credit or debit cards and bank accounts, thereby allowing for efficient transactions (Jesuthasan & Umakanth, 2021). They offer payments that are optimized for rapid transactions and high efficiency, outperforming conventional banking framework, saving money as well as the time (Karim et al., 2020). This emerging trend has led to increased competition among individuals favouring digital wallet transactions rather than transactions in cash (Alsamman et al., 2022). The proliferation of smart technology like a digital wallet has accelerated, driven by innovative applications, user-friendly interfaces, strong security protocols, and enhanced privacy controls (Neves et al., 2023; Yang et al., 2021).

This research aims to explore the key determinants affecting digital wallet usage in Sri Lanka, addressing a gap in the existing literature and offering valuable insights into the topic. In the context of the COVID-19 lockdown, there was a significant improvement in electronic transactions as a means to minimise visits to bank branches (Charndran and Pitchandi, 2020), thus reducing bank traffic and physical transactions. Banking institutions have encouraged users to engage in digital transactions, framing digital wallets as vital instruments in the digital landscape. Despite a large majority of Sri Lankans using digital technologies daily, cash still combines with retail transactions and which was indicated as 95% (Echelon, n.d.). In Sri Lanka, around 80% of individuals have a bank account, yet merely 18.4Mn. utilize debit cards and a scant 1.99Mn. employ credit cards as of 2023 (CBSL, 2023). Additionally, approximately 131.5% of the populace possesses smartphones. A notable share of the consumer base demonstrates resistance to adopting digital payment technologies, primarily stemming from a lack of understanding and various other concerns. Even with widespread ownership of smartphones, few utilise them for payments (TRCSL, 2023). A cashless economy is becoming increasingly essential (Hidayah et al., 2023), and banks must address these issues to boost development and technology. In 2023, the Western Province had 6.1 million residents and over 4.5 million mobile phone users (Department of Census and Statistics, 2023), making it a focal point for this study investigating digital wallet users in the province. The existing research gap reveals a limited focus on digital wallet usage in the Sri Lankan context, with most studies primarily concentrated on the COVID-19 pandemic. Additionally, many of these studies have overlooked Perceived Trust (PT) as a moderating variable and have also ignored Social Influence as an indirect variable, highlighting the need for further exploration of both in this area. Accordingly, the present study aims to examine the factors influencing digital wallet usage, based on evidence from users in Sri Lanka, thereby contributing to the enrichment of the current body of literature and addressing a critical void in regional research. This research offers significant insights for commercial banks in the Western Province of Sri Lanka to implement effective policies that enhance digital wallet usage, improve customer satisfaction, and increase revenue.

This study is structured as follows: The Literature Review examines relevant literature to establish the theoretical foundation. The next section outlines the Sample Characteristics and defines the analysis variables. The Methodology section provides an overview of data collection and analytical methods. Finally, the study concludes with the Key Findings and reflections, highlighting results and suggesting future research directions.

Literature Review

Theoretical background of the study

This research will focus on the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) to study the predictors of digital wallet usage (Alsamman et al., 2022; Jesuthasan & Umakanth, 2021). TAM is applicable as it emphasises perceived usefulness and perceived ease of use, which are critical factors influencing consumer decisions regarding digital wallets. UTAUT complements this by incorporating social influence and facilitating conditions, further enriching the understanding of consumer behaviour in this context. By concentrating on these two theories, a clearer theoretical framework will be established, enhancing the argument for the study's theoretical contribution.

Perceived Usefulness and Intention to Use Digital Wallet (PU and ITDW)

PU is the belief that using a system will enhance work performance and is the strongest factor in the TAM influencing behavioural intention, reflecting the user's expectation that the technology will improve efficiency at work (Yang et al., 2021). Customers anticipate such a system will facilitate helping them accomplish their personal

and financial goals whereas enhancing transaction efficiency (Intarot, 2018). Many researchers have also explored the PU of digital wallets. Alsamman et al., (2022); Sanjeeva and Yatigammana, (2021) identified a significant and positive relationship between the PU and ITDW. Harishanthan and Neruja, (2023); Jayasiri et al., (2015); Warningsih, (2021) also found similar results. Hence, this study hypothesizes:

H1: There is a significant relationship between perceived usefulness and the intention to use digital wallets.

Perceived Ease of Use and Intention to Use Digital Wallet (PEOU and ITDW)

PEOU is a vital indicator of a person's IT behaviour and attitude (Chawla & Joshi, 2023). Davis called this "the extent to which an individual perceives that utilizing a specific system would require minimal effort." Davis F. et al., (1989) highlighted PEOU as a crucial element influencing consumers' purchasing intentions. As a result, previous purchasing experiences may influence a buyer's view on the PEOU associated with digital wallets. Innovations enhance the profitability of internet users; therefore, simplified technology may become the preferred payment option for consumers. A significant number of users of digital wallet applications have expressed appreciation for its user-friendly design (Yang et al., 2021). Earlier studies (Alsamman et al., 2022; Assalaarachchi, 2022; Jayasiri et al., 2015; Jesuthasan and Umakanth, 2021; Karim et al., 2020; Harishanthan and Neruja, 2023), found a positive and significant relationship between PEOU and ITDW. Thus, the study proposed:

H2: There is a significant relationship between perceived ease of use and the intention to use digital wallets.

Perceived Security and Intention to Use Digital Wallet (PS and ITDW)

Karim et al., (2020) define digital wallet security as users' confidence in their continuous safety. Digital wallets improve transactional security by safeguarding payment card information, ensuring that sensitive information remains undisclosed to the merchant or website (Eschenbrenner and Brand, 2023). The security of digital wallets has a significant impact on customer usage. Karim et al., (2020) a study had observed that privacy and security are key elements in digital wallet utilisation. According to Marimuthu and Roseline, (2020) note that while digital wallets are popular for their convenience, issues such as insufficient consumer awareness and security concerns need to be addressed. Prior studies found a positive relationship between PEOU and ITDW (Alsamman et al., 2022; Khan & Abideen, 2023). Considering these studies, the researchers proposed:

H3: There is a significant relationship between perceived security and the intention to use digital wallets.

Social Influence and Intention to Use Digital Wallet (SI and ITDW)

Yang et al., (2021) indicate that SI is systematically designed to assess customers' likelihood of using mobile payment devices and significantly impacts their technology adoption intentions, which is vital for promoting digital wallet usage. In the UTAUT framework, the intention to adopt virtual currency is influenced by normative beliefs and social factors. Various models of attitude-behaviour relationships and technology usage acknowledge the role of SI, reflecting the inherently social nature of consumers who depend on one another for survival and achievement (Hamzah et al., 2023). Many people prefer digital payment systems because they feel socially supported by family and friends. Previous findings indicate that individuals surrounded by a large set of colleagues utilising digital wallet services exhibit a higher propensity to pursue financial information and subsequently adopt these services (Khan and Abideen, 2023; Lwoga & Lwoga, 2017). Alsamman et al., (2022) found a positive relationship between PEOU and ITDW. Thus, the researchers formulated:

H4: There is a significant relationship between social influence and the intention to use digital wallets.

Perceived Trust (PT) as moderator

The positive expectation based on faith in others' behaviours, claims, and opinions is called 'trust' (Marimuthu & Roseline, 2020). Consumers rely on digital wallets to enhance productivity, efficiency, and profitability (Chawla & Joshi, 2023). Customers prioritise the trustworthiness and credibility of financial services (Warningsih and Nuryasman, 2021). Digital wallets necessitate personal and financial data, indicating that consumers seek secure financial transactions (Alsamman et al., 2022). Hanaysha, (2022) found trust drives digital wallet usage. Recent studies indicate that trust affects internet banking, online shopping, mobile payment, and digital wallets.

The literature indicates that trust enhances digital wallet use (Alsamman et al., 2022; Chawla & Joshi, 2023; Neves et al., 2023). Trust affected the independent variable's new technology and application use, according to the literature. Users stressed privacy and confidence when utilising mobile payment. Several studies has used trust as a moderating variable in examining the relationship among PEOU, PU, and ITDW, as outlined by Ariffin and Lim, (2020). The presence of trust has been shown to condition the relationship between independent and dependent constructs, as evidenced by the findings of Al-Hattami et al., (2023) and Mohammad et al., (2024). Accordingly, the following hypotheses were tested,

H5: Perceived Trust moderates the relationship between perceived usefulness and the intention to use digital wallets.

H6: Perceived Trust moderates the relationship between perceived ease of use and the intention to use digital wallets.

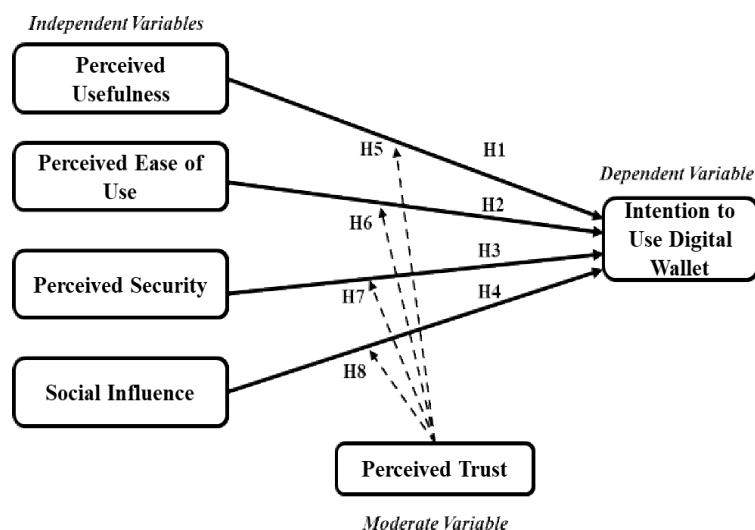
H7: Perceived Trust moderates the relationship between perceived security and the intention to use digital wallets.

H8: Perceived Trust moderates the relationship between social influence and the intention to use digital wallets.

Conceptual Framework

The model of the conceptual is constructed and derived from existing literature to depict the core research framework, emphasising the key determinants influencing digital wallet usage.

Figure 1
Conceptual framework



(Source: Author Compilation based on Literature)

Methodology

Study period and sample

This study examines the utilisation of digital wallets from 2020 to 2024 in the post-COVID-19 pandemic context, analysing the impact of the pandemic on perceptions and behavioural tendencies towards these payment methods while highlighting the increased dependence on contactless payments. Focusing on individuals using digital wallet services provided by commercial banks in Sri Lanka's Western Province, the study assumes an unknown population size due to the lack of published data on total users. Consequently, the sample size was determined using the Krejci and Morgan sampling framework, which recommends a minimum of 385 respondents for unknown populations. A convenience sampling method was employed to facilitate data collection, chosen for its practicality and ease of access to relevant participants.

Dependent variable

Intention to Use Digital Wallets: The user's intention shows their readiness the utilization of product or service.

Independent variables

This study examines four independent variables: PU, PEOU, PS, and SI. These characteristics are essential to understanding digital wallet user intention. Perceived Usefulness measures how much consumers think digital wallets improve financial transactions. Digital tools are rated by their perceived ease of use. Perceived Security assesses users' faith regarding the financial data security during transactions. Social Influence measures how friends and society affect digital wallet usage.

Moderate Variable

This study investigates PT as a moderating construct, evaluating how consumer trust in digital wallet platforms impacts the trajectory and power of the relationship between usage intentions.

Descriptive Statistical Analysis

The research used IBM SPSS 22 to carry out descriptive statistical evaluations. Of the 392 questionnaires distributed, 385 were considered valid and incorporated into the conclusion of the analysis. The majority of respondents identified as female, comprising 52.7% of the overall sample. Age distribution analysis revealed that a dominant proportion of 83.9% which were between 18 and 29 years old. In terms of educational attainment, undergraduates comprised the largest group at 42.3%. Employment status indicated that 59.2% of participants were currently employed. Additionally, income data showed that 37.4% of respondents reported earning less than Rs. 30,000 per month.

Table 1

Results of Fornell-Larcker Criterion

Construct	ITUD	PEOU	PS	PU	SI
ITUD					
PEOU	0.777				
PS	0.738	0.785			
PU	0.814	0.808	0.695		
SI	0.783	0.770	0.822	0.710	

(Source: Authors, based on survey results)

Measurement Model Assessment

Before data analysis, it's essential to ensure that the raw data gathered from the questionnaire has been cleaned to enhance its transparency and accuracy. The study employed SMART PLS 4 to conduct this work, enabling a methodical approach to processing the data.

Table 2

Results of HTMT Ratio

Construct	ITUD	PEOU	PS	PU	SI
ITUD	0.899				
PEOU	0.728	0.881			
PS	0.688	0.727	0.873		
PU	0.763	0.751	0.645	0.886	
SI	0.733	0.716	0.762	0.662	0.881

(Source: Authors, based on survey results)

Reliability Analysis and Validity Analysis

The study used Cronbach's Alpha and Composite Reliability to analyse reliability. For studies using recognised measurements, both metrics must be 0.70 or higher to confirm dependability; values above 0.95 may signal concerns (Hair, 2018). Based on the obtained results, Cronbach's Alpha and CR are above 0.7 and are lower than 0.95, supporting the dependability of the data. Cronbach's Alpha value exceeding 0.9 indicates exceptional consistency (Izah et al., 2024), and the results indicate that the data obtained are consistent. The researcher assessed validity using 'Convergent Validity' and 'Discriminant Validity'. To be legitimate, a construct's AVE must be 0.50 or greater and factor loadings must surpass 0.708 (Hair, 2018). Results demonstrate that all AVE values are above 0.5 and the value of factor loading exceeds 0.708, indicating convergent validity of the sample. Fornell-Larcker and HTMT ratio were utilised to test discriminant validity (Hair, 2018). The Fornell-Larcker Criterion states that the square root of the AVE for each construct must exceed its correlations with all other latent variables, thus validating discriminant validity (Hair, 2018).

The results presented in Table 1 indicate that the square root of the AVE for all the constructs above the correlations with other constructs, validating the sample. The HTMT ratio should be below the threshold value of 0.85 for the sample to be valid (Hair, 2018). The result in Table 2 demonstrates that all constructions are below the HTMT threshold of 0.85, validating this sample. Thus, the Fornell-Larcker and HTMT criteria validate discriminant validity, indicating a sufficient sample for analysis.

Structural Model Assessment

The analysis employed path analysis to assess the structural model and examine the study hypotheses, confirming that the observed factors fulfilled the required requirements for model estimation. Following Hair, (2018), the analysis examined collinearity between constructs, their relationships, and the model's predictive capability, validating its effectiveness (Pico-Saltos et al., 2023). Key criteria included multicollinearity (Inner VIF), size effect (f^2), determination coefficient (R^2), predictive relevance (Q^2), path coefficient (β value), and P-value analyses (Hair, 2018; Subri et al., 2020). VIF values of 5 or above suggest potential correlation issues among predictor constructs (Subri et al., 2020), and results show that all VIF values are below 5, indicating that all variables satisfy the necessary VIF criteria. According to Cohen, (1988), a f^2 value of 0.0 to 0.15 indicates a small effect, 0.15 to 0.35 a medium effect, and 0.35 or higher a large effect.

Table 3 indicates that PEOU, PS, and SI have small effects, while PU shows a medium effect, with its f^2 value between 0.15 and 0.35. For a structural model to demonstrate predictive precision, Q^2 must exceed zero, with values over 0, 0.25, and 0.50 implying small, medium, and large predictive relevance, respectively (Hair, 2018; Pico-Saltos et al., 2023). The data of Table 3, the Q^2 value for ITDW is 0.674., indicating large predictive relevance. Conventional criteria suggest that R^2 values of 0.25, 0.50, and 0.75 indicate weak, moderate, and strong explanatory power, respectively. Since collinearity does not pose an issue in this analysis, the R^2 value of the endogenous construct is subject to evaluation (Hair, 2018). The findings presented in Table 3 reveal a R^2 value of 0.695, suggesting a moderate level of explanatory power within the research model. The p-value assesses statistical significance, with values below 0.05 indicating significant relationships (Hair, 2018); The result of Table 3 signifies all of the β values are positive, confirming a positive impact of PEOU, PU, PS, and SI on ITDW, where PEOU ($p = 0.012$), PU ($p = 0.000$), and SI ($p = 0.000$) have significant relationships, particularly PU and SI, which are highly significant ($p < 0.01$) (Debasish Das, 2017), while perceived security has an insignificant relationship ($p = 0.056$).

Moderation Analysis

The β and p-values of path analysis is utilised for moderation analysis, with the same threshold limits (Al-Hattami et al., 2023). In Table 4, it presents a comprehensive overview of the findings from the moderation analysis. The results indicate that PT does not moderate the relationships between PU, PS, and SI and ITDW, as their p-values (PU: $p = 0.629$, PS: $p = 0.259$, SI: $p = 0.520$) exceed 0.05. In contrast, the β -value of -0.167 and a p-value of 0.016 indicate that PT has a negative and significant moderating effect on the relationship between PEOU and ITDW.

Findings and Discussion

Hypothesis Testing and Key Findings

Results from the hypothesis testing conducted in the study are presented in Tables 3 and 4.

Table 3 illustrates the analysis identified significant relationships between various factors and the intention to use digital wallets. Path analysis revealed that PU and SI had a p-value of 0.000, showing that elevated levels of PU and SI result in a greater ITDW. In addition, PEOU demonstrated a significant relationship with a p-value of 0.012, suggesting that wallets that are easier to use enhance ITDW. In contrast, PS showed an insignificant relationship with a p-value of 0.056, suggesting that perceptions of security do not significantly influence the willingness to use digital wallets.

Table 3

Path Analysis -Direct Effect Hypotheses and Testing

Hypo-thesis	Relation	β -value (Path Coefficient)	p-value	Decision	f^2	R^2	Q^2
H1	PU → ITUD	0.390	0.000	Supported	0.197	0.695	0.674
H2	PEOU → ITUD	0.153	0.012	Supported	0.024		
H3	PS → ITUD	0.112	0.056	Not Supported	0.014		
H4	SI → ITUD	0.280	0.000	Supported	0.089		

(Source: Authors, based on survey results)

Table 4

Path Analysis - Moderating role of PT and Testing

Hypothesis	Relation	β -value (Path Coefficient)	p-value	Decision
H5	PT x PU -> ITUD	0.034	0.629	Not Supported
H6	PT x PEOU -> ITUD	-0.167	0.016	Supported
H7	PT x PS -> ITUD	0.074	0.259	Not Supported
H8	PT x SI -> ITUD	0.049	0.520	Not Supported

(Source: Authors, based on survey results)

Overall, PEOU, PU, and SI significantly influence the intention to use digital wallets, while PS does not reach statistical significance. The path coefficients further assessed the impact of identified factors on ITDW. The path coefficient for PU was 0.390, indicating a strong positive impact on usage. PEOU had a path coefficient of 0.153, showing that increased ease of use correlates with higher intention to use. PS had a β -value of 0.112, reflecting a positive but insignificant influence. SI's path coefficient was 0.280, emphasising that social perceptions positively affect usage. These results demonstrate that PEOU, PS, PU, and SI all positively impact ITDW, with varying degrees of influence. The findings are displayed in Table 4 of a moderation analysis examining the role of PT in moderating these relationships. The findings indicated that PT did not moderate the relationship between PU ($\beta = -0.034$, $p = 0.629$), PS ($\beta = 0.074$, $p = 0.259$), and SI ($\beta = 0.049$, $p = 0.520$) with ITDW. Nonetheless, regarding PEOU, PT exhibited a notable negative moderating impact ($\beta = -0.167$, $p = 0.016$), demonstrating that increased trust may cause users to view digital wallets as more complicated. The findings indicate that PT has a moderate impact solely on the relationship between PEOU and the intention to utilise digital wallets.

Conclusion

The current study conducted a comprehensive analysis of the determinants influencing the intention to utilise digital wallets based on evidence from commercial bank customers, with a specific focus on Sri Lanka's Western Province. Bridging an important gap in the existing literature and stemming from the scarcity of region-specific research, the investigation contributes meaningful insights into consumer behaviour surrounding digital wallet usage. This framework incorporates four principal variables: PEOU, PS, and SI, with PT serving as a moderating construct. The study examined the direct relationships between the independent variables and the dependent variable as well as the moderating effect of PT. The results indicated that PS, PEOU, and SI each had a statistically significant impact on ITDW, emphasising the importance for financial institutions to highlight the simplicity, usability, and social relevance of digital wallet technologies. It was also discovered that PT greatly moderated the association between PEOU and ITDW, underscoring its pivotal role in fostering consumer trust in digital financial platforms. In sum, this research not only deepens the understanding of digital wallet usage within the Sri Lankan context but also provides valuable insights for commercial banks and financial service providers. These include enhancing user-centric features, building trust through secure and transparent systems, and aligning services with evolving digital expectations to better engage customers and remain competitive in the digital economy.

The present study examines the use of digital wallets within a limited scope, focusing primarily on a select number of variables influenced by external factors. This limitation may restrict insights into the intentional behaviours associated with digital wallet usage. This limitation can be addressed by future researchers who should expand the range of variables considered and include diverse contexts while maintaining the study's conceptual framework. Furthermore, the research is geographically confined to the Western Province of Sri Lanka, limiting its applicability to other regions where cultural, economic, and regulatory differences could affect digital wallet adoption. Future researchers can expand the study's scope beyond the Western Province to encompass the entire country, allowing for insights that are not restricted by geographical constraints.

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THE ROLE OF DIGITAL FINANCIAL INCLUSION IN ACHIEVING SUSTAINABLE POVERTY ALLEVIATION: A SYSTEMATIC LITERATURE REVIEW

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Abstract

This study was conducted with two main research objectives. The objectives were to (1) find out the current empirical knowledge in ‘The Role of Digital Financial Inclusion in Achieving Sustainable Poverty Alleviation’ and (2) find out the areas with less literature in ‘The Role of Digital Financial Inclusion in Achieving Sustainable Poverty Alleviation’. The systematic literature review (SLR) approach and Preferred Reporting Items for systematic reviews and meta-analyses (PRISMA) framework were applied in this research. Articles were discovered through Lens.org and Scopus databases, and the search terms used for the study were ‘poverty alleviation’ and ‘digital financial inclusion. Both automated and manual screening were used to choose articles. Researchers have employed mathematical techniques based on Biblioshiny and VOSviewer. The findings highlight that digital technologies such as mobile banking, digital wallets, and international remittances serve as crucial tools for marginalised populations, enhancing their financial stability, entrepreneurial behaviour, and overall well-being. Researchers identified nine themes of keywords that highlight the broad impacts of digital financial inclusion on poverty alleviation. These themes collectively demonstrate the multifaceted impact of digital financial inclusion for economic growth and gender equality, to environmental sustainability and social development. Despite these insights, the review also identified areas with limited research, notably international remittances, environmental impact, digitalisation, and cybersecurity, which require further investigation. It is very important to further investigate these areas related to digital financial inclusion and poverty alleviation for the design of new economic policies and to achieve sustainable economic growth.

Keywords: Digital financial inclusion, mobile banking, poverty alleviation, sustainability

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Introduction

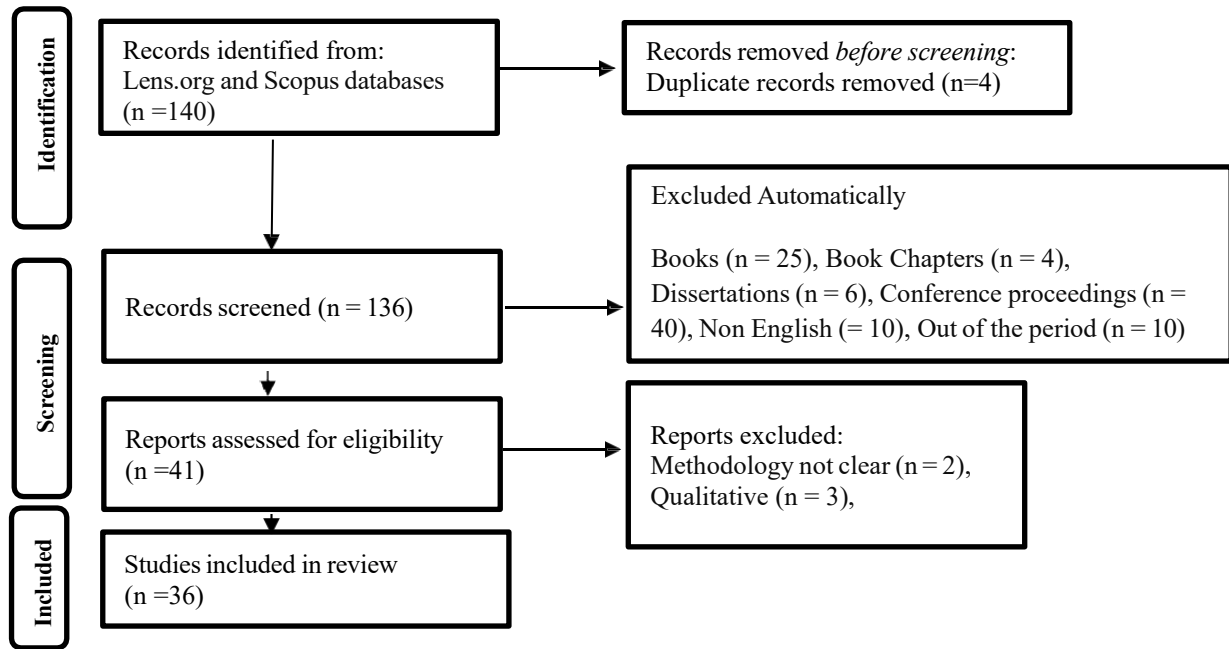
One of the most significant tools for reducing poverty has always been financial inclusion (Mwakalila & Muba, 2025). It highlights the scope and expansion of financial services and attempts to give the impoverished and other vulnerable groups sufficient financial help. It is founded on the equal opportunity principle. Digital financial inclusion, which is defined by both inclusivity and digitalisation, has emerged as a key strategy for lowering poverty and preventing its recurrence (Ho et al., 2025). Removing barriers resulting from variables like education, gender, age, irregular income, regulatory limitations, and geographic location is the main objective of financial inclusion programs implemented globally (Mwakalila & Muba, 2025). Digital financial inclusion is the integration of digital and inclusive finance, which improves the economy's efficiency and well-being and acts as an accelerator to reduce poverty (Gumilar et al., 2024). Because digital technology and the internet are integrated, digital financial inclusion encompasses a bigger demographic and has a more expansive scope than traditional finance (Ok Ergün, 2024). In contrast to traditional finance, which is restricted to certain activities like loans, savings, and payments, digital financial inclusion makes use of digital technologies to create network effects without incurring marginal expenses. Within the last two decades usage of digital financial services has grown very fast. Today 85% of the population worldwide owns a smartphone, which makes digital financial services accessible. 75% of adults in low- and middle-income nations have a bank account. Since 2011, there has been an 80% growth. Compared to 25% in 2021, 40% of adults in these economies now formally save through an account. In 2024, 62% of adults sent or received digital payments, with 42% of those transactions going toward purchases (United Nations, 2025). However, studies on the impact of digital financial inclusion on poverty reduction are limited. Researchers have found some important studies on the particular area. According to Chen and Zhao (2021), digital finance has a huge impact on reducing the absolute and relative poverty of rural households in China. It primarily does this by reducing information and credit barriers and encouraging the growth of social networks. Although digital financial inclusion is essential in reducing the income gap between urban and rural areas and enhancing uneven growth, Wang et al. (2020) noted that its impacts varied by region. It is of great theoretical and practical significance to discuss the relationship between digital financial inclusion and poverty alleviation. However, there are a limited number of previous papers that are on the particular topic. Especially, when it is considered about the literature papers, researchers did not find any systematic literature review paper at the time they conducted the research. Therefore, researchers conducted their study to answer the main research problem of 'What is the Role of Digital Financial Inclusion in Achieving Sustainable Poverty Alleviation?' The particular study was conducted with two main research objectives, including (1) to find out the current empirical knowledge in 'The Role of Digital Financial Inclusion in Achieving Sustainable Poverty Alleviation' and (2) to find out the areas with less literature in 'The Role of Digital Financial Inclusion in Achieving Sustainable Poverty Alleviation'.

Methodology

The systematic literature review (SLR) approach was used in this research. The Preferred Reporting Items for systematic reviews and meta-analyses (PRISMA) framework, which offers recommended principles for planning, carrying out, and writing reports in an SLR, must be adhered to by the SLR (Dogra & Priyashantha, 2023). Therefore, in accordance with PRISMA guidelines, researchers created a protocol at the design stage of this study, the contents of which are listed in Table 1. The PRISMA criteria, for which the PRISMA flow diagram was created, were used to choose the articles, as shown in Table 1. The three phases are 'identification,' 'screening,' and 'inclusion.' The study's implementation of these phases can be seen in Figure 1. The search terms used for the "identification" were 'Poverty Alleviation' and 'Digital Financial Inclusion.' Using the 'OR' operator for similar phrases and the "operative" for distinct terms, they were typed into the Lens.org and Scopus databases. Both automated and manual screening were used to choose articles. For transparency, automated screening involved algorithmic filtering based on predefined criteria, while manual screening entailed human review to assess context and ensure accuracy. Researchers have employed mathematical techniques based on Biblioshiny and VOSviewer. Biblioshiny tool was used to understand the study characteristics such as journals, authors, keywords, references, and year of publication. Using the VOSviewer, researchers have generated two maps called as 'keyword co-occurrence network visualisation' map and the 'density visualisation' map. Using the map known as 'keyword co-occurrence network visualisation,' the VOSviewer shows connections between the terms of the chosen works. This map addressed the first objective: to find out the current empirical knowledge in 'The Role of Digital Financial Inclusion in Achieving Sustainable Poverty Alleviation in Economies' from 2018 to 2025. Keyword density and keyword co-occurrence networks are related. The term density at each location on the density visualisation map is automatically represented by a colour that spans from blue to green to red, according to the VOSviewer guide. When a position's hue approaches red, it indicates that it contains more neighbouring keywords, and its weight rises accordingly. The weights decrease as a point gets closer to blue and has fewer close keywords. This map addressed the second objective, finding the areas

with less literature in ‘The Role of Digital Financial Inclusion in Achieving Sustainable Poverty Alleviation in Economies.’

Figure 1
PRISMA article selection for flow diagram



(Source: Authors' creation (2025))

Table 1
Inclusion criteria

Inclusion criterion	Focus on
1	Publications from 2018 to 2025
2	Publications in academic journals
3	Publications as articles
4	The articles in the English language
5	Empirical research that employed quantitative methodologies

(Source: Authors' creation (2025))

Empirical results

Study selection

140 articles were initially discovered in the Lens.org and Scopus databases. 4 articles were eliminated from the 140 total because they were duplicates. Following that, the authors began screening the documents. The Lens.org and Scopus databases' automatic screening feature was utilised to remove 95 articles. It's noteworthy that 10 articles were disqualified for failing to satisfy criterion 1. The writers have eliminated Dissertations (n = 6), books (n = 25), book chapters (n = 4), and conference proceedings (n = 40) were not included since they did not satisfy criteria 2 and 3.

Because they did not satisfy criteria 4, 10 papers authored in other languages were found and eliminated. Also, when the articles were checked manually for eligibility, it was discovered that the methodology was unclear (n=2), qualitative (n=3). These were eliminated because they did not satisfy criterion 5. As a result, 36 studies have been added to the final review since they satisfy all inclusion requirements.

Study Characteristics

36 publications from 29 journals were included in the review. The review used the results of 451 references and 75 keywords. The number of published papers has increased over the period; the greatest number of articles (10) was published in 2024, next by eight in 2023. However, no publications about the specific research criteria were found in 2019. The 9 journals that published the highest number of related articles out of 29 journals. Thus,

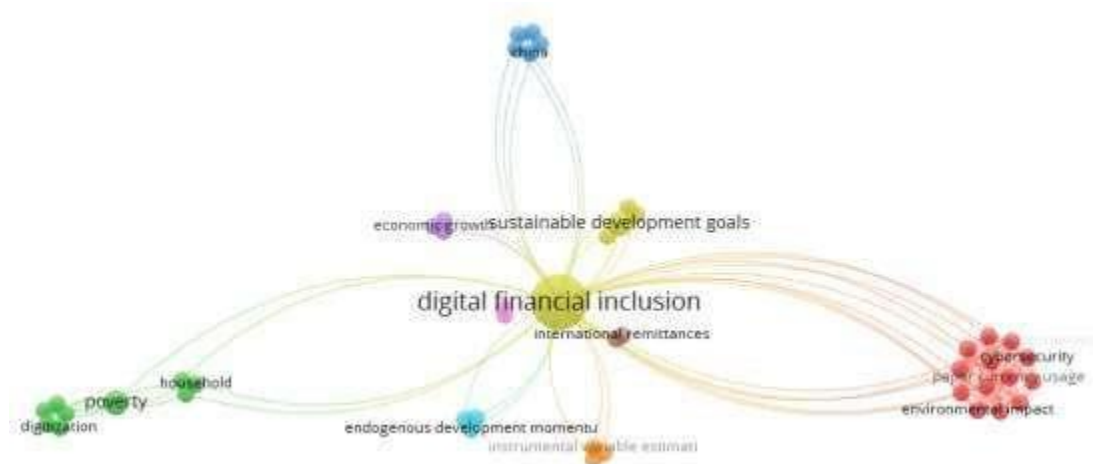
Elsevier BV (2 articles), Financial Inclusion and Sustainable Development in Sub-Saharan Africa (2 articles), and Frontiers in Business, Economics and Management (2 articles) reported having the highest number of publications.

Results of the articles

The current empirical knowledge

One or two keyword occurrences in the included articles for review are visualised as a keyword co-occurrence network in the following Figure 2. It shows the clusters of keywords with various colours.

Figure 2
Keyword co-occurrence network visualisation



Source: VOSviewer output

According to Figure 2 above, ‘digital financial inclusion’ and Poverty can be considered as the two main keywords of the study that have occurred many times and are interconnected with other keywords. It implies that a vast amount of empirical knowledge can be gathered in this cluster with significant impact. Researchers have found the interconnection among these two main keywords with other keywords as follows.

The role of digital financial inclusion in poverty alleviation is very important. Especially, digital financial technologies are helpful for the underprivileged populations experiencing multidimensional poverty (Ahmad & Arshad, 2025; Wang et al., 2024). In other words, through digitalisation, these marginalised communities can access services such as mobile banking, digital wallets, and international remittances. This improves their financial stability and entrepreneurial behaviour (Božović, 2025; Inoue, 2024). Digitalisation of financial services can reduce dependency on paper currency and improve transactional efficiency and cybersecurity. (Ahmad & Arshad, 2025). Digital platforms also encourage resource conservation by minimising the environmental impact of traditional banking infrastructure. Furthermore, Digital financial inclusion contributes to sustainable development practices and economic growth of a country (Mhlanga, 2024; Lee et al., 2023)

Table 2
Keyword co-occurrence

Theme	Keywords	Citations
Theme 1: Sustainable Fintech Ecosystems	Cybersecurity, environmental impact, financial technologies, innovative opportunities, paper currency usage, physical currency, digital infrastructure, resource conservation, responsible consumption, socio-economic development, sustainability, sustainable development, technology-driven financial services, underprivileged populations	Ahmad & Arshad, 2025; Baheti et al., 2024; Duvendack et al., 2023; Mhlanga, 2024; Wang et al., 2024; Wang & He, 2020
Theme 2: Digital Inclusion Dynamics	Digitisation, growth, household, inclusion, literacy, MSMES, poverty, rural, vulnerability	Božović, 2025; F. Wang et al., 2024; Hu et al., 2024; Li, 2025; Pei et al., 2024; Wang & He, 2020; Zhu, 2025
Theme 3: Inclusive Growth Analysis	China, econometric analysis, household consumption, inclusive growth, liquidity constraints	Duvendack et al., 2023; Li, 2025

Theme 4: Gendered Financial Inclusion	Digital financial inclusion, gender equality, India, sustainable development goals	Baheti et al., 2024; Li, 2025; Mhlanga, 2024, Zhu, 2025
Theme 5: Entrepreneurship-Led Growth	Economic growth, entrepreneurial behaviour, and the income of residents	Baheti et al., 2024; Li, 2025
Theme 6: Spatial Poverty Dynamics	endogenous development momentum, poverty alleviation areas, spatial measurement	(Wang et al., 2020)
Theme 7: Poverty Risk Resilience	instrumental variable estimation, risk-coping ability, vulnerability to poverty	(Wang & He, 2020) (Zhu, 2025)
Theme 8: Mobile Remittance Impact	International remittance, mobile penetration, poverty reduction	Inoue, 2024; Zhu, 2025
Theme 9: Multidimensional Poverty Effects	Multidimensional poverty, nonlinear effect	Cheng, 2023; F. Wang et al., 2024

Source: Author compiled based on VOSviewer output

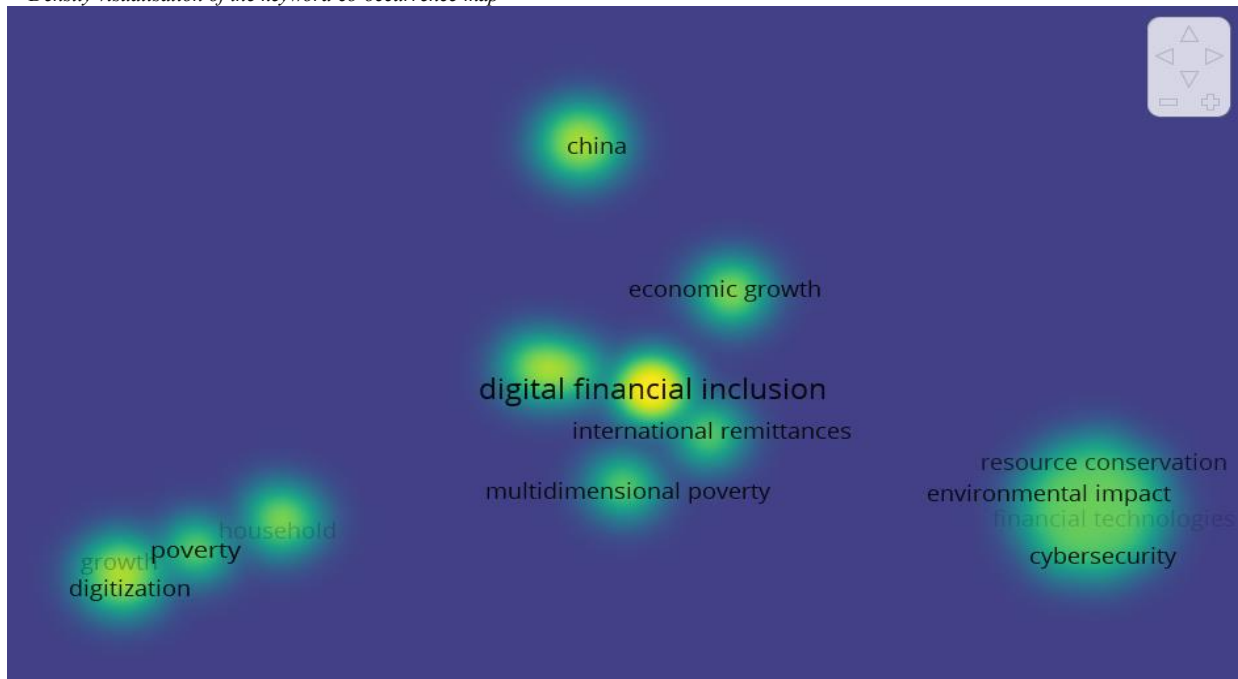
Theme 1 - Sustainable Fintech Ecosystems: Digital financial inclusion has become a very impactful factor when building sustainable fintech ecosystems, and it drives the alleviation of poverty and gains socio-economic development (Ahmad & Arshad, 2025). One impactful outcome of the technology-driven financial services is the minimisation of physical or paper currency usage. It not only fosters resource conservation and responsible consumption but also enhances access for underprivileged populations to financial services. The robust digital infrastructure improves financial technologies. (Wang et al., 2024). This will lead to innovative opportunities for sustainable development, while minimising environmental impact. Theme 2 - Digital Inclusion Dynamics: The digitalisation of financial services connects rural communities and vulnerable households. Further financial inclusion expands the financial literacy of Micro, Small, and Medium Enterprises (MSMEs) and reduces poverty, and mitigates vulnerability (Zhu, 2025). Theme 3 - Inclusive Growth Analysis: Digital financial inclusion increases household consumption and minimises liquidity constraints. This will lead to an inclusive growth of the economy (Li, 2025). Researchers can do econometric analysis to investigate how long-term financial resilience contributes to sustainable poverty alleviation. Theme 4 - Gendered Financial Inclusion: Empowering women for financial inclusion is helpful to bridge economic gaps and drives broader social transformation. On the other hand, digital financial inclusion improves gender equality (Li, 2025). Theme 5 - Entrepreneurship-Led Growth: Entrepreneurial behaviour is stimulated by digital financial inclusion, and it will boost the income of residents (Baheti et al., 2024). Finally, there will be an inclusive economic growth. Theme 6: Spatial Poverty Dynamics. This theme emphasises the importance of spatial measurement and localised development momentum, particularly in areas targeted for poverty reduction (Wang et al., 2020). Theme 7: Poverty Risk Resilience incorporates econometric approaches such as instrumental variable estimation to assess how digital financial inclusion affects risk-coping abilities. Theme 8 - Mobile Remittance Impact: Access to international remittance is improved by mobile penetration, allowing for effective transfers and promoting poverty reduction in marginalised communities (Inoue, 2024). Theme 9 - Multidimensional Poverty Effects: Digital financial inclusion reduces multidimensional poverty with a nonlinear effect. Because it enhances the health, education, and livelihood in diverse communities (Cheng, 2023).

Find areas with less literature

According to Figure 3 (density visualisation of keyword co-occurrence map), the keywords in the yellow area denote extensive research on the findings represented by such keywords and indicate sufficient knowledge of the area. The keywords in the green circle points of Figure 3 indicate fewer research areas. As examples, keywords such as international remittances, environmental impact, digitalisation, and cybersecurity are in the green circles. Such a low level of occurrences of keywords indicates an insufficiency of findings related to such keywords to generalise. Thus, future researchers must focus on these areas to generate more research for established knowledge.

Figure 3

Density visualisation of the keyword co-occurrence map



(Source: VOSviewer output)

Conclusion

This systematic review synthesises empirical research on the role of digital financial inclusion in achieving sustainable poverty alleviation from 2018 to 2025. The study analyses 36 articles from 29 journals, highlighting a growing body of knowledge, particularly in recent years (2023–2024). The nine themes highlight the broad impacts of digital financial inclusion on poverty alleviation. In order to promote sustainable development, inclusive growth places an emphasis on rising consumption by households and less liquidity constraints. Social change is fuelled by gendered financial inclusion, which supports gender equality and women's empowerment. Entrepreneurship-led growth demonstrates how citizens' incomes are increased through entrepreneurial activity when they have access to digital resources. The impact of mobile remittances demonstrates enhanced international transfer capabilities, supporting marginalised communities. Multidimensional poverty effects show how digital tools enhance livelihoods, education, and health in a variety of communities. In order to enable comprehensive sustainable development, other themes like sustainable fintech ecosystems and digital inclusion dynamics concentrate on creating environmentally responsible financial institutions and increasing access to vulnerable and rural communities. For the particular study, researchers have used VOSviewer and Biblioshiny. These bibliometric tools provide a valuable visualisation; however, they cannot fully capture the contextual depth of the studies. The review also identifies gaps for further research by pointing out that important topics like international remittances, environmental impact, digitalisation, and cybersecurity are underrepresented in the scope of current literature. Both theoretically and practically, this paper makes a significant contribution to researchers and policymakers. Theoretically, it emphasises the importance of digital finance as a multidimensional driver for sustainable poverty alleviation and how existing literature regarding this area. Practically, it guides policymakers to implement digital tools such as mobile banking, remittances to empower digital financial inclusion.

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A DATA-DRIVEN QUANTITATIVE FRAMEWORK FOR CRYPTOCURRENCY INVESTMENT PORTFOLIO DESIGN

M.A.N.Maleesha¹, U.P.Liyanage²

Abstract

Cryptocurrencies are digital currencies secured by cryptography techniques, and they use blockchain technology to provide decentralised transactions. Bitcoin, Ethereum, and Ripple are examples of over 37 million unique cryptocurrencies today. Often, cryptocurrencies are traded as assets analogous to stock trading, and this study focuses on such trading and investment opportunities. The main objective of this study is to form optimal portfolios by developing strategies based on risk, return, and price classifications. As the first step, feasible currencies were selected using market information and collected hourly price data for three months. After that, based on the volatility spectrum and the market dynamics, price, risk, and return levels were identified. One of the machine learning techniques, namely K-means clustering, is deployed in this level of identification. Concerning the total portfolio investment, small-scale investments ranging from 0\$ - 50\$, 50\$ - 150\$, and 150\$ - 500\$ are prioritised in the analysis. Addressing the different risk aversion behaviours of investors, strategies such as High Risk-High return, Moderate Risk-Moderate return, Low Risk-High return, and Low Risk-Moderate return have been considered in portfolio formation. A Monte-Carlo simulation framework is formed to investigate the performance of the portfolios consisting of cryptocurrencies belonging to different classes of price, risk, and return levels, to address the above investors' strategies. The Markowitz optimisation procedure optimises each of the portfolios. On average, the return of the resulting optimum portfolios exceeded the return of random portfolios that have not been formed according to such a quantitative framework. In conclusion, the steps involving price, risk, and currency level identification, strategically forming portfolios, and selecting the optimal portfolio to be exercised, have formed a rigid quantitative framework that can be utilised in cryptocurrency investment to result in better returns. This framework may be used in forming portfolios of any investment level. However, the machine learning algorithms used in the framework must be recalibrated to the cryptocurrency market changes reflected by the price fluctuation as time progresses.

Keywords: Cryptocurrency, k-means search, Markowitz optimisation, Monte-Carlo simulations, quantitative framework, risk classification

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DOI:

Introduction

The modern financial markets offer investors a wide range of options, such as stocks, bonds, Treasury bills, gold, and real estate. Further, investing in currencies is also a common practice among investors. In recent years, cryptocurrency adoption has accelerated dramatically around the world. The global crypto ownership rate is estimated at nearly 12-15% as of 2025. At the same time, over 510 million people hold digital assets, and that is nearly a 50% increment from five years ago. Major markets like India, Nigeria, and Vietnam account for significant growth, while Asia-Pacific now leads all regions with 37.6% of global market share. In the United States, over 15% of adults own cryptocurrencies, and 65% of millennials and Gen Z view digital assets as a preferred investment over traditional stocks.(CoinLaw, 2025). From these trends, cryptocurrencies show that they are new complex investment opportunities while addressing edges that traditional strategies often fail to address. Among the cryptocurrencies, Bitcoin takes a major place. It was the first cryptocurrency, and it was invented by an anonymous entity known as Satoshi Nakamoto in 2009 (Nakamoto, 2008).Bitcoin is now defined as ‘Digital Gold’ because of its market value and limited supply. One may earn cryptocurrencies by purchasing or mining them, in addition to receiving them as payment for goods and services (World bank group, 2018).

This research introduces a comprehensive quantitative framework that integrates price, risk and return classifications to guide portfolio formation, while other existing studies either focus solely on risk-return optimisation or apply traditional portfolio models directly to cryptocurrency data. Some Studies have demonstrated the success of Machine Learning (ML) algorithms such as Support Vector Machines, Random Forests, and K-means clustering in predicting market trends and optimising portfolios (Rajendran et al., 2024). This framework provides a systematic approach to tailor portfolios for different investment levels and risk appetites, particularly for small-scale investors, by combining machine learning-based clustering with Markowitz optimisation and Monte Carlo simulation. This multi-layered integration offers a novel practical contribution to cryptocurrency investment analysis, bridging the gap between theoretical optimisation models and real-world investment decision-making under high volatility.

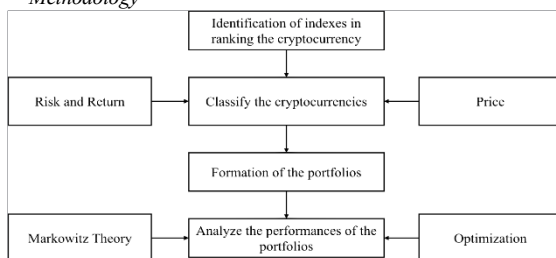
Theoretically, K-means clustering provides a robust mechanism to identify natural groupings of cryptocurrencies based on their statistical properties, reducing heterogeneity within clusters and improving model interpretability(Kocabiyyık et al., 2024). The Monte Carlo Simulation method allows portfolio behaviour to be tested across thousands of random market scenarios while enabling stochastic modelling of asset performance under uncertainty (Meher & Mishra, 2024).

Methodology

Often, the cryptocurrency investments are in the range of \$ 5000 or below. Nevertheless, the price of cryptocurrency can be as high as \$ 60,000 or as low as \$ 0.1. Further, investors use reliability ratings to select trustworthy currencies, depending on the financial information available. In this study, the historical hourly pricing data of trustworthy cryptocurrencies with values lower than \$ 300 is considered for analysis. Moreover, in the selection of currencies, data consistency is preserved by omitting currencies with missing price values. Therefore, highly priced cryptocurrencies such as Bitcoin and Ethereum were excluded despite their reliability and popularity. Excluding Bitcoin reduces market representation but helps focus on smaller cryptocurrencies with higher growth and diversification opportunities. The currency pricing data is available on many forex platforms. Herein, the ‘coinmarketcap’, which is a commonly used platform among financial analysts, is used to get the pricing data (Truong et al., 2020). Due to the rapid fluctuations, long-term investments are not practised in cryptocurrencies in the selected price. The dataset consists of the historical hourly prices of cryptocurrencies from November 1, 2024, to January 1, 2024.

The research methodology follows the flow chart shown in Figure 1.

Figure 1
Methodology



(Source: Developed by authors based on literature (2025))

Historical data show that volatility patterns may be reset within a 6-hour time frame, with a 2% margin. Consequently, risk and return patterns should be examined within this same timeframe to capture their changes accurately. Price ranges, on the other hand, exhibit significant changes (a 2% margin) within one week. Accounting for these volatility patterns, risk and return should be classified using price data for 6-hour, 12-hour, and 24-hour periods in determining their associated levels. For price data, the historical data patterns reveal that one week should be considered in classification to obtain its associated levels. To perform these classifications, an appropriate algorithm must be deployed. In this analysis, the K-Means algorithm has provided optimal results, making it the appropriate method for these classifications. K-means was chosen because it efficiently groups cryptocurrencies with similar price and risk patterns, making it ideal for numerical data. The cluster quality was validated using the Silhouette Score for cohesion and the Davies-Bouldin Index for separation.

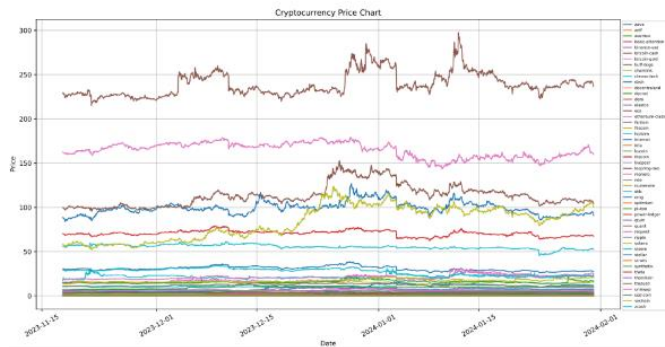
As the next step, illustrated in Figure 1, portfolios can be formed by selecting cryptocurrencies based on the risk, return, and price levels identified from the classification process. These levels are mapped to common risk diversification strategies: high risk-high return, moderate risk-moderate return, low risk-high return, and low risk-moderate return, allowing investors to choose the strategy according to their risk aversion behaviour. However, in complex investment portfolio formation, numerous risk/return diversification strategies can be employed. However, for small-scale investment portfolios, the chosen diversification is optimal. In forming portfolios, cryptocurrencies belonging to each class are randomly selected based on the strategy undertaken. Each selected set of cryptocurrencies forms a portfolio. This portfolio can be optimised using standard Markowitz portfolio theory. Nevertheless, for performance comparisons, the Monte Carlo technique is employed. This technique generates many such portfolios and compares their expected returns. The computational framework was built using Python (Version 3.11).

Results and Discussion

Adhering to the inclusion criteria defined in the Methodology section, 50 cryptocurrencies have been selected for this analysis. There were nearly 5000 data points because the hourly data were considered. Cryptocurrencies with missing values were excluded since the study emphasises developing a practical investment framework rather than a theoretical model. All data were used ethically in compliance with open-access research standards.

Figure 2

Price profile of selected cryptocurrencies



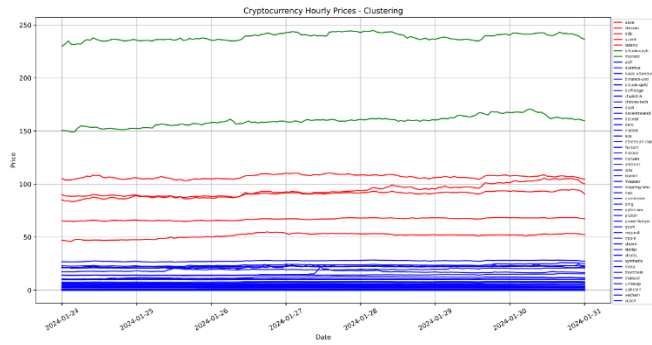
(Source: Developed by authors based on literature (2025))

Figure 2 shows the price patterns of these currencies over the specified period. The figure illustrates the different volatility patterns exhibited by cryptocurrencies. Some show high fluctuations, while others have moderate fluctuations. During the period investigated, the price patterns show relatively stable market behaviour. However, chaotic behaviour is also possible within the cryptocurrency market. Note that most of the currencies (about 80%) have below \$ 50 average price. Nevertheless, their volatility is low compared to the other currencies.

Price Classification

In the classification of cryptocurrency prices, one of the machine learning techniques, the K-Means Search, is used. The classification is performed over different time intervals of prices: one week, two weeks, and seven weeks. However, the classification consistently results in three classes, each containing the same set of cryptocurrencies.

Figure 3
Price classification: One-week prices



(Source: Developed by authors based on literature (2025))

Figure 3 shows the price classification considering one week. In this figure, two cryptocurrencies have comparatively high values and are classified into one class. Their price patterns are shown in blue. Five cryptocurrencies fall into a moderate price range, illustrated in red, and form the second class of price levels. The remaining cryptocurrencies, shown in green, have low price levels and form the third class.

The clusters in Figure 3 exhibit some behaviour when considering the 7-week average price as well, due to the market's stability.

Table 1 summarises the price classification along with its respective classes.

Table 1
Price classification, along with respective classes

Price category	Cryptocurrency
Low	self, aventus, basic-attention, binance-usd, bitcoin-gold, buff-doge, chainlink, chrono-tech, dash, decentraland, decred, dero, elastos, eos, ethereum-classic, fantom, filecoin, horizen, internet, iota, kucoin, livepeer, loopring-neo, neo, numeraire, omg, optimism, pluton, power-ledger, qtum, request, ripple, steem, stellar, stratis, synthetix, theta, thorchain, trueusd, uniswap, usd-coin, vechain, zcash
Moderate	aave, litecoin, okb, quant, solana
High	bitcoin-cash, monero

(Source: Developed by authors based on literature (2025))

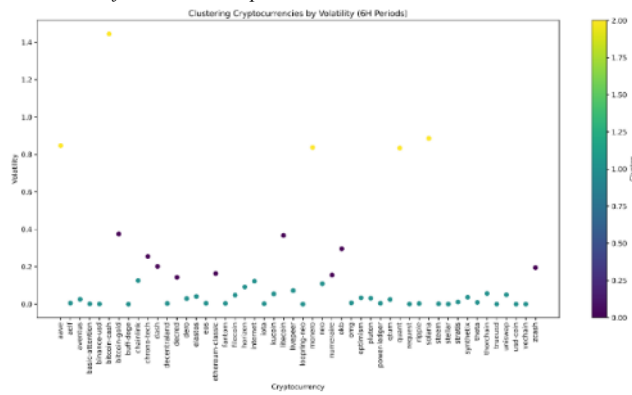
Risk and Return Classification

Risk is typically measured by the volatility of prices over a certain period, while returns are calculated using the following Equation 1.

$$R_t = \frac{P_t - P_0}{P_0} \quad (1)$$

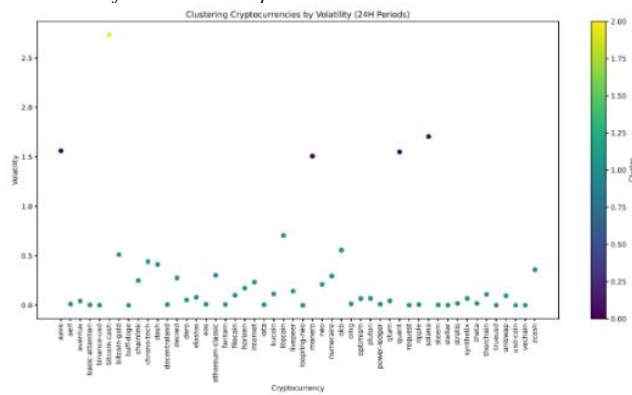
Here, P_0 is the price at the beginning of the period, P_t is the price at the end of the period and R_t is the return over the period. For this analysis, four short-term periods were considered for risk and return calculations: 6 hours, 12 hours, 24 hours, and 48 hours, assuming the short time investments. For these time periods, risk and return levels were also identified using the K-means clustering technique. These time frames were selected to capture the high-frequency volatility characteristics of the cryptocurrency market, where prices fluctuate significantly within short durations. Figures 4 and 5 show the resulting classification for the risk levels for the 6-hour and 24-hour periods, respectively.

Figure 4
Risk classification: 6-hour period



(Source: Developed by authors based on literature (2025))

Figure 5
Risk classification: 24-hour period



(Source: Developed by authors based on literature (2025))

As the figures illustrate, there is not much difference among the risk classes, indicating consistency. The results were consistent with the other two time periods as well. Table 2 summarises the risk classification of the currencies along with their respective classes.

Table 2
Risk classification

Risk Class	Cryptocurrency
Low	aelf, aventus, basic-attention, binance-usd, buff-doge, chainlink, dero, elastos, eos, fantom, filecoin, horizen, internet, iota, kucoin, livepeer, loopring-neo, neo, omg, optimism, pluton, power-ledger, qtum, request, ripple, steem, stellar, stratis, synthetix, theta, thorchain, trueusd, uniswap, usd-coin, vechain
Moderate	bitcoin-gold, chrono-tech, dash, decentraland, decred, ethereum-classic, litecoin, numeraire, okb, zcash
High	bitcoin-cash, monero

(Source: Developed by authors based on literature (2025))

As mentioned above, the return classes were also identified. The results are summarised in Table 3 below.

Table 3
Risk classification

Return Class	Cryptocurrency
Low	internet, kucoin, optimism, solana
Moderate	zcash, aelf, aventus, bitcoin-gold, chainlink, chrono-tech, decred, elastos, ethereum-classic, fantom, filecoin, iota, numeraire, okb, synthetix, theta, uniswap, vechain
High	aaave, basic-attention, binance-usd, bitcoin-cash, buff-doge, dash, decentraland, dero, eos, horizen, litecoin, livepeer, loopring-neo, monero, neo, omg, pluton, power-ledger, qtum, quant, request, ripple, steem, stellar, stratis, thorchain, trueusd, usd-coin

(Source: Developed by authors based on literature (2025))

Portfolio formation and Optimisation

To construct an optimised portfolio, the allocation strategy was designed based on three key factors: price, risk, and return clusters. These clusters were determined through prior analysis and classified into three distinct categories: low, moderate, and high. The main aim of this algorithm is to address the risk-aversion behaviour of investor profiles. According to the available capital, a dynamic price selection mechanism was implemented.

- Investment Amount: \$10 - \$1000: The portfolio primarily consists of low-priced cryptocurrencies.
- Investment Amount: \$100 - \$10,000: The focus is on moderate-price cryptocurrencies.
- Investment Amount: Above \$10,000: The portfolio allocates a higher weight to high-priced cryptocurrencies.

This step ensured that the portfolios' price structure matched the investor's capital size.

- (1) Allocation Strategy: The allocation strategy was guided by defined weights for risk tolerance, price range, and return expectations. Investor's risk aversion behaviour was introduced as conservation, balanced, or aggressive. Then, depending on that risk tolerance, a weight distribution was applied to low, moderate, and high-risk clusters. The strategy was further refined based on expected returns and the price range, which related to the investment amount.

For example, an Aggressive investor with a high return expectation and an investment amount in the low price range would allocate as follows:

- Risk Allocation: 20% to low-risk, 30% to moderate-risk, and 50% to high-risk cryptocurrencies.
- Price Allocation: 70% to low-price, 20% to moderate-price, and 10% to high-price cryptocurrencies.
- Return Allocation: 10% to low-return, 30% to moderate-return, and 60% to high-return cryptocurrencies.

Cryptocurrencies from each cluster were randomly selected based on the above-weight allocation. From that, the aim was to ensure balance and diversity within the portfolios, and to align the investor's expectations at the same time.

- (2) Portfolio Optimisation: While addressing the allocation constraints, the selected cryptocurrencies were then subjected to Markowitz portfolio optimisation, aiming to maximise the Sharpe ratio. This was achieved through the following steps.
 - Return Calculation: The percentage change in the historical price data for each selected cryptocurrency was calculated, producing a return dataset.
 - Optimisation: Using the return data, portfolio weights were optimised through the Markowitz method, which balances expected returns against portfolio volatility.
 - Efficient Frontier Analysis: The optimised portfolios were plotted on the efficient frontier to identify the portfolio with the maximum Sharpe ratio.

The final finding of the portfolio construction was that the allocation aligned with the investor's risk, return, and price preferences while optimising for the highest potential return given the specified constraints. Table 4 indicates the optimum portfolios for the High risk- High return strategy.

Table 4
Optimum portfolios for the High risk- High return strategy

0\$-100\$	100\$-1000\$	1000\$- above
No portfolios available	aave-0.4397 quant-0 monero-0.56029 bitcoin-cash-0	aave- 0.90696 quant - 0.0913
	Return 5.2642e-05	Return 5.3522e-05

(Source: Developed by authors based on literature (2025))

Table 5 indicates the optimum portfolios for the Moderate risk - Moderate return strategy.

Table 5
Optimum portfolios for the Moderate risk - Moderate return strategy

0\$-100\$	100\$-1000\$	1000\$- above
zcash-0.728572 bitcoin-gold-0.10871 thorchain-0.42404	kucoin-0.162535 zcash-0.728572 bitcoin-gold-0.1025	bitcoin-gold-0.18087 zcach-0.72848 numeraire-0.16277
Return 0.000261	Return 0.0002635	Return 0.00265

(Source: Developed by authors based on literature (2025))

Table 6 indicates the optimum portfolios for the Low Risk-High return strategy.

Table 6

Optimum portfolios for the Low Risk-High return strategy

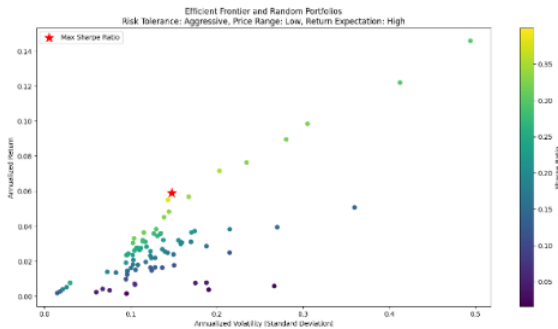
0\$-100\$	100\$-1000\$	1000\$- above
basic-attention-0.015417 binance-usd-0.0435 buff-doge-0.08199 dero-0.1825 loopring-neo-0.050224, thorchain-0.2128 trueusd-0.086 ripple-0.18 stratis-0.05653 usd-coin-0.0372	basic-attention-0.015417 binance-usd- 0.0434 buff-doge-0.08199 dero- 0.18248 livepeer-0.546 loopring-neo- 0.050224 pluton-0.0537 ripple-0.18 thorchain-0.2128 trueusd-0.086 usd-coin-0.0379	basic-attention-0.0095 binance-usd-0.04206 buff-doge-0.0792 dero-0.179 livepeer-0.0545 loopring-neo-0.0486 pluton-0.0489 thorchain-0.209 ripple- 0.1753 trueusd-0.085 usd-coin-0.0365 aventus – 0.0313
Return 0.0001797	Return 0.0002635	Return 0.00265

(Source: Developed by authors based on literature (2025))

Figure 6 and Figure 7 illustrate the Efficient Frontiers generated from the portfolio optimisation process, showing the potential risk-return trade-offs for different portfolio compositions.

Figure 5

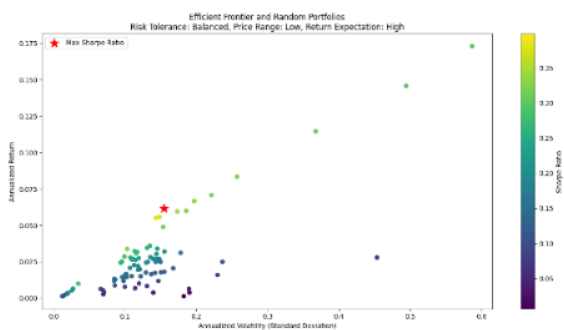
Efficient Frontiers generated from the portfolio optimisation process



(Source: Developed by authors based on literature (2025))

Figure 6

Efficient Frontiers generated from the portfolio optimisation process



(Source: Developed by authors based on literature (2025))

Conclusion

The cryptocurrency market is a volatile market, unlike traditional stock exchanges. And there is no centralised association to govern the transactions. This is very important to investors because they don't have to pay any transaction fees. The main goal of this study is to develop a novel framework to form portfolios in the cryptocurrency market. According to the above methodology, a novel version of the framework was developed. Price, Return, and Risk classifications play major roles in this framework. According to the results, the clusters have high accuracy. And the number of clusters always became three. The levels are defined as High, Moderate, and Low. This framework requires continuous practice with the new prices. If someone follows this sequence of

steps, they will have the optimum portfolio. Using this result, the investor can identify the portfolio spectrum as well. Additionally, need to mention that this study is about only for the quantitative basis of the cryptocurrency market. The qualitative measures also affected the return. With proper investigation of the market dynamics and the investor decisions cryptocurrency market has the potential to give continuous returns to the investor. The News and sentiment changes can strongly impact cryptocurrency returns then the framework may be affected. Future studies should integrate AI-based techniques to improve the framework.

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THE IMPACT OF FINANCIAL LITERACY AND FUTURE ORIENTATION ON INVESTMENT DECISION MAKING: EVIDENCE FROM THE WESTERN PROVINCE, SRI LANKA

Rathnayake. W.R.A.T.S¹, Panamaldeniya. A.A.M.A.K², Balasooriya A.B.S.T³

Abstract

Selecting the right investment option involves making informed decisions about where to allocate funds. This is crucial for both individual financial success and for the broader economic well-being. This study examines the impact of Financial Literacy and Future Orientation on Investment Decision-Making among investors in the Western Province of Sri Lanka. Financial Literacy is tested through financial knowledge, skills, and attitudes, while Future Orientation is examined in terms of long-term and short-term orientations. The main objective of this study is to find the relationship and influence of Financial Literacy and Future Orientation on Investment Decision Making. A total of 393 responses were collected through a structured questionnaire distributed among investors in the Western Province, Sri Lanka. The analysis covers hypothesis testing, correlation testing, contingency tables, including plots and statistical summaries generated from SPSS software. The response variable, Investment Decision making, is examined through a Multiple Linear Regression model. According to the results, Financial Literacy and Future Orientation exhibit a significant positive impact on choosing investment options. Financial Attitude is identified as the top contributor of Financial Literacy for Investment Decision Making, whereas the Long-Term Orientation is discovered as a key element of Future Orientation for making investment decisions. Moreover, a positive impact is indicated by all the predictors in the regression model. The findings of the study highlight the need for policymakers, educators and financial institutions to design targeted financial literacy programs that go beyond the technical skills to emphasise understanding. Hence, having more financial understanding and competencies, along with a positive financial mindset, is better for investors to invest in the best investment opportunities.

Keywords: Financial Literacy, future orientation, investment decision making, investors

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DOI:

Introduction

Background of study

Investment decision-making is a critical process, and the methodology varies among individuals. According to Williams (2007), financial literacy is a globally important sector for everyone involved in business, including board members, shareholders, employees and the general community. Inadequate financial literacy results in costly borrowing, excessive debt, restricted involvement in the financial sector, and insufficient retirement planning (Rasoaisi & Kalebe, 2015). Effective financial resource management is, therefore, an essential component of achieving life satisfaction.

Individuals' financial planning processes are greatly influenced by the conflict between short- and long-term results, which defines their level of future orientation (Howlett et al., 2008). Future orientation represents the extent to which an individual engages in future-focused behaviours such as saving, planning, and postponing gratification (Ansar et al., 2019), according to I. Khan et al. (2021), societies promote frugality, savings, and long-term investments as means of securing and enhancing future lifestyles. Consequently, investors in cultures that are long-term oriented typically commit more time and resources to choosing the best investments for the sake of achieving long-term goals.

A lack of financial literacy may obstruct the development of a country or a nation in several ways. It may lead to high levels of debt, restricted access to financial services, low savings and investment rates, limited entrepreneurship and innovation, and elevated inequality. In recent research in Sri Lanka, Madhushani and Rajapakse (2023) revealed that the level of financial literacy among professionals is often moderate. Individuals with low financial literacy tend to make uninformed financial decisions that reduce their overall well-being (Albeerdy & Gharleghi, 2015; Mohammed Esmail Alekam et al., 2018). Since there has been limited focus on analysing financial literacy and future orientation in investment decision-making among investors in the Western Province of Sri Lanka, it is worthwhile to research the impact of financial literacy and future orientation on investors in Sri Lanka.

Research objectives

This study examines the impact of Financial Literacy and Future Orientation on Investment Decision-Making among investors in the Western Province of Sri Lanka. Accordingly, the objectives of this study are as follows:

RO1: To identify the relationship between financial literacy, future orientation and investment decision making among investors in Western Province.

RO2: To examine the impact of financial literacy and future orientation on investment decision-making among investors in Western Province.

RO3: To find the most influential aspect of financial literacy and future orientation for investment decision-making among investors in Western Province.

The study will assist in identifying the influence of financial literacy and future orientation on making better-informed investment decisions. The findings will assist educators and policymakers in designing programs and policies to initiate financial well-being, reduce financial stress, and enhance economic growth. This information may be used to develop innovative policies and initiatives that support stability and economic expansion, ultimately increasing the country's GDP.

Literature Review

Theoretical background

A comprehensive strategy developed to improve financial literacy and enhance the well-being of finance is the OECD/INFE framework for financial literacy. Those who make decisions, governments, policymakers, and other parties who are interested can use the framework as a guide to create, carry out, and assess financial literacy initiatives (Howlett et al., 2008). According to the "prospect theory", it shows people are risk-averse on losses and risk-seeking in profits. Behavioural Finance provides examples of how various investors perceive and respond to information in the market. Ricciardi & Simon (2000) stated that behavioural finance characterises and advances our understanding of the emotional components of investor reasoning and how these factors impact the process of decision making. Goal-setting theory is a theory of encouragement that highlights the connection between

setting goals and the execution of results, which is very crucial in finance. These theories are incorporated in the current study to fulfil the objectives mentioned.

Investment decisions, financial literacy and future orientation

Making decisions about investments entails deciding where, how, and how much to put into different financial instruments to increase their value or generate revenue. According to the OECD/INFE Framework, financial knowledge, financial skills, and financial attitudes are the vital components of financial literacy. Hajam (2020) has defined Future orientation as “a person’s beliefs and assessment of how they will interact with their environment in the future”, describing it as a complex motivational cognitive process. According to Khalidah (2022), both future orientation and financial literacy are critical components that enhance pension fund planning, which is an important aspect of investment decision-making.

Empirical evidence from global context

Khan (2020) investigates the moderating influence of financial literacy at the Islamabad Stock Exchange and the impact of herding bias, disposition effect, and psychological accounting bias on investment decisions. A study conducted in Pakistan by Chaudary, Zafar and Tang (2024) revealed that, while not applicable to retail investors, the perspectives of professional money managers significantly influenced both long-term and short-term investment decisions. Kanagasabai and Aggarwal (2020) investigated the effects of risk resilience as a mediating variable between investment success and financial literacy, utilising a well-designed questionnaire to collect data from 203 investors in Chennai, India. In Malaysia, Albeerdly & Gharleghi (2015) have done research on the factors affecting the financial literacy of the students. In the mentioned study, they have concluded that financial literacy rates of Malaysian students are directly impacted by financial socialisation agents, education and money views.

Empirical evidence from local context

Balagobei and Prashanthan (2021) examined how individuals’ investing decisions are influenced by their level of financial literacy in the Jaffna area. The findings revealed that financial literacy, including its components of financial conduct, financial attitude, and financial knowledge, is positively related to investment decision-making. Similarly, Priyadarshani and Kumari (2021) conducted a study aimed at identifying the factors that impact personal financial literacy among university students in Sri Lanka. The research on undergraduates’ financial literacy and investment decisions conducted by D.A.T. (2020) involved 200 students from the four main government universities in the Western Province of Sri Lanka. Moreover, the study by Madhushani and Rajapakse (2023), found that professionals have a moderate level of awareness and understanding in both basic and advanced financial literacy. However, the financial literacy of professionals in non-management schemes, such as doctors and attorneys, was relatively low. Despite these contributions, a gap remains in the local literature, as few studies have examined investment decision-making by jointly considering the effects of both financial literacy and future orientation. The present study, therefore, focuses on this gap, with special attention given to investors in the Western Province.

Methodology

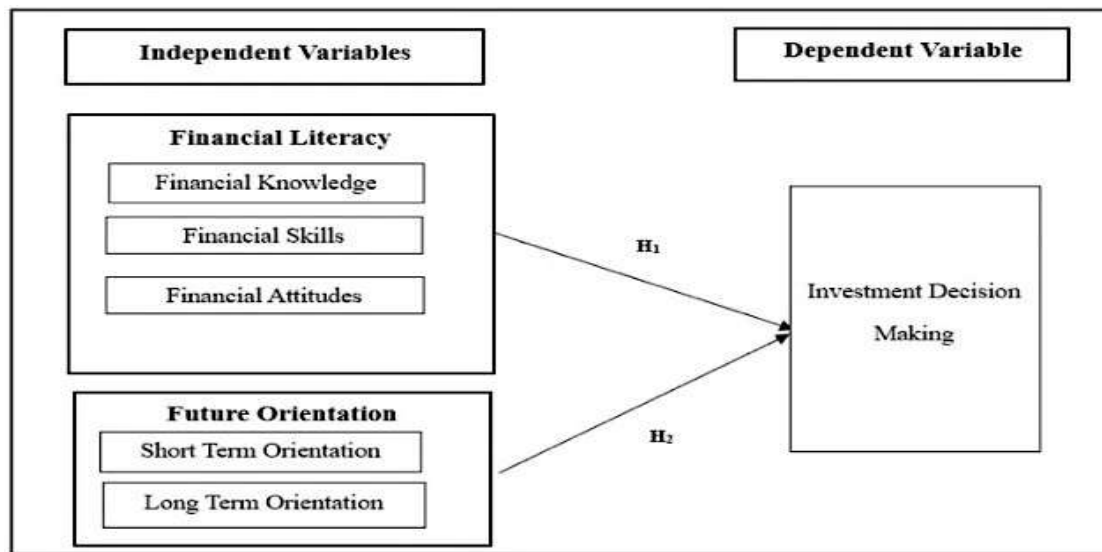
This study employs a deductive and quantitative methodology that utilises established findings and hypotheses. The research is a cross-sectional study, meaning data is collected from individuals at a singular moment in time. The investors in Western Province were designated as the research population. Individuals above 20 who have invested in at least one platform and live in the Western province are considered investors for the study. Due to the unknown population size, the Morgan table is utilised to determine the sample size. The calculation indicates that a minimum of 385 replies is required when the population size is unknown, with a margin of error set at 5%. Convenience sampling is employed as the sample technique. A self-administered questionnaire is shared with the convenience investors via online. The response rate is reported as 96.25%. The questionnaire consists of seven sections, such as Demographic Information, Financial Knowledge, Financial Skills, Financial Attitudes, Short-Term Orientation, Long-Term Orientation and Investment Decision Making. A total of 393 responses were collected through the distributed questionnaire, and the data collected were analysed using SPSS version 22. The reliability of the questionnaire is tested via statistical tests.

Based on the studies discussed in the literature review, Figure 1 shows the conceptual framework and hypothesis developed to examine the impact of Financial Literacy and Future Orientation on Investment Decision-Making among investors in the Western Province of Sri Lanka.

H1: *There is a significant relationship between Financial Literacy and Investment Decision Making.*

H2: *There is a significant relationship between Future Orientation and Investment Decisions.*

Figure 1
Conceptual Framework



(Source: Developed by authors based on literature (2025))

The study's variables are primarily derived from the literature. The dependent variable is investment decision-making, while the independent variables include the components of financial literacy (knowledge, skills and attitudes) and future orientation (short-term and long-term perspectives). All the variables gather data via a Likert scale, having a range from 1 to 5 (Antonides et al., 2011).

Results and Analysis

Cronbach alpha test for reliability and Kaiser–Meyer–Olkin (KMO) test

For the 36-item scale, Cronbach's Alpha value was 0.934, which is more than 0.7, indicating a high level of internal consistency. Additionally, Cronbach's Alpha values for each section of the questionnaire also exceeded 0.7, confirming the reliability of all variables across the different sections. According to the KMO test, the sampling adequacy value is 0.930, and it is significant at 5% significance level. This indicates that the original data is well-suited for conducting factor analysis as well.

Descriptive statistics analysis

Data received from respondents indicates that 49.62% are female and 50.38% are male. The highest percentage of responses, 90.84%, is derived from the 20–30 age group. A notable proportion, 47.8% (188 respondents), earn in excess of Rs. 100,000 monthly, likely reflecting elevated levels of education, including postgraduate and graduate qualifications in high-paying roles. On the other hand, 50 respondents, constituting 12.7%, earn below Rs 20,000. The majority of respondents are investing in Fixed Deposits.

Descriptive statistics for the independent variables and dependent variable

Within the Financial Literacy factors, Financial Attitudes exhibits the greatest mean (4.0030), whereas Short-Term Orientation displays the lowest mean (3.1841) among Future Orientation variables. Short-Term Orientation displays a slight positive skewness, but most variables exhibit negative skewness, signifying a concentration of responses at elevated values. Kurtosis values show various data distributions, ranging from platykurtic (e.g., Short-Term Orientation) to leptokurtic (e.g., Financial Attitudes and Financial Literacy). The data is suitable for further investigation as it typically demonstrates positive trends, moderate variability, and satisfactory levels of normalcy.

The dependent variable exhibits the subsequent summary of descriptive statistics. The sample size (N) consists of 393 responses, indicating that the responses encompass the entire scale, with a range of 4, a maximum value of 5, and a minimum value of 1. The standard error is 0.03238, and the mean value is 3.7031, suggesting predominantly affirmative responses. The data exhibits moderate variability, indicated by a variance of 0.412 and a standard deviation of 0.64182.

Inferential statistics

Correlation analysis is a statistical technique used to measure the strength and direction of the relationship between two continuous variables. In this study, Karl Pearson's correlation coefficient is used, which ranges from -1 to +1. A value close to (+1) indicates a strong positive relationship, a value close to (-1) indicates a strong negative relationship, and a value near 0 indicates no relationship. Based on this approach, the following hypotheses are tested in the study.

H1: *There is a relationship between Financial Literacy and Investment Decision Making.*

H2: *There is a relationship between Financial Knowledge and Investment Decision Making.*

H3: *There is a relationship between Financial Skills and Investment Decision Making.*

H4: *There is a relationship between Financial Attitudes and Investment Decision Making.*

H5: *There is a relationship between Future Orientation and Investment Decision Making.*

H6: *There is a relationship between the Long-Term Orientation and the Investment Decision Making.*

H7: *There is a relationship between the Short-Term Orientation and the Investment Decision Making.*

Table 1
Results of hypothesis testing

Hypothesis	Pearson Correlation Value
H1	0.657
H2	0.535
H3	0.547
H4	0.589
H5	0.607
H6	0.590
H7	0.378

(Source: Authors' Compilation)

Table 2
Model summary

R	R Square	Adjusted R Square	Durbin Watson
.706	.498	.491	2.168

(Source: Authors' Compilation)

Table 3
ANOVA results for the regression model

Model	Sum of Squares	Degrees of Freedom	Mean Square	F-value	Significance
Regression	80.408	5	16.082	76.769	.000
Residual	81.069	387	.209		
Total	161.477	392			

(Source: Authors' Compilation)

According to Table 1, all independent variables suggest a significant positive relationship with the dependent variable. Therefore, for further analysis, the MLR model is applied.

Multiple linear regression model

According to Table 2, the R^2 for the fitted MLR model is 0.498. Therefore, 49.8% of the variability in the Investment Decision Making variable is explained by the independent variables. Also, in accordance with the results, much variation cannot be seen between the R^2 values and the Adjusted R^2 value for the fitted model. This indicates a better fit on the fitted model. The Durbin-Watson for the fitted MLR model is 2.168, which is closer to 2 and within the range 1.5 and 2.5. It can be concluded that there is no autocorrelation in the fitted model. This is the hypothesis for the ANOVA test of the regression model. H_A : Model is valid

In accordance with Table 3, the p-value obtained from the ANOVA test is 0, which is below the threshold. Hence, the alternative hypothesis can be accepted at the 5% level of significance, which can be summarised as the fitted MLR model is significant and valid. Since the fitted model is significant, the interpretations of the coefficients can be made. The VIF values under 5 are acceptable and reveal no multicollinearity. The tolerance values are also not less than 0.1, indicating the same conclusion.

According to Table 4, all the coefficients except the coefficient for Financial Skills are significant at 5% significance level. The model can be written as follows.

$$y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 \dots \dots \dots (1)$$

$$\text{Investment Decision Making} = 0.325 + 0.171 (\text{Financial Knowledge}) + 0.086 (\text{Financial Skills}) + 0.225 (\text{Financial Attitudes}) + 0.156 (\text{Short Term Orientation}) + 0.271 (\text{Long Term Orientation})$$

All the coefficients are positive, indicating a positive impact on the dependent variable.

Table 4
Coefficients of the regression model

Model	Unstandardized Coefficients		Standardized Coefficients	t-value	Significance	Collinearity Statistics	
	Beta	Standard Error	Beta			Tolerance	VIF
Constant	.325	.175		1.85	.049		
Financial Knowledge	.171	.05	.165	3.42	.001	.557	1.79
Financial Skills	.086	.053	.088	1.61	.107	.44	2.27
Financial Attitudes	.225	.049	.24	4.56	.0	.467	2.14
Short-Term Orientation	.156	.035	.177	4.47	.0	.831	1.2
Long-Term Orientation	.271	.053	.259	5.088	.0	.499	2.0

(Source: Authors' Compilation)

Model diagnostic tests

The VIF values of all the input variables are within the acceptable range (1-5), and no correlation exists between the independent variables in the fitted model. The tolerance values are also not less than 0.1, indicating the same conclusion that no serious correlation exists between the independent variables. The residuals are randomly distributed. Hence, this MLR model has no issues with heteroscedasticity. The PP-Plot obtained for the fitted model indicates that standardised residuals are distributed close to the regression line. That indicates the normality of residuals. Therefore, the assumption of normality is fulfilled for the fitted regression model.

Discussion

The results indicate that the proportions of males and females are approximately equal, nearing 50% each. The majority of responders are aged between 20 and 30 and are graduates. More than Rs 100,000 per month was earned by the largest percentage of respondents. The investment platform in which the greatest number of respondents have invested is Fixed Deposits, followed by Stock Markets. Investors possessing the greatest academic credentials appear to have adequate financial expertise. Investors with a monthly income ranging from Rs 20,000 to Rs 50,000 appear to be managing their budgets. Investors over the age of 50 appear to have effectively controlled both essential and non-essential expenditures. Furthermore, investors from all risk categories appear to be present in the current study.

A notable correlation exists between Financial Literacy and Investment Decision Making at a 5% significance threshold. A correlation coefficient of 0.657 indicates a favourable correlation. This suggests that elevated financial literacy correlates with a greater willingness and capacity to make educated investing decisions. The Financial Attitudes variable, possessing the highest correlation coefficient, can be identified as the most influential part of Financial Literacy. This suggests that investors' attitudes about finance significantly influence their investment decisions. A correlation coefficient of 0.607 signifies a favourable relationship; specifically, increased preparation and foresight enhance the willingness and capacity to make investment decisions. The primary factor of future orientation affecting investment decision-making is identified as long-term orientation, since it exhibits the strongest correlation coefficient.

All independent variables, except Financial Skills, are significant at the 5% significance level in the fitted model, indicating a substantial impact on investment decision-making. This suggests that having financial skills alone (like budgeting or record-keeping) may not directly influence the investment decisions unless combined with financial understanding or positive attitudes. However, as stated by D.A.T. et al. (2020), small firms' financial skills have a direct impact on their investment decisions. All coefficients in the model are positive, indicating that the influence of the independent variables on investment decision-making is favourable. The focus on long-term variables exerts the most significant positive influence on investment decision-making as it has the highest coefficient value. Within financial literacy, financial attitudes demonstrate the strongest positive effect according to the fitted model. The model is valid at a 5% significance level, and all assumptions have been validated to support its validity. In summary, the influence of Financial Knowledge, Financial Attitudes, Financial Skills, Short-Term Orientation, and Long-Term Orientation on Investment Decision Making is positive, with Long-Term Orientation and Financial Attitudes exerting the most significant positive impact. This indicates that individuals with a strong long-term orientation and favourable financial attitudes are more likely to make sound investment decisions. While financial knowledge and skills are important, attitudes toward finance and future-oriented thinking are equally crucial for informed and prudent investment decisions.

It is recommended to promote long-term financial planning and investment behaviour, and to conduct financial literacy training programs, ensuring that people apply their financial knowledge to make wise financial decisions. The findings of the study will contribute to reducing the financial stress of various stakeholders and enhance the economic growth of the country. However, the researcher focuses on regions, giving special attention to the Western Province. Still, this limitation makes it impossible to include all investors in the study's sample.

Conclusion

This study was conducted to examine the impact of financial literacy and future orientation on Investment decision-making among investors in Western Province. According to the results, both future Orientation and financial literacy have a significantly positive impact on Investment decision-making. Moreover, the most influential aspect of financial literacy for Investment Decision-Making is identified as the Financial Attitudes of investors, and the most influential aspect of Future orientation for investment decision-making is long-term orientation. Apart from that, risk-averse, risk-neutral and risk-seeking investors are identified in the sample collected. Hence, financial literacy and future orientation are crucial when making informed and best investment decisions. Moreover, apart from financial literacy and future orientation, other factors can be combined with the study, and therefore, the current study on Investment Decision Making can be extended to further factor analysis.

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THE INFLUENCE OF BIG FIVE PERSONALITY TRAITS ON FINANCIAL RISK TOLERANCE ACROSS GENERATIONS IN THE COLOMBO AREA

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Abstract

This study investigates the influence of the Big Five personality traits—openness, conscientiousness, extraversion, agreeableness, and neuroticism—on financial risk tolerance across generational cohorts in Sri Lanka. The aim is to understand how personality traits shape financial decision-making among Generation Z (12–27), Millennials (28–43), Generation X (44–59), and Baby Boomers (60–78). A quantitative survey was conducted with 400 participants, evenly distributed across the four generational groups. Correlation and regression analyses were applied to examine the relationships between personality traits and financial risk tolerance. The results reveal significant generational differences in financial risk tolerance and associated personality traits. Extraversion and neuroticism emerged as the most influential predictors. Extraversion was positively correlated with financial risk tolerance across all generations, while neuroticism showed a consistent negative correlation. Younger generations (Gen Z and Millennials) demonstrated higher openness and extraversion but reported lower levels of financial risk tolerance. In contrast, older generations (Gen X and Baby Boomers) exhibited higher conscientiousness and lower risk tolerance. The findings confirm that personality traits, particularly extraversion and neuroticism, significantly influence financial risk tolerance across generations. These insights suggest the importance of incorporating personality and generational characteristics into financial advising, product design, and educational initiatives. Future research should explore additional psychological variables, such as financial literacy and self-control, and consider cultural influences on financial behaviour.

Keywords: Big Five personality traits, financial risk tolerance, generational difference

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Proceedings of the 16th International Conference on Business and Information - ICBI 2025 © 2025 by The Faculty of Commerce and Management Studies, University of Kelaniya, Sri Lanka is licensed under CC BY-SA 4.0.

DOI:

Introduction

Financial management is central to everyday life, influencing the decisions of pensioners, professionals, and investors alike. As investment options grow increasingly complex (Filbeck et al., 2005), evaluating financial risk tolerance the willingness to accept risk for potential returns, has become vital. Risk tolerance is shaped by demographic, social, and cognitive factors, with personality emerging as a key determinant. Prior research suggests generational experiences can moderate these relationships (Exley et al., 2021; Rodrigues & Gopalakrishna, 2023). Building on this foundation, the present study investigates how the Big Five personality traits Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism influence financial risk tolerance across four Sri Lankan generational cohorts: Baby Boomers, Generation X, Millennials, and Generation Z. (Kuzniak & Grable, 2017). Recognising such differences is crucial for both individual investors and financial advisors to support informed investment decisions (Dickason & Ferreira, 2018).

In Sri Lanka, investment choices are influenced by risk tolerance, demographics, and cognition. Few local studies examine how the Big Five personality traits affect generational differences, especially in Colombo, where digitalisation shapes investment, highlighting the need for tailored financial strategies. The research problem in Sri Lanka is that individuals' investment decisions across stocks, real estate, and bank deposits are influenced by risk tolerance, which is shaped by personality traits and varies across generational cohorts. The research question guiding this study asks how the Big Five personality traits openness, conscientiousness, extraversion, agreeableness, and neuroticism affect financial risk tolerance among Millennials, Generation X, and Baby Boomers in Colombo. The study aims to examine relationships between personality traits and risk tolerance, identify generational differences, and provide recommendations for financial planning, policymaking, and educational programs tailored to each cohort's characteristics. In 2023, Sri Lanka's labour force participation was 62.6%, with investments contributing 31.1% to GDP, indicating that most investments are made by this workforce. Colombo, as a financially literate hub, is an ideal setting to study financial behaviour. This study focuses on personality traits as predictors of financial risk tolerance, while excluding factors like income, literacy, and technology adoption. A cross-sectional design limits capturing changes over time. Although international research shows personality significantly affects risk-taking (Filbeck et al., 2005; Grable, 2000; Grable & Joo, 2004), empirical research in Sri Lanka remains limited. Some studies have examined risk tolerance and investment behaviour (Heenkenda, 2015), yet few have investigated the combined effect of the Big Five personality traits and generational differences on financial risk tolerance. This gap limits understanding of how personality shapes financial decisions across age cohorts, emphasising the need for targeted behavioural finance research in the Sri Lankan context.

Literature Review

Financial risk tolerance refers to an individual's willingness to accept uncertainty in financial decisions. Since attitudes toward risk vary widely, understanding the role of personality in shaping financial behaviour is crucial, particularly across generational cohorts who face distinct economic contexts. The Big Five personality traits, Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism, represent a widely accepted framework for explaining differences in behaviour, including financial choices. This section reviews theoretical and empirical studies, emphasising how these traits influence financial risk tolerance across generations and establishing the hypotheses guiding this study.

Risk

Financial risk is broadly defined as the possibility of loss due to market volatility, interest rate fluctuations, or economic downturns. It is relevant for individuals, firms, and governments alike and lies at the core of financial decision-making. Managing such risk is essential for financial stability and long-term planning.

Risk tolerance

Risk tolerance refers to the degree of uncertainty an individual is prepared to accept in pursuit of returns. Wanyana (2011) classified risk tolerance into low, medium, and high levels, noting that demographic, psychological, and situational factors influence where individuals fall along this spectrum.

Several studies demonstrate that personality strongly affects financial choices. Sadiq and Amna (2019) showed that personality traits significantly influence investment behaviour, while Falahati and Paim (2012) highlighted differences in risk tolerance across gender and age groups. Kanadhasan (2015) found that younger investors are more likely to accept higher risks, often because they lack experience or perceive greater time to recover from losses. Cognitive biases such as overconfidence, anchoring, and herd behaviour also distort decision-making under uncertainty (Laing, 2010; Oehler & Wedlich, 2018). Zaleskiewicz (2001) and Bye & Lamvik (2007) similarly emphasised the critical role of individual attitudes and personality traits in shaping risk-taking.

Beyond personality, other determinants also matter. Zakaria et al. (2017) noted that risk tolerance directly drives investment behaviour. Bayar et al. (2020) identified financial literacy, education, and income as positive predictors of higher tolerance, while women and older individuals generally exhibit more risk-averse tendencies. Anastasia and Basana (2021) found that risk-tolerant millennials favour high-risk, high-return investments such as equities and derivatives, reflecting their different financial perspectives compared with older generations.

Personality traits and financial risk tolerance

The Big Five model developed by Costa and McCrae (1992) remains the dominant framework for categorising personality into five broad traits:

Openness: Creativity, curiosity, and willingness to embrace novelty. High openness is linked to greater financial risk tolerance, with individuals more inclined toward innovative, uncertain investments (Nandan & Saurabh, 2016; Nga & Ken Yien, 2013).

Conscientiousness: Reflects discipline, prudence, and responsibility. Conscientious individuals generally avoid risk, preferring low-risk assets like bonds or deposits.

Extraversion: Sociability, assertiveness, and energy. Extroverts are more comfortable with risk and drawn to high-return assets, while introverts tend to be more risk-averse (Mayfield et al., 2008; Sadi et al., 2011).

Agreeableness: Cooperation, trust, and empathy. Agreeable individuals are often risk-averse and rely on advisors in financial decision-making (Halder et al., 2010).

Neuroticism: Emotional instability and anxiety. High neuroticism is associated with strong risk aversion (Pak & Mahmood, 2015).

Hamza and Arif (2019) further linked agreeableness, extraversion, and openness positively with financial literacy, while neuroticism was negatively associated. This suggests that personality traits, when combined with education, strongly shape investment decisions.

Prospect theory

Prospect Theory, developed by Kahneman and Tversky (1979), challenges the rational assumptions of Expected Utility Theory. It argues that individuals are risk-averse for gains but risk-seeking when facing losses. This duality explains why people with similar financial conditions may adopt different investment strategies. When combined with personality traits, Prospect Theory provides a strong basis for understanding variations in financial risk tolerance.

Empirical review

Research shows Big Five traits influence financial risk tolerance, with generational differences - Baby Boomers, Generation X, Millennials, and Generation Z - shaping financial behaviour.

Extraversion: Positively associated with higher risk tolerance; extroverts prefer high-risk, high-return assets (Mayfield et al., 2008; Rai, Gupta, & Tyagi, 2021).

Neuroticism: Negatively associated with risk tolerance; anxious individuals avoid risky investments (Pak & Mahmood, 2015).

Openness: Encourages exploration of innovative opportunities and higher risk-taking (Nandan & Saurabh, 2016; Nga & Ken Yien, 2013).

Agreeableness & Conscientiousness: Generally linked to risk aversion and cautious decision-making (Gunkel et al., 2010; Halder et al., 2010).

In the Sri Lankan context, younger investors show higher financial risk tolerance than older generations, who tend to adopt more conservative investment strategies (Heenkenda, 2015). These findings confirm that extraversion and openness increase financial risk tolerance, while neuroticism, agreeableness, and conscientiousness generally reduce it, consistent across both global and local studies.

2.6 Hypotheses Development

H1: *Openness has an impact on risk tolerance among Baby Boomers, Generation X,Y,Z.*

H2: *Openness has no impact on risk tolerance among Baby Boomers, Generation X,Y,Z.*

H3: Conscientiousness has an impact on risk tolerance among Baby Boomers, Generation X,Y,Z.

H4: Conscientiousness has no impact on risk tolerance among Baby Boomers, Generation X,Y,Z.

H5: Extraversion has an impact on risk tolerance among Baby Boomers, Generation X,Y,Z.

H6: Extraversion has no impact on risk tolerance among Baby Boomers, Generation X,Y,Z.

H7: Agreeableness has an impact on risk tolerance among Baby Boomers, Generation X,Y,Z.

H8: Agreeableness has no impact on risk tolerance among Baby Boomers, Generation X,Y,Z.

H9: Neuroticism has an impact on risk tolerance among Baby Boomers, Generation X,Y,Z.

H10: Neuroticism has no impact on risk tolerance among Baby Boomers, Generation X,Y,Z.

Methodology

This study employed a quantitative cross-sectional survey to investigate the influence of the Big Five personality traits openness, conscientiousness, extraversion, agreeableness, and neuroticism on financial risk tolerance across generational cohorts in Sri Lanka, including Generation Z, Millennials, Generation X, and Baby Boomers. Guided by a positivist approach, the research used structured questionnaires and validated psychometric scales to ensure objective and reliable measurement. The Big Five traits served as independent variables, financial risk tolerance as the dependent variable, and generational cohort as a moderating factor. A total of 384 participants were selected using stratified cluster random sampling to ensure equal representation across cohorts. Data were collected online via Google Forms, covering demographics, personality, and risk preferences. Analyses, including descriptive statistics, correlation, and regression, were conducted using SPSS and R. Ethical standards such as informed consent, confidentiality, and transparency were strictly maintained throughout the study.

Results and Analysis

Descriptive analysis

Table 1

Descriptive analysis

Age = 12-27		Openness	Consciousness	Extraversion	Agreeableness	Neuroticism	Risk tolerance
N	Valid	96	96	96	96	96	96
	Missing	0	0	0	0	0	0
Mean		4.0104	3.3333	3.8681	2.5451	2.6250	2.1458
Std. Deviation		.65686	.85293	.66223	.84066	1.02854	.47898
Skewness		-.786	-.685	-.478	.209	-.003	.093
Std. Error of Skewness		.246	.246	.246	.246	.246	.246
Kurtosis		1.475	-.568	.495	-.596	-1.111	-.838
Std. Error of Kurtosis		.488	.488	.488	.488	.488	.488

(Source: Authors' Compilation)

Table 2

Descriptive analysis

Age = 28-43		Openness	Consciousness	Extraversion	Agreeableness	Neuroticism	Risk tolerance
N	Valid	96	96	96	96	96	96
	Missing	0	0	0	0	0	0
Mean		3.6771	3.3646	3.5694	2.6875	2.6875	1.9152
Std. Deviation		.75619	.81517	.86507	.90717	.92378	.52256
Skewness		.099	-.671	-.277	-.115	-.151	.439
Std. Error of Skewness		.246	.246	.246	.246	.246	.246
Kurtosis		-.545	.456	-.525	-.888	-.904	-.565
Std. Error of Kurtosis		.488	.488	.488	.488	.488	.488

(Source: Authors' Compilation)

Table 3

Descriptive analysis

Age = 44-59		Openness	Consciousness	Extraversion	Agreeableness	Neuroticism	Risk tolerance
N	Valid	96	96	96	96	96	96
	Missing	0	0	0	0	0	0
Mean		3.4965	3.3611	3.3472	2.5451	2.4861	1.7158
Std. Deviation		.82787	.82599	.79312	.81667	.87715	.52458
Skewness		-.490	-.352	-.060	.324	.673	.817
Std. Error of Skewness		.246	.246	.246	.246	.246	.246
Kurtosis		.033	-.426	-.522	-.911	.202	.042
Std. Error of Kurtosis		.488	.488	.488	.488	.488	.488

(Source: Authors' Compilation)

Table 4

Descriptive analysis

Age = 60-78		Openness	Consciousness	Extraversion	Agreeableness	Neuroticism	Risk tolerance
N	Valid	96	96	96	96	96	96
	Missing	0	0	0	0	0	0
Mean		3.2431	3.4722	3.1806	2.6875	2.6458	1.4911
Std. Deviation		.74218	.75806	.77673	.80468	.78407	.39915
Skewness		-.387	-.235	-.023	.127	.285	.962
Std. Error of Skewness		.246	.246	.246	.246	.246	.246
Kurtosis		.137	-.486	-.245	-.444	-.337	.173
Std. Error of Kurtosis		.488	.488	.488	.488	.488	.488

(Source: Authors' Compilation)

Generational differences were evident in descriptive results. Generation Z recorded the highest scores for openness ($M = 4.01$) and extraversion ($M = 3.87$) but relatively low financial risk tolerance ($M = 2.15$). Millennials reported similar but slightly lower levels of openness and extraversion, with moderate neuroticism and risk tolerance ($M = 1.92$). Generation X showed reduced openness and extraversion but produced the highest model fit in regression analysis. Baby Boomers scored lowest in openness and extraversion and displayed the lowest financial risk tolerance ($M = 1.49$).

Correlation analysis

The correlation results revealed that financial risk tolerance is significantly associated with several personality traits, with patterns varying across generations. Extraversion and openness showed strong positive correlations with risk tolerance, particularly among younger cohorts. For Millennials, extraversion demonstrated the strongest relationship ($r = 0.665$, $p < .001$), while Generation Z also reported notable positive correlations with both extraversion and openness. In contrast, neuroticism displayed a consistent negative relationship across all cohorts, with the strongest effect among Baby Boomers ($r = -0.612$, $p < .001$). Conscientiousness showed weak or negative correlations in younger groups, whereas agreeableness exhibited no significant relationship across generations. Overall, the results suggest that extraversion and openness increase risk-taking tendencies in younger generations, while neuroticism reinforces risk-averse behaviour in older cohorts.

Regression analysis

Age 12–27: The model reveals a strong relationship ($R = 0.729$), with 53.2% of the variance in financial risk tolerance explained ($R^2 = 0.532$) and an adjusted R^2 of 0.506. The standard error is 0.33680, suggesting good predictive accuracy. The Durbin-Watson value (1.926) confirms no autocorrelation.

Age 28–43: This group shows a moderately strong relationship ($R = 0.694$), with R^2 at 0.482 and an adjusted R^2 of 0.453. The standard error is slightly higher at 0.38633, but still acceptable. The Durbin-Watson statistic (2.133) indicates no autocorrelation.

Age 44–59: The strongest model is seen in this group ($R = 0.783$), explaining 61.4% of the variance ($R^2 = 0.614$) and an adjusted R^2 of 0.592. The standard error (0.33500) is low, and the Durbin-Watson value (1.957) confirms the model's reliability.

Age 60–78: The model is moderate in strength ($R = 0.638$), with $R^2 = 0.407$ and adjusted $R^2 = 0.374$. Although the model explains less variance, the standard error is low (0.31589), and the Durbin-Watson statistic (1.938) confirms no autocorrelation.

Coefficient

Ages 12–27: Extraversion ($\beta = 0.441$, $p < .001$) significantly increases risk tolerance, while conscientiousness ($\beta = -0.193$, $p = .016$) reduces it. Other traits show no significant effects. High VIFs for agreeableness (2.911) and neuroticism (3.497) suggest collinearity.

Ages 28–43: Extraversion ($\beta = 0.511$, $p < .001$) is the strongest predictor. Other traits are non-significant. Moderate VIFs for neuroticism (2.769) and agreeableness (2.416) indicate some collinearity.

Ages 44–59: Extraversion ($\beta = 0.473$, $p < .001$) positively predicts risk tolerance, while neuroticism ($\beta = -0.323$, $p = .002$) negatively affects it. VIFs indicate moderate collinearity.

Ages 60–78: Neuroticism ($\beta = -0.408$, $p = .007$) is the only significant trait. Others show no notable influence. High VIFs for agreeableness (3.600) and neuroticism (3.367) suggest collinearity.

ANOVA results

ANOVA tests confirmed statistically significant generational differences in openness ($F = 19.506$, $p < .001$) and extraversion ($F = 14.041$, $p < .001$). However, no significant differences were observed for conscientiousness, agreeableness, or neuroticism across cohorts. This suggests that openness and extraversion are the most influential differentiators of financial risk tolerance between generations.

Diagnostic Tests

Tests of normality and residual analysis confirmed that the assumptions of regression were not violated. Multicollinearity and heteroscedasticity tests further supported the robustness of the models, strengthening the validity of the results.

Discussion

The findings reveal that the Big Five personality traits significantly influence financial risk tolerance across generational cohorts in Colombo. Extraversion and openness strongly predict higher risk-taking, particularly among younger investors, reflecting their sociability, assertiveness, and willingness to explore novel opportunities. Neuroticism negatively affects risk tolerance, especially in older generations, indicating more cautious financial behaviour. Conscientiousness slightly reduces risk tolerance in younger groups, while agreeableness shows no significant effect. Generational differences are evident, with younger cohorts demonstrating higher openness and extraversion, whereas older cohorts exhibit lower openness, higher neuroticism, and lower risk tolerance. These patterns suggest that personality and generational factors interact to shape investment behaviours.

Conclusion

This study confirms that personality traits, particularly extraversion and neuroticism, are key determinants of financial risk tolerance across generations in Colombo. Younger investors tend to embrace higher-risk investments due to higher extraversion and openness, whereas older generations prefer conservative approaches aligned with higher neuroticism and lower openness. Conscientiousness has a minor negative effect, and agreeableness is largely irrelevant. These insights highlight the value of integrating personality assessments into financial advisory services and policymaking. Tailoring investment strategies and educational programs to generational traits can enhance decision-making and support more effective, personality-informed financial planning.

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THE IMPACT OF HERDING BEHAVIOR AND OVERCONFIDENCE BIAS ON INVESTMENT DECISIONS OF GEN Z INVESTORS IN SRI LANKA: THE MEDIATING ROLE OF RISK PERCEPTION

Suraweera, BG¹, Wijekumara JMN²

Abstract

In the current era of financial democratisation, Generation Z (Gen Z) investors in Sri Lanka are increasingly participating in the stock market, driven by digital platforms and social media influence. However, this participation often occurs amid cognitive biases such as herding behaviour and overconfidence, which can distort rational investment decision-making. This research aims to investigate the influence of herding behaviour and overconfidence bias on the investment decisions of Gen Z investors in Sri Lanka, with a specific focus on the mediating role of risk perception. The study employs a quantitative research approach and collects primary data through a structured online questionnaire using a seven-point Likert scale. The survey was conducted among a sample of 150 Gen Z investors representing diverse investment backgrounds. Statistical analyses, including correlation, regression, and structural equation modelling (SEM), were conducted using SPSS and SMART PLS to examine the relationships between variables. The results reveal that both herding behaviour and overconfidence bias significantly impact investment decisions, and risk perception plays a mediating role in these relationships. Findings from the study provide valuable insights into behavioural finance, particularly the cognitive patterns of young investors in emerging markets like Sri Lanka. The implications of this research extend to financial educators, policymakers, and institutions seeking to develop targeted interventions that promote informed investment practices among Gen Z. By enhancing awareness of psychological biases and risk perception, the study contributes to fostering more responsible and strategic financial behaviour among young investors in the country.

Keywords: Behavioural finance, herding bias, investment decision, overconfidence bias, risk perception

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Proceedings of the 16th International Conference on Business and Information - ICBI 2025 © 2025 by The Faculty of Commerce and Management Studies, University of Kelaniya, Sri Lanka is licensed under CC BY-SA 4.0.

DOI:

Introduction

The dynamics of investment decision-making have increasingly attracted scholarly attention, particularly within the field of behavioural finance, which challenges the traditional notion of purely rational investors. In the Sri Lankan context, the rapid expansion of digital investment platforms and the growing accessibility of financial markets have encouraged a new generation of participants, Generation Z (Gen Z), to engage actively in equity trading. According to the Securities and Exchange Commission of Sri Lanka (2024), there has been a notable rise in young retail investors. For example, in 2020, 47% of new brokerage accounts were held by those aged 18-30, driven by mobile trading applications, social media influence, and the pursuit of financial independence.

While this trend represents a positive shift towards greater financial market participation, it also raises important concerns regarding the behavioural tendencies influencing Gen Z investors. In particular, cognitive biases such as herding behaviour, the tendency to follow the actions of others, and overconfidence bias (an inflated belief in one's knowledge and abilities), are increasingly evident in trading activities. These biases can undermine rational investment processes, leading to suboptimal decisions and, at times, significant financial losses.

A key factor in understanding these biases lies in risk perception, which shapes how investors evaluate opportunities and threats. Risk perception not only determines whether an investment is deemed acceptable but also mediates the effects of psychological biases on decision-making. Empirical studies have confirmed this mediating role in various market contexts. For instance, Ahmed et al. (2022) and Almansour et al. (2023) found that risk perception significantly mediates the relationship between behavioural biases such as herding and overconfidence, and investment decisions in emerging economies, indicating that investors' subjective evaluation of risk channels the impact of cognitive biases on their final choices. Similarly, Kaban and Linata (2024) demonstrated in an Indonesian Gen Z sample that risk perception acts as a psychological mechanism through which herding and overconfidence influence investment intentions. These findings suggest that investors who perceive lower levels of risk are more likely to follow crowd behaviour or act with overconfidence, leading to riskier investment outcomes.

The present study focuses specifically on herding and overconfidence biases among the twenty commonly identified behavioural biases because these two are most prevalent and empirically validated in prior literature as dominant factors shaping retail investors' decisions (Barber & Odean, 2001; Madaan & Singh, 2019; Wibowo et al., 2023). Moreover, these biases are particularly relevant to Generation Z investors, who are heavily influenced by social media trends (amplifying herding) and digital financial content (reinforcing overconfidence). Given their strong theoretical foundation, empirical significance, and contextual relevance to the Sri Lankan Gen Z investment environment, herding and overconfidence were selected as focal constructs, with risk perception serving as the mediating psychological bridge that links these biases to investment behaviour.

This study addresses this gap by examining the interplay between herding behaviour, overconfidence bias, and investment decision-making, with a specific focus on the mediating role of risk perception. Using data collected from 150 Gen Z investors in Sri Lanka, analysed through Partial Least Squares Structural Equation Modelling (PLS-SEM), this research contributes empirical insights into the cognitive patterns of young investors in an emerging market. By understanding these impacts, the findings aim to inform financial educators, policymakers, and market participants in developing targeted strategies that promote informed, rational, and sustainable investment practices among Sri Lanka's future investor base.

Literature Review

Investment decision-making is a multifaceted process in which individuals determine where, when, and how much to invest to achieve favourable returns. This process requires evaluating different investment avenues, considering factors such as expected returns, risk levels, and market conditions. While traditional finance theories assume that individuals act rationally to maximise wealth, real-world decision-making often deviates from this assumption due to behavioural influences and subjective perceptions of risk. In the context of Generation Z (Gen Z) investors, who are heavily influenced by digital platforms, peer networks, and online trends, such deviations are increasingly pronounced.

Herding behaviour and overconfidence bias are two of the most prominent behavioural tendencies observed in this demographic. Herding refers to imitating the investment actions of others rather than conducting independent analysis, which can lead to market inefficiencies and volatility. Overconfidence bias, meanwhile, occurs when investors overestimate their knowledge, predictive ability, or control over market outcomes, potentially resulting in excessive risk-taking and poor diversification. Both biases can be shaped or moderated by an investor's risk perception, the subjective assessment of uncertainty and potential loss in a given investment decision.

Overconfidence bias, on the other hand, occurs when investors overestimate their own knowledge, predictive ability, or control over market outcomes (Barber & Odean, 2001). Overconfident investors tend to trade more frequently, underestimate risks, and hold under-diversified portfolios (Glaser & Weber, 2007). This bias can be reinforced by short-term successes, selective recall of profitable trades, and exposure to online investment content that encourages aggressive trading. For Gen Z investors, who often rely on social media, influencer opinions, and readily available but unverified online resources, overconfidence may be amplified despite limited market experience.

Risk perception is the subjective evaluation of the potential for loss in an investment decision (Slovic, 1987; Weber & Milliman, 1997). It is shaped by an individual's experiences, knowledge, emotions, and the prevailing market environment. Risk perception serves as a critical psychological filter in decision-making, influencing how investors interpret information and assess opportunities. Importantly, it can mediate the impact of behavioural biases: herding may lower perceived risk due to a "safety in numbers" effect, while overconfidence may result in underestimating risk altogether. Conversely, heightened risk perception may prompt more cautious behaviour, mitigating the effects of these biases. This mediating role has been empirically supported in other emerging markets (Hossain & Siddiqua, 2022; Kaban & Linata, 2024) but remains underexplored among Gen Z investors in Sri Lanka.

Empirical studies in behavioural finance consistently highlight the influence of herding behaviour and bias overconfidence on investor decision-making. Herding behaviour has been observed in both developed and emerging markets, often leading to market anomalies such as price bubbles and excessive volatility. Bikhchandani and Sharma (2001) and Chang et al. (2000) demonstrated that herding is more prevalent in environments with high information asymmetry, where investors rely on others' actions as a substitute for independent analysis. In the context of emerging markets, Waweru et al. (2008) found that herding tendencies are particularly strong among retail investors with limited access to credible market data.

Overconfidence bias has also been widely documented. Barber and Odean (2001) showed that overconfident investors trade more frequently and achieve lower net returns due to transaction costs and suboptimal timing. Glaser and Weber (2007) further established that overconfidence is linked to risk underestimation and poor diversification. Empirical evidence from Almansour et al. (2023) and Wibowo et al. (2023) suggests that this bias is especially prevalent among younger investors, who may conflate digital literacy with investment expertise, leading to aggressive trading behaviour.

Risk perception plays a critical role in shaping the magnitude and direction of these biases' effects on investment decisions. Slovic (1987) emphasised that risk is not perceived uniformly, but rather interpreted through individual experiences, knowledge, and emotions. Weber and Milliman (1997) found that low perceived risk encourages riskier investment choices, while heightened perceived risk can moderate the influence of biases. More recently, Hossain and Siddiqua (2022) confirmed that risk perception mediates the relationship between behavioural biases and investment intentions in the context of emerging economies.

Studies in Indonesia (Kaban & Linata, 2024) found that risk perception significantly mediated the effects of herding and overconfidence on investment decisions, suggesting that awareness and interpretation of risk can either amplify or suppress bias-driven behaviours. However, such empirical investigations remain limited in Sri Lanka, especially among Generation Z investors participating in the Colombo Stock Exchange. Given this demographic's increasing reliance on digital platforms and susceptibility to online sentiment, understanding these relationships in the Sri Lankan context can provide valuable insights for both academic research and practical interventions.

Methodology

The population of this study consists of Generation Z (Gen Z) equity investors who have invested in the Colombo Stock Exchange (CSE). Gen Z is defined in this research as individuals born between 1997 and 2012, representing a demographic that is both digitally proficient and increasingly active in capital markets. Gen Z comprises approximately 25% of Sri Lanka's ~23.2 million total population, i.e., ~5.8 million people. Among local individual investors holding CDS accounts (~661,948), it is estimated that ~165,500 are Gen Z investors.

Since there is no official record detailing the total number of Gen Z investors in Sri Lanka, the study employed a non-probability convenience sampling method. This approach allowed for the inclusion of respondents who met the criteria of being part of Gen Z and having prior investment experience in the CSE, while also being accessible through online channels. Convenience sampling is widely used in behavioural finance studies where the precise population size is unknown, and respondents are dispersed across various locations (Liaqat et al., 2020; Mehtab, 2019). A total of 150 responses were collected through a self-administered online questionnaire distributed via

social media platforms, online investment forums, and university investor networks. The questionnaire included screening questions to ensure that participants met the study's demographic and experience criteria.

Results and Analysis

Reliability of measurement instrument

Cronbach's alpha is the most widely used measure for assessing an instrument's internal consistency. Therefore, both Composite Reliability (CR) and Cronbach's alpha were employed to evaluate the model's reliability, with acceptable values exceeding 0.7. The values for Cronbach's alpha and CR, as calculated by the PLS-SEM algorithms, are presented in Table 1.

Table 1
Assessment of reliability

Variable	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)
Herding Behaviour (HB)	0.871	0.874	0.903
Investment Decision (ID)	0.913	0.920	0.936
Overconfidence Bias (OB)	0.891	0.906	0.920
Risk Perception (RP)	0.828	0.845	0.890

(Source: Authors Compilation)

According to Table 4.2, all Cronbach's Alpha values and composite reliability values are above 0.70, confirming the reliability of the variables.

Convergent validity

The AVE value of 0.609 indicates that approximately 60.9% of the variance in the observed indicators related to Herding Behaviour is explained by the underlying latent variable of Herding Behaviour. This suggests that the indicators collectively provide a strong representation of the concept of Herding Behaviour, capturing a substantial portion of its variability. The AVE value of 0.744 indicates that around 74.4% of the variance in the observed indicators related to Investment Decision is explained by the underlying latent variable of Investment Decision. This demonstrates that the indicators capture a significant amount of variability in Investment Decision, making them a robust representation of this construct. The AVE value of 0.697 suggests that about 69.7% of the variance in the observed indicators related to Overconfidence Bias is explained by the underlying latent variable of Overconfidence Bias. This indicates that the indicators provide a strong representation of Overconfidence Bias, capturing a considerable portion of its variability. The AVE value of 0.673 indicates that approximately 67.3% of the variance in the observed indicators related to Risk Perception is explained by the underlying latent variable of Risk Perception. This suggests that the indicators capture a substantial portion of the variability in Risk Perception, making them a reliable representation of this construct.

Table 2
Assessment of convergent validity

Construct	Average Variance Extracted (AVE)
Herding Behaviour (HB)	0.609
Investment Decision (ID)	0.744
Overconfidence Bias (OB)	0.697
Risk Perception (RP)	0.673

(Source: Authors Compilation)

Discriminant validity

Discriminant validity assesses the extent to which a construct is truly distinct from other constructs by examining whether it shares more variance with its own indicators than with other constructs (Hair et al., 2017). This ensures that each construct captures unique phenomena relevant to the research model.

Table 3

Assessment of discriminant validity

Construct	HB	ID	OB	RP
Herding Behaviour (HB)	0.882			
Investment Decision (ID)	0.730	0.778		
Overconfidence Bias (OB)	0.882	0.778	0.871	
Risk Perception (RP)	0.830	1.00	0.871	1.00

(Source: Authors Compilation)

In this study, discriminant validity was evaluated using the Fornell-Larcker criterion, which requires that the square root of the Average Variance Extracted (AVE) for each construct should be greater than its correlations with other constructs (Fornell & Larcker, 1981).

Table 4.4 presents the correlations among constructs, with the diagonal values representing the square root of the AVE for each construct. As shown, the diagonal values for Herding Behaviour (HB), Investment Decision (ID), Overconfidence Bias (OB), and Risk Perception (RP) are 0.882, 0.778, 0.871, and 1.00, respectively. These values are higher than the corresponding off-diagonal correlations, confirming adequate discriminant validity.

Therefore, the constructs in this study are empirically distinct, supporting the validity of the measurement model.

Descriptive statistics of variables

Descriptive statistics provide an overview of the central tendency and variability of the key constructs in this study, offering insights into the distribution and dispersion of the data before advanced analysis.

Table 4

Assessment of discriminant validity

Variable	Sample items	Mean (M)	Std. Deviation (STDEV)
Herding Behaviour (HB)	150	0.008	0.046
Investment Decision (ID)	150	0.362	0.091
Overconfidence Bias (OB)	150	0.135	0.048
Risk Perception (RP)	150	0.471	0.080
Overall	150	0.772	0.043

(Source: Authors Compilation)

Table 4.5 presents the sample size, mean, and standard deviation for each variable. The sample size for all variables is consistent at 150 observations. Herding Behaviour (HB) has a mean value close to zero ($M = 0.008$) with a low standard deviation ($STDEV = 0.046$), indicating minimal variation around the mean. Investment Decision (ID) shows a moderate mean of 0.362 and a standard deviation of 0.091, reflecting moderate variability among respondents. Overconfidence Bias (OB) has a mean of 0.135 and a standard deviation of 0.048, suggesting relatively low dispersion. Risk Perception (RP) exhibits a higher mean value of 0.471 with a standard deviation of 0.080, indicating a moderate level of variability. The overall mean across variables is 0.772 with a standard deviation of 0.043.

These descriptive statistics indicate that the data exhibit sufficient variation to support meaningful analysis and modelling using SmartPLS.

Multicollinearity

According to Table 5 above, the Tolerance values range from 0.323 to 0.402, and the Variance Inflation Factor (VIF) values range from 2.485 to 3.095. Tolerance values below 0.1 are typically considered indicative of serious multicollinearity issues; here, the values are well above 0.1, suggesting moderate but not severe multicollinearity. VIF values between 1 and 5 are generally acceptable, indicating a moderate level of correlation among the independent variables but not high enough to cause major issues with the regression model. In this case, the highest VIF is 3.095 (for Overconfidence Bias > Investment Decision), which is still within acceptable limits. Therefore, these results suggest that while there is some correlation between the predictors, multicollinearity is not severe enough to distort the results. The individual contributions of each variable in explaining investment decision-making and risk perception remain relatively distinct and interpretable.

Table 5

Multicollinearity analysis

Variables	Tolerance	VIF
Herding Behaviour > Investment Decision	0.358	2.795
Herding Behaviour > Risk Perception	0.402	2.485
Overconfidence Bias > Investment Decision	0.323	3.095
Overconfidence Bias > Risk Perception	0.402	2.485
Risk Perception > Investment Decision	0.386	2.592

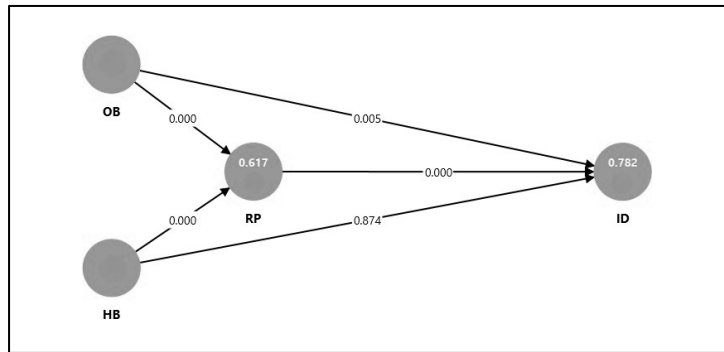
(Source: Authors Compilation)

Coefficient of determination (R²)

After including Risk Perception as a mediating variable, the R² value for Investment Decision increased to 0.782, which reflects a substantial level of explanatory power, demonstrating that risk perception significantly strengthens the model's predictive ability. Furthermore, the R² value for Risk Perception was recorded as 0.617, indicating a moderate to substantial level of variance explained by herding behaviour and overconfidence bias. These results confirm the mediating role of risk perception in enhancing the explanatory strength of the model.

Figure 1

Coefficient of determination (R²) with mediation variable



(Source: Authors Compilation)

Hypotheses testing

Hypotheses were tested using the bootstrapping method with 5,000 subsamples in SmartPLS 4.1.2. This process assessed the significance of the path relationships among the constructs: Herding Behaviour (HB), Overconfidence Bias (OB), Risk Perception (RP), and Investment Decision (ID). The results are summarised in Table 6.

Table 5

Multicollinearity analysis

Hypothesis	Path	Sample Mean (M)	Standard Deviation (STDEV)	Path Coefficient (β)	P Value
H ₁	HB → ID	0.008	0.046	0.007	0.874
H ₂	HB → RP	0.362	0.091	0.359	0.000
H ₃	OB → ID	0.135	0.048	0.136	0.005
H ₄	OB → RP	0.471	0.080	0.474	0.000
H ₅	RP → ID	0.772	0.043	0.772	0.000

(Source: Authors Compilation)

In the current study, Herding Behaviour → Investment Decision ($\beta = 0.007$) falls within the insignificant range, indicating that herding behaviour does not directly influence investment decision-making among Gen Z investors. Overconfidence Bias → Investment Decision ($\beta = 0.136$) exceeds the 0.1 threshold, supporting the hypothesis that overconfidence bias has a positive and significant impact on investment decisions. Herding Behaviour → Risk Perception ($\beta = 0.359$) and Overconfidence Bias → Risk Perception ($\beta = 0.474$) both show strong, positive coefficients, confirming their significant influence on shaping investors' risk perceptions. Risk Perception → Investment Decision ($\beta = 0.772$) records the highest coefficient in the model, indicating that risk perception is a critical determinant of investment decision-making among Generation Z investors in Sri Lanka.

H1: Investment decision is impacted by the herding bias of Sri Lanka's Gen Z investors

The path coefficient of herding bias and investment decision was $\beta = 0.007$, indicating a very weak and statistically insignificant relationship between the two variables. According to the analysis findings, the p-value was 0.874, which is higher than the acceptable level of 0.05 ($p > 0.05$). Therefore, hypothesis H1, which states that herding bias impacts the investment decisions of Gen Z investors in Sri Lanka, is not accepted.

H2: Investment decision is impacted by the overconfidence bias of Sri Lanka's Gen Z investors

The path coefficient of overconfidence bias and investment decision was $\beta = 0.136$, indicating a moderate positive relationship between the two variables. According to the analysis findings, the p-value was 0.005, which is less than the acceptable level of 0.05 ($p < 0.05$). Therefore, hypothesis H2, which states that overconfidence bias impacts the investment decisions of Gen Z investors in Sri Lanka, is accepted.

H3: Investment decision is impacted by the risk perception of Sri Lanka's Gen Z investors

The path coefficient of risk perception and investment decision was $\beta = 0.772$, indicating a strong positive relationship between the two variables. According to the analysis findings, the p-value was 0.000, which is significantly lower than the threshold of 0.05 ($p < 0.05$). Therefore, hypothesis H3, which states that risk perception impacts the investment decisions of Gen Z investors, is accepted.

H4: Risk perception is impacted by the herding bias of Sri Lanka's Gen Z investors

The path coefficient of herding bias and risk perception was $\beta = 0.359$, indicating a strong positive relationship between the two variables. According to the analysis findings, the p-value was 0.000, which is less than the acceptable level of 0.05 ($p < 0.05$). Therefore, hypothesis H4, which states that herding bias impacts the risk perception of Gen Z investors, is accepted.

H5: Investment decision is impacted by the herding bias mediated by risk perception

The path coefficient of the indirect effect of risk perception between herding bias and the investment decision of Sri Lanka's Gen Z investors was $\beta = 0.277$. This indicates a statistically significant positive indirect relationship. According to the analysis findings, the p-value was 0.000, which is less than the acceptable level of 0.05 ($p < 0.05$). Therefore, hypothesis H5, which states that risk perception mediates the relationship between herding bias and investment decision, is accepted.

The VAF (Variance Accounted For) was 97.5%, confirming that the nature of the mediation is full mediation, as the direct effect ($\beta = 0.007$) was insignificant while the indirect effect was significant. This indicates that risk perception fully transmits the effect of herding bias on investment decision-making.

Table 6
Hypotheses testing-mediation effect I

Mediation Effects – Hypothesis Six	Direct Effect (DE) – Path Coefficient	Indirect Effect (IE) – Path Coefficient	Total Effect (TE) – Path Coefficient	VAF = (IE/TE)	P-Value	Nature of Mediation
Herding Bias → Risk Perception → Investment Decision	0.007	0.277	0.284	97.50%	0	Full mediation

(Source: Authors Compilation)

H6: Risk perception is impacted by the overconfidence bias of Sri Lanka's Gen Z investors

The path coefficient of overconfidence bias and risk perception was $\beta = 0.474$, which indicated a strong positive relationship between the two variables. According to the analysis findings, the p-value was 0.000, less than the acceptable level of 0.05 ($p < 0.05$). Therefore, hypothesis H6, which states that overconfidence bias impacts the risk perception of Gen Z investors, is accepted.

H7: Investment decision is impacted by the overconfidence bias mediated by risk perception

The path coefficient of the indirect effect of risk perception between overconfidence bias and investment decision was $\beta = 0.366$. According to the analysis findings, the p-value was 0.000, which is less than the acceptable level of 0.05 ($p < 0.05$). Therefore, hypothesis H7, which states that risk perception mediates the relationship between overconfidence bias and investment decision of Sri Lanka's Gen Z investors, is accepted.

The VAF ratio was 72.9%, which falls between the range of 20% and 80%, indicating a partial mediation effect (Sarstedt et al., 2017). This means that risk perception partially explains the relationship between overconfidence bias and investment decision-making.

Table 7
Hypotheses Testing-Mediation Effect I

Mediation Effects – Hypothesis Seven	Direct Effect (DE) – Path Coefficient	Indirect Effect (IE) – Path Coefficient	Total Effect (TE) – Path Coefficient	VAF = (IE/TE)	P-Value	Nature of Mediation
Overconfidence Bias → Risk Perception → Investment Decision	0.136	0.366	0.502	72.90%	0	Partial mediation

(Source: Authors Compilation)

Conclusion

This study has explored a crucial dimension of investment behaviour by investigating how behavioural biases, specifically herding bias and overconfidence bias, along with risk perception, influence investment decisions among Generation Z investors in Sri Lanka. By focusing on the mediating role of risk perception, the research addresses an important gap in the behavioural finance literature in the Sri Lankan context. Using Structural Equation Modelling (SEM) via SmartPLS, the study systematically assessed the measurement and structural models to test the proposed hypotheses. The analysis was conducted on a sample of 150 Gen Z investors actively participating in the Colombo Stock Exchange, ensuring data quality by addressing missing values, outliers, and testing for validity and reliability. The findings highlight several key insights: behavioural biases notably affect investment decisions, but their influence is significantly mediated by risk perception. Herding bias does not directly affect investment decision-making but has a full indirect effect through risk perception, whereas overconfidence bias impacts investment decisions both directly and indirectly via risk perception. This mediation underscores the importance of investors' subjective assessment of risk as the psychological mechanism linking biases to investment behaviour. This research contributes to understanding the complexity of investment decision-making among young, emerging market investors who are increasingly influential in the Sri Lankan stock market. The demonstrated role of risk perception as a mediator enriches the theoretical framework and provides a nuanced perspective on how behavioural biases translate into actual investment choices. The application of SEM lends robustness to the study, underpinning its conclusions with rigorous statistical validation. These insights offer valuable implications for investors, financial advisors, and policymakers. Investors can benefit from greater awareness of their psychological tendencies and subjective risk assessments, leading to more informed and rational decision-making. Financial advisors may incorporate behavioural and risk perception insights into their client counselling strategies, enhancing investment outcomes. Regulators can also leverage these findings to formulate educational policies and investor protection measures that address behavioural pitfalls. Looking forward, this research encourages further examination of other psychological and contextual factors affecting investment behaviour across different demographic groups and market settings in Sri Lanka. Expanding the scope of behavioural influences and exploring longitudinal impacts could deepen the understanding of investor psychology in emerging markets. Overall, this study makes a meaningful contribution by confirming that behavioural biases and risk perception critically shape the investment decisions of Sri Lankan Gen Z investors, emphasising risk perception's pivotal mediating role. It thereby adds valuable knowledge to the evolving discourse on behavioural finance and supports more informed engagement in the Colombo Stock Exchange.

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THE IMPACT OF FINANCIAL LEVERAGE ON FIRM PROFITABILITY: AN EMPIRICAL STUDY OF SRI LANKAN HEALTHCARE EQUIPMENT AND SERVICES COMPANIES DURING AND POST-COVID-19 ERA (2020-2024)

W.G.K.M. Deshan¹, Sulanie Perera², Tiloka De Silva³

Abstract

This research examines the impact of financial leverage on the profitability of healthcare and equipment companies listed on the Colombo Stock Exchange (CSE) from 2020 to 2024. This study specifically examines how Sri Lankan healthcare firms modified their capital structure through financing decisions during and after the COVID-19 pandemic and evaluates the impact of these decisions on their profitability. The study analyses financial data using panel data techniques, considering both fixed effects and random effects models. Four proxy variables were used to capture financial leverage and profitability. Debt-to-Equity Ratio (D/E) and Interest Coverage Ratio (ICR) represent financial leverage, while Return on Assets (ROA) and Return on Equity (ROE) represent profitability. Firm size was used as a control variable in the analysis, measured by the total assets of the companies. The empirical results show several important relationships between financial leverage and profitability. A higher D/E ratio lowers ROA and ROE, indicating that excessive debt reduces financial performance and increases risk for healthcare companies. In contrast, a higher ICR contributes to increased profitability because of the positive relationship between ICR and profitability. These results highlight the significance of capital structure decisions in Sri Lanka's healthcare sector during a pivotal economic period. Future research could extend to other sectors to compare leverage effects on profitability and incorporate qualitative methods to capture managerial perspectives. This is crucial for gaining a deeper understanding of how financial leverage affects firm profitability across various industries.

Keywords: Capital structure, firm profitability, healthcare equipment and services companies, post-COVID-19 era, Sri Lanka

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DOI:

Introduction

Finance is fundamental for ensuring smooth business operations by providing necessary funds at crucial times (Wachtel, 2001). Companies consistently face the critical decision of how to fund their operations in a manner that not only maintains continuity but also maximises profitability and enhances shareholder value. This decision focuses on the selection of appropriate funding options between debt and equity financing. These two financing paths offer different cost structures, levels of risk and impacts on ownership and control (Frank & Goyal, 2009). Debt financing involves borrowing through loans or bonds and offers tax-deductible interest payments, which reduce taxable income and the overall cost of capital (Myers, 2001). It also allows business owners to retain full control, as debt holders do not gain ownership. However, it increases financial risk due to fixed repayment obligations. In contrast, equity financing raises capital by issuing shares. It provides more flexibility during financial stress, improves creditworthiness and avoids mandatory repayment. But it may dilute ownership and impose long-term pressures to deliver shareholder returns (Frank & Goyal, 2009).

The strategic choice between debt and equity shapes a firm's capital structure. This capital structure represents the mix of financing used to support operations, investment and growth. A key component of this structure is financial leverage, which reflects the degree to which a company relies on debt relative to equity (Brigham & Daves, 2007). An optimal balance of debt and equity can minimise financing costs and improve profitability, supporting long-term growth and sustainability (Jensen, 1986). The health care system in Sri Lanka mainly depends on the healthcare equipment and services industry, which provides hospitals and clinics with sophisticated medical equipment, simple diagnostic instruments. However, the COVID-19 pandemic caused significant increases in import prices and disrupted global supply chains. In the face of scarce resources and growing worldwide demand, local healthcare firms had to deal with significant financial strains to acquire necessary equipment (Govindaraj & Navaratne, 2014). These challenges highlighted the need for cautious leverage decisions and revealed the financial vulnerabilities of the industry.

Expanding upon this background, this research specifically looks at the impact of financial leverage on the profitability of healthcare equipment and services firms that were listed on the Colombo Stock Exchange (CSE) during the crucial COVID-19 period. While previous research studies in Sri Lanka have focused exclusively on the period before the COVID-19 pandemic, they have not considered the unique financial challenges and market conditions that arose during and after the pandemic (Senarathne & Perera, 2021). This research critically examines the underexplored impact of financial leverage on the profitability of listed healthcare equipment and services firms in Sri Lanka during the COVID-19 crisis. Prior studies have mainly focused on general sectors or pre-pandemic periods, leaving limited evidence on how leverage decisions affected firm performance under extreme financial stress. The healthcare sector was selected due to its vital role during the pandemic, which created unique financial pressures and operational challenges. This study examines whether higher debt levels improved or reduced profitability in Sri Lankan healthcare firms. It offers insights for managers and policymakers to navigate volatile economic conditions.

Literature Review

There is no universally ideal theory for capital structure, but several prominent frameworks offer valuable insights into how firms make financing decisions. The Trade-Off Theory proposes that firms pursue an optimal capital structure by weighing the tax advantages of debt against the costs of financial distress (Tarek, 2013). In contrast, the Pecking-Order Theory proposes that firms prefer internal financing first, followed by debt and lastly equity, based on funding costs and availability (Myers & Majluf, 2013). Meanwhile, the Agency Cost Theory highlights that debt enhances managerial discipline by mandating interest obligations, although excessive borrowing can generate conflicts between shareholders and creditors over investment risk preferences. (Moez, 2018). These theories are frequently evaluated by researchers using financial indicators such as Return on Assets (ROA), Return on Equity (ROE) and Earnings Per Share (EPS). These metrics examine how effectively companies use their resources and generate returns for shareholders (Bachtiar & Haizam, 2020).

The relationship between capital structure and profitability varies by industry, depending on the unique characteristics and conditions. Researchers found that debt can improve profits through tax benefits along with best management practices (Margaritis & Psillaki, 2010). However, Khan & Kaleem (2012) show that too much debt can increase financial risks and lower profits. Government-owned companies often have high debt but lower profits due to inefficient operations (Dewenter & Malatesta, 2001). The IT industry successfully uses debt for technological growth (Murugesu & Subramaniam, 2013), while Olaoye & Adesina (2022) find manufacturing companies struggle with long-term debt. Companies in France and Germany benefit from debt, while Italian companies face challenges with debt financing (Weill, 2007). Empirical evidence from Nwoha & Duru (2024) found that excessive debt levels can negatively impact healthcare organisations, particularly when these companies struggle to produce sufficient cash flows. In Sri Lanka, most research focuses on the manufacturing,

banking, and tourism sectors. Manufacturing companies' high debt levels reduce profits due to financial risks (Murugesu & Subramaniam, 2013). Banks heavily rely on debt, with 89% of their assets funded through borrowing, which generally stresses their profitability (Velampy & Nireesh, 2012). The tourism sector has no significant impact of debt on profits (Balasundaram, 2010), so it focuses on long-term investments. Sri Lanka's healthcare industry needs a large amount of capital for growth, especially for improving services and adopting new technologies. However, only one study has examined the impact of financial leverage on the profitability of healthcare companies in the country during the period 2013 – 2019. Senarathne & Perera (2021) found that companies with high debt levels struggle to stay profitable because loan repayments reduce the money available for upgrades and new investments.

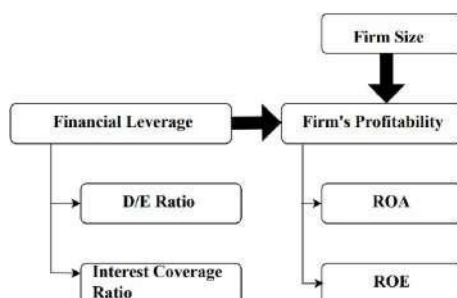
Despite extensive research on capital structure and profitability, few studies examine how Sri Lankan healthcare firms manage debt and equity decisions. The healthcare sector was chosen due to its pivotal role during the COVID-19 pandemic, which created unprecedented financial pressures and market disruptions. This situation forced firms to urgently invest in critical equipment while managing severe cash flow constraints. The study addresses this gap by analysing the impact of financial leverage on profitability in Sri Lanka's listed healthcare companies, providing sector-specific insights where financing choices directly influenced operational resilience and performance during a crisis.

Methodology

The study focuses on healthcare equipment and services companies listed on the Colombo Stock Exchange (CSE) during and after the COVID-19 pandemic (2020–2024). There are only eight companies in this sector. Therefore, all eight were included in the study, and this ensures complete industry coverage. The companies included are Nawaloka Hospitals PLC, Asiri Hospitals PLC, Lanka Hospitals PLC, Asiri Surgicals PLC, Singhe Hospitals PLC, E-Channelling PLC, Muller and Phipps (Ceylon) PLC and Ceylon Hospitals PLC. This dataset was created by extracting relevant financial data from each company's published annual reports and organising it into an Excel sheet. The resulting dataset is classified as panel data because it tracks multiple companies (cross-sectional units) across multiple years (time series), allowing for analysis of both firm-specific trends over time and differences across firms.

The conceptual framework for this study is developed based on an extensive analysis of the literature (refer Figure 1). It examines how financial leverage affects firm profitability in Sri Lankan healthcare equipment and services companies. To examine the relationship between financial leverage and firm profitability, this study employs a systematic approach using proxy variables that accurately represent the key concepts being investigated. Financial leverage refers to the extent to which a firm uses debt in its capital structure to finance its activities. This is measured using two selected proxy variables: the Debt-to-Equity Ratio (D/E) and the Interest Coverage Ratio (ICR), which serve as independent variables. A firm's profitability reflects the ability of a company to generate earnings through its core operations. In this study, Return on Assets (ROA) and Return on Equity (ROE) serve as dependent variables that act as proxies for measuring the firm's profitability. The framework includes Total Assets as a control variable to represent firm size. By controlling the firm size, the study can accurately reflect the impact of financial leverage on profitability regardless of company size.

Figure 1
Conceptual framework



(Source: Authors' Compilation)

Model specifications

This study investigates the impact of financial leverage on firm profitability using panel data methods. Traditional pooled OLS is limited because it assumes all firms behave the same across time. This ignores important differences between firms and can lead to misleading results if these differences are correlated to the explanatory variables. To address this, the study applies fixed effects and random effects models. Fixed effects models control for factors that do not change over time within each firm. They assume these factors may be related to the variables being studied. Random effects models assume firm-specific factors are random and not related to the variables. This allows random effects to use both changes within firms and between firms. It also includes factors that stay the same over time. The Hausman test is used to choose the suitable model (Amini & Delgado, 2012). This approach is crucial for producing robust and unbiased results as firm-specific factors play a key role in influencing profitability.

Hypothesis of the study

Empirical studies show that financial leverage significantly impacts firm profitability (Nwoha & Duru, 2024; Murugesu & Subramaniam, 2013). Based on this evidence, the following alternative hypothesis is formulated and provides a clear direction for the study.

H1: *There is a significant impact of financial leverage on the profitability of listed healthcare equipment and services companies in Sri Lanka.*

Models for the study

To assess the impact of financial leverage on firm profitability, two panel regression models are constructed.

$$ROA_{it} = \beta_0 + \beta_1 D/E_{it} + \beta_2 ICR_{it} + \beta_3 Assets_{it} + \alpha_i + \varepsilon_{it} \dots (1)$$

$$ROE_{it} = \beta_0 + \beta_1 D/E_{it} + \beta_2 ICR_{it} + \beta_3 Assets_{it} + \alpha_i + \varepsilon_{it} \dots (2)$$

The abbreviations ROA, ROE, D/E, ICR, Assets and ε represent Return on Assets, Return on Equity, Debt-to-Equity Ratio, Interest Coverage Ratio, Total Assets (used as a control variable for firm size) and the error term, respectively. α_i are the unobserved, time-invariant firm fixed effects. All variables are measured across multiple firms and over the time period 2020-2024, where i represents individual firms and t denotes time periods.

Findings and Discussion

The key financial relationships among ROA, ROE, D/E, Interest Coverage Ratio and Total Assets are presented in the correlation matrix given by Table 1. The results show that ROA and ROE had a strong positive relationship with a correlation of 0.95. This means firms that use their assets efficiently also tend to provide higher returns to shareholders. However, the D/E ratio had a clear negative relationship with ROA (-0.61) and ROE (-0.62). This suggests that higher debt levels reduce profitability and increase financial risk. In addition, the Interest Coverage Ratio had a positive relationship with ROA (0.57) and ROE (0.41), meaning more profitable firms handle debt better. Finally, Total Assets showed a weak positive relationship with ROA (0.18) and ROE (0.33), suggesting that larger firm size may have a positive impact on profitability.

Table 1

Results of Correlation Analysis

	Total Assets	Interest Coverage Ratio	D/E Ratio	ROE	ROA
Total Assets	1				
Interest Coverage Ratio	-0.17	1			
D/E Ratio	0.14	-0.28	1		
ROE	0.33	0.41	-0.62	1	
ROA	0.18	0.57	-0.61	0.95	1

(Source: Authors' Compilation)

Model selection

The Hausman test was used to decide between the fixed effects model and the random effects model. This test checks whether the individual-specific errors (α_i) are correlated with the explanatory variables. The null hypothesis assumes no correlation, suggesting that the random effects model is appropriate, while the alternative hypothesis supports the fixed effects model. As shown in Table 2, the test produced a Chi-Square statistic of 1.2666 with 4 degrees of freedom and a p-value of 0.8670. Since the p-value was much greater than the significance level of 0.05, the null hypothesis was not rejected. Based on the Hausman test results, the random effects model was preferred as it provided efficient and consistent estimates when the null hypothesis held true. Moreover, the balanced panel dataset of eight companies over five years indicates that unobserved firm-specific effects are likely independent of the explanatory variables. The inclusion of total assets as a control reduces omitted variable bias, and financial leverage precedes profitability, limiting reverse causality concerns. These data characteristics justify the use of the random effects model and support obtaining robust and consistent estimates.

Table 2
Test Summary of the Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f	Prob
Cross-sectional random effects	1.2666	4	0.8670

(Source: Authors' Compilation)

Model fit and performance

Table 3 shows that financial leverage, measured by the Debt-to-Equity Ratio (D/E) and the Interest Coverage Ratio (ICR), had a strong impact on firm profitability. This relationship was observed in both models after controlling for firm size. Model 1 examined the impact of financial leverage on Return on Assets (ROA) and achieved an R-squared of 0.6579. This means that the debt-to-equity ratio (D/E) and Interest coverage ratio (ICR) explained about 66% of the variation in ROA while controlling for the firm size through total assets. The F-statistic of 19.257 demonstrated strong overall model significance, while the p-value of 0.0000 confirmed **statistical significance** at the **0.05 significance level**. Model 2 examined the impact of financial leverage on Return on Equity (ROE). According to the Model 2 results, R-squared was 0.6328, indicating that the same proxy variables for financial leverage explained about 63% of the variation in ROE. The F-statistic of 20.679 indicated robust model performance, and the p-value of 0.0000 established **statistical significance** at the **0.05 significance level**. These results highlighted that decisions regarding financial leverage had a significant impact on firm profitability. Effective management of debt influenced both the firm's ability to efficiently use its assets and the returns generated for shareholders.

Table 3
Model Fit Statistics

Model	R-squared	F-statistic	P-value
Model (1)	0.6579	19.257	0.0000
Model (2)	0.6328	20.679	0.0000

(Source: Authors' Compilation)

Regression results for models

Table 4 presents the estimated panel regression results for Model 01 and Model 02. Model 01 examined the impact of financial leverage on Return on Assets (ROA). As shown in Table 3, the coefficient of -3.7240 and t-statistic of -2.6159 show that the Debt-to-Equity (D/E) ratio had a significant negative effect on ROA. According to the results, having more debt lowers profitability because it increases interest costs and financial risk. With a coefficient of 3.4179 and a t-statistic of 5.3075, the Interest Coverage Ratio also demonstrated a positive impact on ROA. According to these results, companies that are more capable of covering interest payments typically have higher returns on their assets. A positive correlation between ROA and total assets was demonstrated by the t-statistic of 3.6945 and the coefficient of 2.3658. Thus, an increase in the firm's assets is positively correlated with ROA. Model 02 focused on the relationship between financial leverage and Return on Equity (ROE). The D/E

ratio again showed a significant negative impact with a coefficient of -7.0451 and a t-statistic of -2.8646. These results suggest that high debt increases financial obligations and lowers shareholder returns. ROE had a favourable effect on the Interest Coverage Ratio, as indicated by a t-statistic of 4.4414 and a coefficient of 3.7405. These findings suggest that better equity returns are supported by efficient debt management. Furthermore, Total Assets continued to show a significant positive effect on ROE, with a coefficient of 5.4372 and a t-statistic of 4.9784. These findings show that an increase in firm size contributes to improved profitability for shareholders.

Table 4
Estimation results of models

Model	Variable	Coefficient	Std. Error	T-Statistic	P-value
Model 01 (Y=ROA)	D/E	-3.7240	1.4236	-2.6159	0.0129
	Interest coverage	3.4179	0.6440	5.3075	0.0000
	Assets	2.3658	0.6403	3.6945	0.0007
Model 02 (Y=ROE)	D/E	-7.0451	2.4593	-2.8646	0.0069
	Interest coverage	3.7405	0.8422	4.4414	0.0001
	Assets	5.4372	1.0922	4.9784	0.0000

(Source: Authors' Compilation)

Based on these findings, the alternative hypothesis (H1) that financial leverage has a significant impact on firm profitability is accepted. Moreover, this result is consistent with Pedige & Ishari (2016), Murugesu & Subramaniam (2013), which supports the validity of these findings. The findings reveal that high debt levels negatively impact profitability by increasing financial risk, while larger asset bases and higher interest coverage ratios mitigate this effect. This suggests excessive leverage costs outweigh benefits for Sri Lankan healthcare firms. Managers should maintain balanced capital structures by evaluating debt capacity based on asset quality and cash flow stability. Investors must assess firms' debt-servicing abilities alongside leverage ratios. Critically, policymakers should develop targeted financial policies for the healthcare sector, including regulatory frameworks that facilitate access to affordable long-term financing.

Conclusion

This study observed the impact of financial leverage on the profitability of Sri Lankan healthcare equipment and services companies listed on the Colombo Stock Exchange, addressing the period during COVID-19 and the post-pandemic period. This period involved significant disruptions, such as sudden changes in demand and supply chain problems, which required urgent investment in medical infrastructure. These factors emphasise the importance of financing decisions in managing such challenging situations.

The study considered both fixed and random effects regression models to deal with panel data. The Hausman test results accepted the random effects model. Financial leverage was evaluated using the Debt-to-Equity (D/E) ratio and the Interest Coverage Ratio (ICR), while profitability was measured using Return on Assets (ROA) and Return on Equity (ROE) as proxy variables. To clearly understand the impact of financial leverage on firm profitability, firm size was controlled and measured using total assets. The findings reveal a strong positive correlation between ROA and ROE, and this confirms that they are reliable measures of profitability. The D/E ratio was negatively correlated with profitability, indicating that higher debt risks harm performance. Conversely, ICR positively correlated with profitability, emphasising firms' ability to meet interest obligations. Regression results support accepting the alternative hypotheses and highlighting financial leverage as a key determinant of profitability. Policymakers should introduce clear leverage limits and leverage guidelines to prevent firms from taking on excessive debt. They should also implement policies that promote access to low-cost, long-term financing to support sustainable growth and financial stability in the healthcare sector. This study is limited because the data were taken only from listed healthcare firms, excluding non-listed companies that could provide a fuller industry perspective. It is also restricted to the COVID-19 period, which may reflect crisis-specific effects and limit generalizability. Future research should extend beyond the healthcare sector to critically assess how leverage influences profitability across different industries. It should also incorporate qualitative methods to capture managerial perspectives on financial strategies, while conducting robust checks to validate the consistency and reliability of empirical results.

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BANK-SPECIFIC DETERMINANTS OF PROFITABILITY: EVIDENCE FROM SRI LANKAN DOMESTIC COMMERCIAL BANKS

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Abstract

This study aims to examine the bank-specific determinants that influence the profitability of domestic commercial banks in Sri Lanka, offering insights into which internal factors most significantly affect their financial performance. A balanced panel dataset comprising 70 observations from 10 domestic commercial banks over the period 2018–2024 was analysed using fixed effects regression. Return on Assets (ROA) was employed as the measure of profitability. The study evaluated the impact of key bank-specific variables such as bank size, capitalisation, asset structure, financial structure, asset quality, operational efficiency, revenue diversification, and liquidity. The findings revealed that capitalisation, asset quality, operational efficiency, and revenue diversification positively influence bank profitability. In contrast, bank size and liquidity have a negative impact. No statistically significant relationship was found between profitability and the variables of asset structure and financial structure. This study contributes to the limited body of empirical research focusing on the Sri Lankan banking sector by using recent data and a robust econometric approach to identify internal drivers of profitability. The findings offer practical implications for bank management and policymakers in optimising operational strategies to improve profitability.

Keywords: Bank-specific determinants, commercial banks, panel data analysis, profitability, Sri Lanka

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DOI:

Introduction

Banks play a crucial role in any economy as they significantly contribute to the development of an economy through the facilitation of financial intermediation. Hence, the stability, efficiency and consequently profitability of the banking sector are of vital importance for the stability and growth of the whole economy (Al-Omar and Al-Mutairi, 2008). In 2024, Sri Lanka's commercial banking sector continued to maintain stability by conserving capital and liquidity well above the regulatory minimum levels and also maintaining compliance with prudential requirements (Central Bank, 2024). This sector accounts for 61.9% of total assets by the end of 2024 (Central Bank, 2024), reflecting an increase in investment. Other significant improvements in the performance of the banking sector can be identified as: credit quality of the sector based on Non-Performing Loans (NPL) ratio improved, and profitability improved (Central Bank, 2024). Both Return on Assets (ROA) and Return on Equity (ROE) improvements indicated better operational efficiency. Credit expansion, especially in the SME and retail sectors, led to loan portfolio growth. Asset quality improved with a lower NPL ratio, supported by better borrower repayment capacity and proactive loan restructuring. The sector maintained strong capital adequacy and liquidity positions, despite challenges like sovereign debt restructuring and narrowing net interest margins. Banks focused on enhancing digital infrastructure and governance, with the Central Bank enforcing regulatory reforms to ensure stability (Central Bank, 2024). In the literature, the determinants of profitability of Banks are expressed as bank-specific determinants and macroeconomic determinants (Al-Omar and Al-Mutairi, 2008; Athanasoglou, Delis and Staikouras, 2008; Alper and Anbar, 2011; Louzis et al, 2010; Sufian and Kamarudin, 2012). Many empirical studies have been done on determinants of bank profitability, and such determinants are well documented in many other countries. However, comprehensive studies to assess the bank-specific determinants of profitability in the Sri Lankan context are further required. Therefore, this study may fill the empirical gap regarding this aspect. Hence, the objective of this study is to investigate the impact of bank-specific determinants, i.e., bank size, capitalisation, asset structure, financial structure, asset quality, operational efficiency, revenue diversification and liquidity, on the profitability of Sri Lankan domestic Commercial Banks during the period from 2018 to 2024.

Literature Review

Firm-specific determinants mostly reflect the bank's management decisions, policy objectives and practices about sources and utilisation of funds, capital, liquidity, and expense management. Athanasoglou, Delis and Staikouras(2005) rationalised that small-sized institutions try to grow faster even at the expense of profitability. Accordingly, recently incorporated institutions put more emphasis on increasing their market share rather than improving profitability. However, a few other researchers argue that marginal cost savings could be achieved by increasing the size of the bank, especially as the market develops (Sufian and Kamarudin, 2012). Sufian and Chong (2008) also highlight that in the literature, profitability and size found mixed relationships, while in some cases, a U-shaped relationship is identified. Alper and Anbar (2011) and Sufian and Kamarudin (2012) found a positive relationship between profitability and size; however, Athanasoglou, Delis and Staikouras(2005) claim that there is no significant relationship between size and profitability. Hence, the size of banks and their profitability may be expected to be in a non-linear relationship. The relationship of capitalisation with profitability is expected to be positive, and most of the empirical findings support a positive relationship. Athanasoglou, Delis and Staikouras(2005) stressed that sound capital pursues more opportunities, more effectively, offers more time and flexibility to handle unexpected losses, and hence supported increased profitability. However, Hoffmann (2011) suggests that well-capitalised banks tend to reduce the risk of equity and, accordingly, lower the expected return on equity. Further, higher equity reduces the profit after tax by reducing the tax shield provided by the tax deductibility of interest payments on borrowed funds.

Sufian and Kamarudin (2012) argue that loans and advances are assumed to be the main source of profitability and are expected to affect performance positively. However, they also anticipate a negative relationship due to weak asset quality, especially during adverse economic conditions. Alper and Anbar (2011) highlight that the more deposits are transformed into loans, the higher the interest margin and profit. Hence, banks with a higher composition of deposits in their Financial Structure are more profitable. However, Flamini et al. (2009) disagree and justify that banks which are more dependent on deposits for their funding needs are less profitable, possibly due to expenses required to have extensive branch networks and other expenses that may be incurred to administer the deposit accounts. Asset Quality is directly related to the credit function of banks, and it can be identified as Credit Risk. Hoffmann (2011) highlights that financial institutions are more vulnerable to high credit risk than other institutions. Athanasoglou, Delis and Staikouras(2005) also highlight that the bank can improve profitability by improving screening and monitoring of credit risk, and such policies involve the forecasting of future levels of risk. In the banking literature, many researchers argue that the institution with high loan growth often faces more losses as credit appraisals and analysis procedures are less rigorous, but it may allow the institution to charge a high margin, representing a risk-return trade-off. Further research on bank failures, explaining the causes, found that a major proportion of assets were kept under nonperforming loans before failures (Sufian and Parman, 2009).

Several researchers highlight that the relationship between profitability and expenses appears to have a straightforward negative relationship; this may not always be the case (Kosmidou, 2008; Olweny and Shipho, 2011). This is because a higher degree of expenses may be associated with higher volumes of activities and enhance the revenues. Flamini et al. (2009) pointed out that high operating expenses erode profits except for banks that manage to pass on their costs to depositors and lenders. Revenue diversification specifies moving away from traditional revenue sources and toward fee and commission income, dividend income, trading revenue and other operating income, including income from off-balance sheet activities. Alper and Anbar (2011) found a positive relationship between profitability and revenue diversification in the Turkish banking sector. This indicates that greater bank activity diversification positively influences returns. The relationship between profitability and liquidity are often discussed in banking literature. Sufian and Parman (2009) state, “liquidity risk arising from the possible inability of a bank to accommodate a decrease in liabilities or to fund increases on the assets’ side of the balance sheet, is considered an important determinant of bank profitability”. Accordingly, holding of high liquidity is at the opportunity cost of lending with high returns. Further, banks are engaged in the maturity transformation process, where short-term deposits will be converted to long-term advances. This process would constantly involve the risk associated with maturity mismatches (Guru et al., 2002).

Based on the literature, the hypotheses below were developed:

H1: *There is a positive relationship between bank size and bank profitability.*

H2: *There is a positive relationship between capitalisation and bank profitability.*

H3: *There is a positive relationship between net Loans and Advances to total Assets Ratio and bank profitability.*

H4: *There is a positive relationship between the Deposits to Total Assets Ratio and bank profitability.*

H5: *There is a negative relationship between Credit Cost Ratio and bank profitability.*

H6: *There is a negative relationship between the Cost to Income Ratio and bank profitability.*

H7: *There is a positive relationship between Non-Interest Income as a percentage of Total Assets and bank profitability.*

H8: *There is a negative relationship between liquidity and bank profitability.*

In terms of Sections 21(1) and 76H of the Banking Act, No. 30 of 1988, as amended, the Central Bank of Sri Lanka has determined that every licensed commercial bank and licensed specialized bank shall maintain Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR) as the statutory liquidity ratios, in accordance with “Basel III: International Framework for Liquidity Risk Measurement, Standards and Monitoring”, “Basel III: The Liquidity Coverage Ratio and Liquidity Risk Monitoring Tools” and “Basel III: The Net Stable Funding Ratio”, (Central Bank, 2024). In Sri Lankan literature (Amararathne and Wanigasuriya, 2022; Ruwanthika, Wijekoon and Gunathilaka, 2022), studies examine bank-specific factors and macro-economic factors on profitability till the year 2020, and this study focuses on bank-specific factors and a more comprehensive expansion considering the period of 2018- 2024 for the Sri Lankan Commercial Banks.

Methodology

Study period and sample

In Sri Lanka, 24 Licensed Commercial Banks (LCBs) were identified by the end of 2024 (Central Bank, 2025). This study uses panel data, which combines cross-sectional and time series data for 10 banks covering the period 2018 to 2024. Companies were selected based on the highest market capitalisation value, and the data was collected using company annual reports and secondary data sources.

Variables identified

Based on a comprehensive review of prior studies, this research identifies eight endogenous variables as core explanatory factors hypothesised to affect bank profitability. Return on Assets (ROA) is the key ratio and most of the literature on Banks’ profitability uses as a measure of profitability (e.g. Sufian and Parman, 2009; Sufian and Chong, 2008; Flamini et al., 2009; Kosmidou, 2008; Alper and Anbar, 2011; Amararathne and Wanigasuriya, 2022; Ruwanthika, Wijekoon and Gunathilaka, 2022). Hence, this study uses the ROA as a proxy for profitability, as suggested in most of the banking literature and is calculated using average assets, as suggested by Flamini et al. (2009). Further, as suggested by Athanasoglou, Delis and Staikouras (2005), before tax profit is considered as the numerator. Bank-specific variables are the internal factors of the banks, and they can be controlled by the management. Based on previous research as analysed in the literature review, we can summarise that the firm-

specific factors, such as bank size, capitalisation, asset structure, financial structure, asset quality, operating efficiency, revenue diversification, and liquidity, are the firm-specific variables that influence profitability. Table 1 presents a comprehensive explanation of the measures used in the study.

Table 1

Definitions, notation and expected effect of the explanatory variables of domestic Commercial Bank profitability

Variable		Measure		Notation	Hypothesised Relationship
Explanatory Variable	Profitability	$\frac{\text{Net Profit after Tax}}{\text{Average Assets}}$	X 100	ROA	
	Bank Size	Ln (Total Assets)		SIZE	Positive / Negative
	Capitalization	$\frac{\text{Core Capital (Tier 1)}}{\text{Total Risk-Weighted Assets}}$	X 100	CCAR	Positive
	Asset Structure	$\frac{\text{Net Loans \& Advances}}{\text{Total Assets}}$	X 100	LATA	Positive
	Financial Structure	$\frac{\text{Due to Customers (Deposits)}}{\text{Total Assets}}$	X 100	DPTA	Positive / Negative
	Asset Quality	$\frac{\text{Impairment Charges}}{\text{Average Gross Loans \& Advances}}$	X 100	CRCO	Positive
	Operating Efficiency	$\frac{\text{Operational Cost net of Taxes}}{\text{Net Interest Income + Other Income}}$	X 100	COIN	Positive
	Revenue Diversification	$\frac{\text{Non-Interest Income}}{\text{Total Assets}}$	X 100	REVD	Positive / Negative
	Liquidity	$\frac{\text{Liquid Assets}}{\text{Public Deposits}}$	X 100	SLAR	Negative

(Source: Authors' Compilation)

Panel data allows controlling for variables which we cannot observe or measure, or variables that change over time and not across entities. Baltagi (2005) states, “panel data give more informative data, more variability, less collinearity among the variables, more degrees of freedom and more efficiency”. This study uses panel data regression to examine the factors which influence the profitability of Sri Lankan domestic Commercial Banks since panel data can take heterogeneity explicitly into account by allowing for subject-specific variables. To estimate the effects of explanatory variables on the profitability of banks, three estimation models were used, namely, pooled Ordinary Least Squares (OLS), the random effects, and the fixed effects. The description of three estimation models – pooled OLS, fixed effects, and random effects is given below:

$$Y_{it} = \alpha + \beta X_{it} + \varepsilon_{it} \quad (1) \quad Y_{it} = \alpha_i + \beta_i X_{it} + u_{it} \quad (2) \quad Y_{it} = \alpha + \beta X_{it} + u_{it} + \varepsilon_{it} \quad (3)$$

Where,

- Y_{it} – is the response variable where i = bank and t = time (can be measured by ROA)
- α – unknown intercept
- α_i – unknown intercept constant for each bank (n bank-specific intercepts, $i = 1 \dots n$)
- X_{it} – Explanatory variable
- β – is the coefficient for the explanatory variable
- ε_{it} – is the cross-sectional error component
- u_{it} – is the error term of bank i at time t

As discussed in the previous section, to estimate the panel regression model, three alternative methods, such as the pooled ordinary least squares method (equation 1), fixed effects (equation 2), and random effects (equation 3), were used. Specification tests, such as the Breusch-Pagan Lagrange Multiplier test and the Hausman test, were performed to find the fitted model. Further, the researcher has checked for heteroskedasticity, autocorrelation / serial correlation and multicollinearity in order to ensure reliable estimates. Finally, the researcher has checked for the presence of unobservable time effects by controlling for variables that are constant across entities but vary over time.

Findings and Discussion

Multicollinearity and fixed effects

Multicollinearity is a state of very high intercorrelations or inter-associations among the explanatory variables, which may lead to unreliable and unstable estimates of regression coefficients. Variance Inflation Factor (VIF) measures the relationship of all explanatory variables concurrently and explains how much the variance of a coefficient is inflated due to linear dependence on other explanatory variables. The researchers checked for VIF of the variables (refer to Table 2), and all variables are within the rule of thumb of 10.

Table 2
Variance inflation factor and hausman test

Variable	VIF	1/VIF	---- Coefficients ----		(b-B) Difference	Sqrt (diag(V _b - V _B)) S.E.
			(b) Fixed Effects	(B) Random Effects		
SIZE	5.62	0.177984	-.3654199	-.0850058	-.2804141	.0740848
CCAR	9.23	0.108332	.0215926	.0152701	.0063224	.0082601
LATA	2.79	0.357978	.0099117	-.0015863	.011498	.0050547
DPTA	2.73	0.366310	-.0113599	.0051234	-.0164833	.005186
CRCO	1.21	0.828209	-.5297602	-.5535429	.0237827	.0097656
COIN	5.64	0.177412	-.0433062	-.0415168	-.0017894	.0019566
REVD	1.77	0.566145	.6720816	.6830108	-.0109292	.0267591
SLAR	5.13	0.195081	-.0057707	-.0026573	-.0031134	.0017683

(Source: Authors' Compilation)

The researchers also checked for time fixed effects when running a Fixed effects model by controlling for variables that are constant across entities but vary over time. This eliminates the omitted variable bias caused by excluding unobserved variables that evolve but are constant across banks. A time varying intercept (λt) is included for this purpose and however, the model failed to reject the null (Prob > F = 0.5674) that all years' coefficients are jointly equal to zero. Therefore, it is concluded that no time fixed effects are needed (Table 2).

Descriptive and correlation

Table 3 presents the descriptive statistics for the variables used in the analysis and the Pearson correlation coefficients between variables. While considering the bank-specific factors, the bank size is identified as a profitability determinant factor, but surprisingly with a negative coefficient of 0.3654. This is statistically significant at a 95% confidence level. This indicates that banks with a relatively large asset base are less profitable than the small banks. The finding supports diseconomies of scale in the Sri Lankan Commercial Banking Sector.

Capitalisation is positively correlated with profitability (coefficient 0.0216) and is statistically significant at a 90% confidence level. This confirms that commercial banks with a strong capital base tend to achieve increased profitability, and is consistent with most studies conducted in other countries. However, we may find that the coefficient is not particularly high, likely because capital is highly regulated in Sri Lanka. The Asset Structure (loans and advances to total assets) exhibits a positive and relatively small coefficient of 0.0099, which is statistically insignificant. Loans and advances are identified as the major assets of banks, representing their financial intermediation function; however, they fail to explain them as a profitability determinant factor in Sri Lankan Commercial Banks. This may be due to a reduced spread on intermediation activities, issues related to high credit costs for delinquent loans, and the bank's recent focus on fee-based activities.

Table 3
Descriptive statistics and correlation

	Mean	ROAA	SIZE	CCAR	LATA	DPTA	CRCO	COIN	REVD	SLAR
ROAA	1.73552	1.0000								
SIZE	24.0689	0.5203* 0.0000	1.0000							
CCAR	19.4268	-0.7394* 0.0000	-0.6827* 0.0000	1.0000						

LATA	14.6125	0.5347* 0.0000	0.1554 0.1800	-0.6374* 0.0000	1.0000					
DPTA	65.2948	0.6189* 0.0000	0.5048* 0.0000	-0.7549* 0.0000	0.6307* 0.0000	1.0000				
CRCO	70.7078	-0.2532* 0.0273	-0.1030 0.3761	0.2068 0.0730	-0.1914 0.0977	-0.0584 0.6160	1.0000			
COIN	.617105	-0.8765* 0.0000	-0.7122* 0.0000	0.8211* 0.0000	-0.5326* 0.0000	-0.6702* 0.0000	0.0347 0.7661	1.0000		
REVD	56.4342	0.5419* 0.0000	-0.1668 0.1497	-0.2475* 0.0311	0.2852* 0.0125	0.1776 0.1248	0.0684 0.5573	-0.2883* 0.0116	1.0000	
SLAR	1.5319	-0.7114* 0.0000	-0.4451* 0.0001	0.8546* 0.0000	-0.6628* 0.0000	-0.6879* 0.0000	0.2286* 0.0470	0.7448* 0.0000	-0.2838* 0.0130	1.0000

(Source: Authors' Compilation)

Financial Structure (deposits to total assets) of banks leaves a negative coefficient of 0.0114 and is not statistically significant at any level. This indicates that the financing structure of banks is not a major profitability determinant factor, and it could be concluded that financial structure is insignificant as far as Sri Lankan Commercial Banks are concerned. Asset quality has also been identified as a major factor at a 99% significance level. The coefficient of the credit cost ratio with profitability is -0.5298, which shows that asset quality is positively correlated with a high coefficient. i.e., the higher the asset quality, the higher the profitability. The findings emphasise that asset quality is the chief determinant of the banks' profitability. The result is consistent with almost all the findings in the banking literature. With the above findings, we may conclude that the Commercial Banks that operate with better credit origination standards, efficiency and a timely recovery approach may enhance the profitability. In the case of operating efficiency, a positive relationship (negative relationship with cost to income ratio) is shown with a weak coefficient of 0.0433 and is statistically significant at a 99% confidence level. The finding is in line with most of the other empirical findings in other countries. Accordingly, improving operating efficiency is crucial for enhancing the profitability of Sri Lankan Commercial Banks.

Revenue Diversification appears to be an important determinant of the profitability of Commercial banks in Sri Lanka. Non-interest income as a percentage of total assets shows a positive relationship with a large coefficient of 0.6721 at the significant level of 99%. Hence, this finding suggests a diversification of revenue sources to enhance the profitability of banks. Finally, the statutory liquid assets ratio, a proxy for Liquidity, indicates a relatively small negative coefficient of 0.0058 and is statistically significant at the 99% level. This is mainly because liquid assets are usually associated with lower rates of return; however, in order to avoid insolvency, banks often hold liquid assets, which can be easily converted to cash.

Multiple regression analysis models under Pooled OLS, random effects and fixed effects

Table 4 shows the outcome of the multiple regression analysis under pooled ordinary least squares, random effects and fixed effects.

Table 4
Multiple regression analysis models under pooled OLS, random effects and fixed effects

	Pooled OLS		Random effects		Fixed effects		
	Coef (Std. Err.)	P > t	Coef Std. Err.	P > t	Coef Std. Err.		P > t
Intercept	1.7218 (1.9656)	0.384	4.6100 (2.2231)	0.038	10.5827 (3.1170)		0.006
SIZE	0.0417 (0.0697)	0.551	-0.0850 (0.0826)	0.304	-0.3654 (0.1251)	**	0.014
CCAR	0.0205 (0.0098)	0.042	0.0152 (0.0107)	0.156	0.0215 (0.0105)	*	0.066
LATA	-0.0047 (0.0088)	0.601	-0.0015 (0.0096)	0.869	0.0099 (0.0077)		0.228
DPTA	0.0125 (0.0052)	0.021	0.0051 (0.0060)	0.399	-0.0113 (0.0095)		0.258
CRCO	-0.5831 (0.0740)	0.000	-0.5535 (0.0585)	0.000	-0.5297 (0.0803)	***	0.000
COIN	-0.0413 (0.0039)	0.000	-0.0415 (0.0036)	0.000	-0.0433 (0.0062)	***	0.000
REVD	0.6869 (0.0806)	0.000	0.6830 (0.0733)	0.000	0.6720 (0.0961)	***	0.000
SLAR	-0.0014 (0.0031)	0.670	-0.0026 (0.0030)	0.387	-0.0057 (0.0012)	***	0.001
F Test	F(8, 67) = 112.51				F(8,11) = 15111.66		

Wald Chi2 (8)		Wald Chi2 (8) = 838.35	
Prob > F	Prob > F = 0.0000	Prob > chi2 = 0.0000	Prob > F = 0.0000
R ² – within	N/A	0.9260	0.9429
R ² – between	N/A	0.9374	0.5551
R ² – overall	0.9307	0.9137	0.6688

(Source: Authors' Compilation)

Note: Standard errors are given in parentheses. See Table 1 for definitions of all variables

* Significance at the 90% confidence level

** Significance at the 95% confidence level

*** Significance at the 99% confidence level

Empirical findings of this study illustrate that bank size hurts its profitability with high explanatory power. It elaborates that larger banks are less profitable than smaller banks, which contradicts the economics of scale concept. Further, the finding is compatible with the findings of the previous studies on the profitability of banks, such as in the Philippines (Sufian and Chong, 2008) and the US (Hoffmann, 2011), where banks can take advantage of the economies of scale when the size is small, but these economies of scale become exhausted when a bank's size increases. This indicates that the banks have to cut down their costs when expanding. This may be achieved by enhancing technology, which can positively support an increased profitability. However, this finding is in contradiction with most of the findings, such as in Bangladesh (Sufian and Kamarudin, 2012), Turkey (Alper & Anber, 2011), Southeastern European Region (Athanasoglou, Delis and Staikouras, 2008), Greece (Kosmidou, 2008) and Sub-Saharan Africa (Flamini et al., 2009). The empirical findings emphasise the importance of capital to improve the profitability of domestic Commercial Banks, and accordingly, the banks with strong capital can have better profitability than the banks with limited capital. The finding is consistent with the previous studies in different countries such as Greece (Athanasoglou, Delis and Staikouras, 2005; Kosmidou, 2008), Bangladesh (Sufian and Kamarudin, 2012), South Eastern European Region (Athanasoglou, Delis and Staikouras, 2008), Kenya (Olweny and Shipho, 2011), Philippines (Sufian and Chong, 2008) and Sub-Saharan Africa (Flamini et al., 2009) and inconsistent with the US (Hoffmann, 2011). Athanasoglou, Delis and and Staikouras (2005) suggested that high capital will give more flexibility to handle unexpected losses. The results of Hoffmann (2011) exhibit that higher capital leads to predict less profitability which may be due to risk averse behaviour. The Sri Lankan banking industry is fairly capitalised compared to other countries in the region, and the implementation of Basel III in 2017, which is now in full implementation, requires banks to have enhanced quantity and quality of Capital. Further retention of profits will confirm a certain percentage of internal rates of capital generation and authorities need to consider curtailing dividend distribution unless strong capital is evident.

Asset quality is a key determinant of the profitability of banks, with higher explanatory power. The banks with high delinquent loans tend to have low profitability due to the non-realisation of the time value of the investments, and to create reserves for writing off of impaired assets. Further, the result of the positive relationship (negative with credit cost ratio) is consistent with the findings of previous studies in different countries, including Greece (Athanasoglou, Del, is and and Staikouras2005 & Kosmidou, 2008), Turkey (Alper and Anber, 2011), South Eastern European Region (Athanasoglou, Delis and and Staikouras 2008), Kenya (Olweny and Shipho, 2011) and the Philippines (Sufian & Chong, 2008). The findings on the Greek banking sector (Louzis et al., 2010) highlight that asset quality is closely related to macroeconomic variables such as GDP growth, unemployment rate and lending rate. Importantly, the findings of Louzis et al. (2010) stress that management quality has a greater influence on asset quality. The empirical results of this study also illustrate that banks should focus more on asset quality, which can be achieved through better credit origination standards and proper monitoring and follow-up systems as part of their credit risk management. Further, focus on the loan-to-value ratio, evaluation of creditworthiness, and marketability of the collateral are vital during the credit origination. On the other hand, strict credit evaluation processes may curtail the credit growth of banks. Additionally, early recovery action and close follow-up with high-volume advances will help to reduce asset quality deterioration. Hence, the authorities should concentrate more on credit risk management and timely and efficient follow-up mechanisms as an early warning methodology to avoid asset quality deterioration.

The empirical findings prove that the Operating Efficiency has a positive impact on its profitability. The findings are consistent with the findings of previous studies in different countries, including Greece (Athanasoglou, Delis and and Staikouras., 2005 & Kosmidou, 2008), South Eastern European Region (Athanasoglou, Delis and and Staikouras2008), Kenya (Olweny and Shipho, 2011), Malaysia (Guru et al, 2002) and the Philippines (Sufian and Chong, 2008). A number of researchers highlight that the relationship between profitability and expenses appears to have a straightforward negative relationship; this may not always be the case (Kosmidou, 2008; Olweny and

Shipho, 2011). The finding of this study contradicts the findings of Bangladesh (Sufian & Kamarudin, 2012). Flamini et al. (2009) pointed out that high operating expenses erode profits except for banks that manage to pass on their costs to depositors and lenders.

Revenue Diversification acts as a determinant of profitability for banks with a positive impact. The finding is consistent with Bangladesh (Sufian and Kamarudin, 2012), Turkey (Alper and Anber, 2011), Kenya (Olweny & Shipho, 2011), the Philippines (Sufian and Chong, 2008) and Sub-Saharan Africa (Flamini et al., 2009). The findings suggest that the bank's recent focus on fee and commission income, trading revenue and other operating income, including income from off-balance sheet activities, is profitable compared to relying entirely on traditional financial intermediation. Sufian and Chong (2008) highlight that liquidity risk, arising from the possible inability of banks to accommodate decreases in liabilities or to fund increases on the assets' side of the balance sheet, is considered an important determinant of bank profitability. This study establishes a negative relationship between liquidity and profitability. This is mainly due to the fact that liquid assets are usually associated with lower rates of return; however, in order to avoid insolvency, banks often hold liquid assets, which can be easily converted to cash. Further, the result of the negative relationship is consistent with the findings of previous studies such as Greece (Kosmidou, 2008) and Kenya (Olweny and Shipho, 2011). The liquidity in the banking industry is highly regulated, and Commercial Banks are required to maintain a minimum statutory liquid assets ratio of 20% in addition to ensuring the compliance of liquidity coverage ratio and net stable funding ratio. It could be concluded that liquidity is negatively correlated to the bank profitability and however the explanatory power is relatively small compared to other variables. Further, since the banking sector is running with negative maturity mismatches, maintenance of high-quality unencumbered liquid assets is essential for stability.

Conclusion

This study presented evidence on the bank-specific determinants of profitability of Sri Lankan domestic Commercial Banks. The analysis was conducted for the period 2018- 2024, and employed eight endogenous factors such as bank size, capitalisation, asset structure, financial structure, asset quality, operational efficiency, revenue diversification and liquidity. Findings reveal that bank size is an important variable in explaining the profitability, with a negative impact on profitability, with high explanatory power. Hence, the large banks should focus on economies of scale, say for example, moving to digitalisation may reduce their operating expenses. The capital is also an important factor in explaining profitability, and a well-capitalised Commercial Bank is more profitable; however, explanatory power is weak. Asset quality is also an important factor for profitability, with high explanatory power. In order to control the credit cost, banks need to maintain the delinquent advances at lower levels. This implies that banks should be prudent when providing credit facilities. Further, this emphasises that banks should have sound credit risk management processes and good credit origination processes rather than collateral-based lending. Timely recovery actions are also vital for asset quality. With regard to operational efficiency, a positive relationship is identified with weak explanatory power. This indicates that improving operating efficiency is vital for enhancing the profitability of Sri Lankan Commercial Banks. The empirical finding also suggests that revenue diversification enhances profitability with high explanatory power. This indicates banks should also focus on fee-based activities such as fee and commission income, trading revenue and other operating income, including income from off-balance sheet activities, rather than relying only on traditional financial intermediation. Finally, liquidity is also a determinant of profitability, with very weak explanatory power, indicating that maintaining excess liquidity impacts profitability mainly because liquid assets are associated with lower rates of return; however, maintaining sufficient liquidity is essential in order to avoid insolvency. The empirical findings of this study offer considerable policy relevance. The concept of profitability is vital for banks as better performance helps to improve the stability of the financial system. The sustainability of the Sri Lankan Commercial banking sector depends on its efficiency, profitability, and competitiveness. Further, in view of the recent increase in competition among banks, the bank management, regulators and the policy makers need to identify the factors influencing profitability in order to manage their objectives. The limitation of this study is that the focus is restricted only to endogenous factors; however, exogenous factors also may influence profitability, and the researcher leaves this for future research.

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IMPACT OF FORENSIC ACCOUNTING KNOWLEDGE ON DETECTING FRAUDS IN LISTED COMPANIES IN SRI LANKA: EVIDENCE FROM PRACTITIONERS IN SRI LANKA

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Abstract

This study explores the role of forensic accounting knowledge in fraud detection in Sri Lanka, an emerging industry with limited research and unresolved scandals in recent years. It could highlight how the findings differ from global trends or how they address specific challenges faced in the Sri Lankan context, while investigating the most significant skills and knowledge needed for forensic accountants to address fraud-related issues. By reviewing global and local perspectives, the study develops a conceptual framework that incorporates accounting skills, knowledge of procedures, forensic accounting expertise, and a legal background. A sample of 203 practitioners working in listed companies in Sri Lanka was surveyed using a structured questionnaire. The analysis employed descriptive statistics, factor analysis, and regression analysis to identify the most critical factors influencing fraud detection. Findings reveal that knowledge of forensic accounting and legal background are the most significant predictors of fraud detection, while accounting skills and procedural knowledge are less impactful. Moreover, practitioners with forensic accounting experience emphasised the importance of legal and forensic accounting knowledge, while those without such experience did not find any of the variables significant in fraud detection or prevention. This study underscores the need for specialised forensic accounting education and professional development in Sri Lanka to enhance fraud detection capabilities in the corporate sector.

Keywords: Accounting skills, Forensic Accounting, Fraud Detection, Knowledge of procedures, Legal background

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DOI:

Introduction

Forensic accounting is a distinct area of accounting that applies accounting, auditing, and investigative techniques to uncover and avert financial fraud and wrongdoing. Due to the rising intricacy of business dealings and the globalisation of financial markets, the need for forensic accountants has significantly increased lately. In this chapter, the investigator will examine the progression of forensic accounting as a field, its importance in the contemporary business landscape, and its function in uncovering financial offences. The investigator will further address the essential principles and methods employed in forensic accounting, such as fraud investigation, litigation assistance, and expert witness testimony (Rathnasiri & Bandara, 2017). The fields of Accounting, Forensic Accounting, and Auditing are interconnected, and under various conditions, professional accountants or practitioners collaborate to fulfil their goals and requirements. Fraud and fraudulent incidents in the nation heightened the need for forensic accounting. Each day, the frequency of fraud incidents in the nation has increased and totals a larger sum. To uncover these frauds, a fundamental understanding of accounting will not suffice. Forensic accounting is viewed as an important area in accounting for uncovering fraud in the worldwide scenario. In legal settings, forensic accounting is commonly employed to uncover fraud. Fraud involves intentionally deceitful actions aimed at securing an advantage or making a profit. Forensic accounting is a fast-expanding area of accounting that pertains to the involvement arising from real or expected conflicts or legal actions. “Forensic” refers to being appropriate for presentation in a legal court. Forensic Accounting is an investigative approach to accounting aimed at identifying if a person or organisation has participated in any unlawful financial actions. Moreover, forensic accountants can offer litigation assistance and investigative accounting services (Oyebisi, 2018)

When it comes to the Sri Lankan Context, according to the Central Bank of Sri Lanka, some finance companies were bankrupt due to fraud and inability to manage funds, liquidity issues. There are publicly listed and nonpublic listed companies such as Golden Key (2008), The Central Bank of Sri Lanka (CBSL) bond scandal (2015), The Standard Credit Finance Ltd (2016), Central Investments & Finance Ltd (2018), TKS Finance Ltd (2019), ETI Finance Ltd (2020), The Finance Company PLC (2020). Regarding the Sri Lankan context, there is a question of how to use forensic accounting in fraud mitigation compared to the worldwide context. In light of the current situation, several studies have been carried out in the local context concerning this matter. Forensic accounting has emerged as a desirable career path in recent years, leading to a rise in the need for forensic accounting services to address fraud and the misuse of financial reports. Auditors require both accounting and auditing abilities as fundamental skills in their profession. Additionally, it is suggested that a greater number of questionnaires be circulated and extended to firms beyond the Big Four. The use of forensic accounting services has decreased the occurrence of fraud in manufacturing companies in Anambra state. It has additionally resulted in fraud prevention within manufacturing companies in Anambra state (Anyadufu & Uchechi, 2023).

Literature Review

Fraud involves actions taken to secure a benefit or profit. As stated by Walakumbura & Dharmarathna (2022), occupational fraud can be divided into three categories. Including asset misappropriation, financial reporting fraud, and corruption. Frauds can occur at any moment, in any place, or to any individual. An organisation inherently faces the risk of fraud, whether from an individual or a group that hides evidence. Once fraud is revealed, forensic accountants and forensic accounting professionals will arrive and use their expertise and professional scepticism to examine the information. As per Imoniana (2013), the research results indicate that auditors possess strong training and experience in identifying issues beyond just detecting fraud. Nonetheless, due to constraints in time and data, auditors will provide reasonable assurance regarding the qualification of any material misstatements

Frauds occur in both the private and public sectors. Fraud is a global issue since no country is exempt. Particularly, developing nations and their different regions are experiencing the greatest suffering (Okoye, 2013). Forensic Accounting applies accounting principles and methods to resolve legal issues. Forensic accounting encompasses the use of accounting principles, auditing methods, and investigative practices to address legal issues. The system of internal auditing and controls aids in preventing and detecting fraud (Oyebisi, 2018). In 2004, Wolfe and Hermanson contended that although earlier elements such as pressure, rationalisation, and opportunity exist, fraud is unlikely to occur without the fourth element, capability. In other terms, the possible offender needs to possess the skill and capability to carry out fraud. Capability encompasses Position, Intelligence, Ego, coercion, and stress, which are the foundational traits of capability. This factor is especially significant in relation to extensive or prolonged fraud. Consequently, the conclusion is that the previously mentioned factors influence fraud, how they influence it, and what circumstances are emerging as a result (Hassan et al., 2015) The literature on forensic accounting highlights several major themes, including fraud motivation, fraud consequences, fraud detection utilizing forensic accounting techniques, forensic accounting theory, forensic accounting skills, forensic accounting education, and forensic accounting jobs. These themes collectively reflect the diverse aspects and

applications of forensic accounting. They delve into understanding the motivations behind fraudulent activities, exploring the repercussions of fraud, examining methods for detecting fraud through specialised accounting techniques, developing theoretical frameworks for forensic accounting practice, honing the essential skills required in this field, addressing the educational needs of aspiring forensic accountants, and discussing the opportunities and challenges within forensic accounting careers.

Forensic accountants are essential in investigating the financial activities of companies or individuals, emphasising legal matters. Their main responsibilities include examining financial activities, identifying fraud, and creating reports that can serve as evidence in criminal or civil legal proceedings. These specialists offer investigative services focused on revealing financial discrepancies, including embezzlement, money laundering, or manipulation of financial statements. They aid in litigation by providing expert testimony and assisting legal teams with financial analysis and documentation.

In the context of Sri Lanka, certain laws have been enacted by the Sri Lankan parliament to combat fraud associated with corruption and bribery. Including the Prevention of Money Laundering Act No. 5 of 2006 and the Anti-Corruption Act No. 19 of 1994. Currently, Sri Lanka is experiencing an economic crisis, and most businesses have been impacted by numerous challenges related to economic, environmental, and social aspects. The depreciation of the rupee is primarily due to significant inflation, insufficient foreign exchange reserves, a high volume of imports, and a shortfall in exports.

Forensic accounting demands a wide range of abilities and expertise in fields like accounting, psychology, auditing, and legal matters. Fraud detection can involve the use of models. These models have been created by integrating psychological, quantitative, and advanced data analysis techniques on financial data. The Benish model demonstrates greater accuracy than Benford's Law. The primary conclusions of the research indicate that the competencies and techniques utilised in forensic accounting render this role an efficient means of identifying and averting fraud; nonetheless, it needs increased focus from educational organisations and specialised entities that prepare accounting professionals.

Methodology

The researcher has collected responses from 203 practitioners who are working in those organisations through distributing a questionnaire using sampling method of non-probability sampling method and using sampling technique of convenience sample since easy and inexpensive. The researcher has identified the Practitioners who are working in the listed companies in Sri Lanka as the target population for this study, with a total of 284 such companies as of May 31, 2024. In this study, researchers expect to use accounting skills, knowledge of forensic accounting, Legal background, and knowledge of procedures as independent variables. The dependent variable is fraud detection.

The study relies on primary data collected through structured questionnaires as the main source of information. The data collection process involved gathering responses from practitioners selected through purposive sampling. The research design is the plan and structure of the investigation. As such, the study is conducted using a deductive approach, which aims to validate or refute theoretical propositions through empirical investigation. In this research study, the non-probability sampling method has been used. Under the non-probability sampling, the convenience sampling method has been used. Convenience sampling means selecting participants based on their easy availability and preferring to participate in the study rather than through a random selection process. Convenience sampling is used because of time limitations and the prevalence of online platforms and social media; researchers often use this sampling method to meet a wide range of respondents inexpensively and quickly.

This approach aims to provide valuable insights into the relationships between various factors and the effectiveness of fraud prevention measures in different organisational settings.

The estimated regression equation is,

$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + i$$

Where:

Y = Fraud detection

$\beta_0, \beta_1, \beta_2, \beta_3$ = Estimated Regression Coefficients

X₁ = Knowledge of procedures

- X 2 = Accounting skills
- X 3 = Knowledge of forensic accounting
- X 3 = Legal Background
- i = Random Error Term

Findings and Discussion

Normality test

Accounting Skills Skewness showed that the variable is negatively skewed, as the value stood at -0.346, thus described as having a long-left tail, while the kurtosis of -0.152 is known as a platykurtic distribution because it is less than 3. Also, Knowledge of Procedures Skewness showed that the variable is negatively skewed as the value stood at -0.330 thus described as has a long-left tail while the kurtosis of -0.885 is known as platykurtic distribution because it is less than 3 and Legal Background Skewness showed that the variable is negatively skewed as the value stood at 0.070 thus described as has a long Right tail while the kurtosis of -0.692 is known as platykurtic distribution because it is less than 3. When we consider Knowledge of Forensic Accounting, Skewness showed that the variable is negatively skewed, as the value stood at -0.563, thus described as having a long left tail, while the kurtosis of -0.720 is known as a platykurtic distribution because it is less than 3.

Table 1
Output of data normality

Variable	Skewness	kurtosis
Accounting Skills	-0.346	-0.152
Knowledge of Procedures	-0.330	-0.885
Legal Background	0.070	-0.692
Knowledge of Forensic Accounting	-0.563	-0.720
Fraud Detection	-0.331	-0.386

(Source: Authors' Compilation)

Table 2
Output of descriptive statistics of std. error of skewness & kurtosis

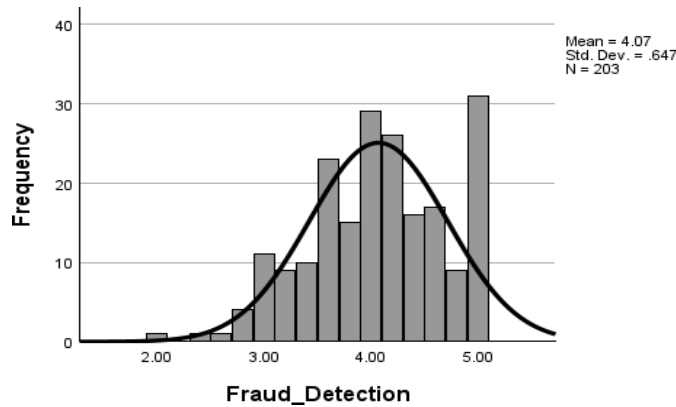
		AS	KP	LB	KFA	FD
N	Valid	203	203	203	203	203
	Missing	0	0	0	0	0
Mean		3.9692	4.1507	4.0315	4.2985	4.0680
Std. Deviation		.54328	.62990	.56795	.61640	.64663
Skewness		-.346	-.330	.070	-.563	-.331
Std. Error of Skewness		.171	.171	.171	.171	.171
Kurtosis		-.152	-.885	-.692	-.720	-.386
Std. Error of Kurtosis		.340	.340	.340	.340	.340

(Source: Authors' Compilation)

In a histogram which demonstrated a bell curve shape, indicating a normal distribution instead of 3 mean values. Overall, there is a normal distribution. In contrast, Figure 1 showed that the regression standardised residual line

fit into the variables significantly based on the P-P Plot analysis. In the below Normal Q-Q Plot graph, the circular dots that represent data points will be positioned approximately along the diagonal line in the Normal Q-Q Plot.

Figure 1
Histogram



(Source: Authors' Compilation)

A p-value greater than 0.05 (in this case, 0.200) suggests that there is no significant difference between the sample distribution and the normal distribution. A p-value greater than 0.05 (in this case, 0.088) also indicates that there is no significant evidence to reject the null hypothesis of normality. Therefore, the residuals are likely to follow a normal distribution.

Table 3
Normality test

Tests of Normality

	Kolmogorov-Smimov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Standardized Residual	.051	203	.200*	.988	203	.088

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

(Source: Authors' Compilation)

Reliability test

Reliability of the study was assessed with Cronbach's Alpha. For the reliability test on Accounting Skills, 4 items were raised, and the Cronbach's Alpha is 0.812. 5 items under Knowledge of Procedures were considered, and the Cronbach's Alpha is 0.900. Also, for the reliability test on Legal Background, 5 items were raised, and the Cronbach Alpha is 0.885. 5 items under Knowledge of Forensic Accounting were considered, and the Cronbach Alpha is 0.899; 5 items under Fraud Detection were considered, and the Cronbach Alpha is 0.894. From the Cronbach Alpha result, it was discovered that all items are reliable and meet the threshold requirement of 0.7.

Table 4
Output of the reliability analysis

Variable	Cronbach's Alpha	N of Items
Accounting Skills	0.812	4
Knowledge of Procedures	0.900	5
Legal Background	0.885	5
Knowledge of Forensic Accounting	0.899	5
Fraud Detection	0.894	5

(Source: Authors' Compilation)

Validity test

According to Shrestha (2021), factor analysis is a technique which can be used to reduce the large number of variables into a smaller number of outlying factors. The researcher has used principal component analysis by considering accounting skills, knowledge of procedures, legal background and knowledge of forensic accounting as the independent variables and fraud detection as the dependent variable. Furthermore, the researcher has performed the varimax rotation to make the output more reliable and easier to interpret. Later on, the researcher employed KMO to measure the sample adequacy.

Regression analysis

Generally, if the R-squared value is more than 0.5, it will. implies the dependent variable is covered by the model by 50% and the model is nicely fitted. There should not be a huge gap between R-squared and Adjusted R Square. If there is a huge gap between them, it means there are unnecessary independent variables in the model. R Square tells the proportion of the variance in the dependent variable (Fraud Detection) that is explained by the independent variables (Knowledge of Forensic Accounting, Knowledge of Procedures, Accounting Skills, and Legal Background). In this case, 14.8% of the variation in fraud detection can be explained by the predictors. This is considered a low R² value, suggesting that the model is not explaining much of the variance in the dependent variable. Even with a low R², if predictors are statistically significant, there will be a meaningful relationship with the dependent variable. Furthermore, in this case, the Durbin-Watson value of 1.516 is very close to 2, suggesting that there is no significant autocorrelation in the residuals. The residuals appear to be independent, which is a good sign for the validity of the regression model.

Table 5
Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.384 ^a	.148	.130	.60304	1.516

a. Predictors: (Constant), Knowledge of Forensic Accounting, Knowledge of Procedures, Accounting Skills, Legal Background

b. Dependent Variable: Fraud Detection

(Source: Authors' Compilation)

Table 6
Anova test table

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.459	4	3.115	8.565	<.001 ^b
	Residual	72.003	198	.364		
	Total	84.462	202			

a. Dependent Variable: Fraud Detection

b. Predictors: (Constant), Knowledge of Forensic Accounting, Knowledge of Procedures, Accounting Skills, Legal Background

(Source: Authors' Compilation)

There are no concerns about multicollinearity, as the tolerance values are above 0.1 and the VIFs are below 10. After regression analysis, the researcher decides on the ultimate decision of what the significant factor which influences fraud detection based on the P value.

When considering about P value, it implies a significant Level. The P value of the Accounting Skills, Knowledge of Procedures, Legal Background and Knowledge of Forensic Accounting is 0.464, 0.575, 0.026 and <0.001, respectively. When it comes to the P value of Accounting Skills is 0.464 and which is above 0.1, and it implies insignificant. Accounting skills do not individually have a significant impact on fraud detection. Therefore, the hypothesis should be rejected. P-value of Legal Background is 0.026 and which is below 0.05, and it implies significance. Therefore, it implies that Legal Background has a significant impact on fraud detection. Hence hypothesis can be acceptable. P-value of Knowledge of Forensic Accounting is 0.001 and which is below 0.01 and it implies a significantly high. Therefore, it implies that Knowledge of Forensic Accounting has a highly significant impact on fraud detection. Hence hypothesis can be acceptable value of Knowledge of Procedures is 0.575 and which is above 0.1 and it implies not significant. Therefore, it implies that Knowledge of Procedures is insignificant in fraud detection. Therefore, the hypothesis should be rejected. As per the above analysis, the Accounting Skills and Knowledge of Procedures have been removed from the final model because of insignificance. The model below has been selected as the fitted regression model.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \epsilon$$

$$\text{Fraud Detection} = 2.118 + 0.283x_1 + 0.205x_2 + \epsilon$$

The estimated regression coefficient (β_0) indicates that it is expected to detect 2.118 when there is no impact of independent variables. At the same time, β_1 describes that fraud detection can be increased by 0.283 if the Knowledge of Forensic Accounting increases by 1 unit. β_2 describes that fraud detection can be increased by 0.205 if Legal Background increases by 1 unit. β_3 describes that fraud detection can be increased by 0.042 if knowledge of procedures increases by 1 unit, but it is not significant to the fraud detection since there is a low P value. Knowledge of Forensic Accounting and Legal Background are significant predictors of fraud detection, with positive coefficients indicating that higher levels of these variables lead to better fraud detection. Accounting Skills and Knowledge of Procedures are not significant predictors in this model.

According to Sayeed Siddiqui et al. (2023) states that there is a significant impact of forensic investigation, forensic litigation and forensic accountant investigation tenure on fraud detection in the private sector of Pakistan. The study found a strong correlation between increased forensic accounting practices and increased fraud detection. This implies that as organisations implement more robust forensic accounting procedures, they are more likely to identify and prevent fraudulent activities. The findings of the study revealed that there is a significant impact in between the accounting skills, knowledge of procedures and knowledge of forensic accounting on fraud detection, while there is no significant impact of the legal background and fraud detection (Walakumbura & Dharmarathna, 2022).

According to existing literature and findings of this research implies that when forensic accountants work in his or her profession, a forensic accountant needs knowledge of forensic accounting and legal background knowledge for detecting and preventing fraud, rather than accounting skills and knowledge of procedures. For each variable researcher used a questionnaire to measure those variables and refer to the appendix.

Conclusion

In conclusion, this study highlighted the limited research on forensic accounting in Sri Lanka, especially within specific industries, and underscored the need for specialised knowledge in addressing fraud detection. The research identified significant gaps in forensic accounting knowledge, particularly in the context of Sri Lanka, where several scandals remain unresolved. The study's data come from limited sources, making it less representative of the overall population and reducing the generalizability of its findings. Additionally, while the research emphasises the importance of knowledge in forensic accounting, it fails to explore how professionals can practically develop the necessary skills through training, education, or certifications, leaving a gap in understanding how forensic accountants can effectively build their expertise. Future research should focus on advanced data analysis tools using AI, data mining, and machine learning to address complex, digital-era fraud. Organisations should prioritise experienced personnel in internal controls to improve fraud detection and risk management. Continuous updates in legal frameworks across various countries necessitate a deep understanding and awareness of new regulations and laws. Forensic accountants must not only grasp this evolving legal knowledge but also integrate it within their specific industries.

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THE IMPACT OF AUDIT COMMITTEE CHARACTERISTICS ON EARNINGS QUALITY: EVIDENCE FROM LISTED COMPANIES IN SRI LANKA

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Abstract

This study examines the impact of Audit Committee Characteristics on Earnings Quality of Public Listed Companies in Sri Lanka. Several prior studies have examined this relationship in developed countries. There appears to be a dearth of literature on the subject in developing and Asian countries, and Sri Lanka in particular. This study contributes to the existing literature by integrating both Audit Committee Characteristics and Earnings Quality. A quantitative approach was adopted in the study to find answers to the research questions. Audit Committee Size, Audit Committee Independence, Number of Audit Committee Meetings, Financial Experience of Audit Committee Members and Percentage of Common Stocks Owned by Audit Committee were used as independent variables and Earnings Quality was used as the dependent variable of the study. Pooled data regression is used to analyse data. The used dataset covers all companies in the Colombo Stock Exchange in Sri Lanka except banks, finance and insurance companies and collected data for 5 5-year period from 2020 to 2024. Based on the regression estimate obtained, the study concludes that the earnings quality is significantly influenced by the financial experience of members of the audit committee and ownership of stocks by members of the audit committee, while the size of the audit committee, degree of independence of the audit committee and audit committee meetings have reported an insignificant impact on audit report lag. Findings of the study will be useful to identify the impact of disclosure quality on the financial performance of the listed companies in Sri Lanka. Findings also provide useful insights to regulators and policymakers in coming up with appropriate policies.

Keywords: Audit Committee Characteristics, Corporate Governance, Earnings Quality, Sri Lanka

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Proceedings of the 16th International Conference on Business and Information - ICBI 2025 © 2025 by The Faculty of Commerce and Management Studies, University of Kelaniya, Sri Lanka is licensed under CC BY-SA 4.0.

DOI:

Introduction

Corporate governance has created significant changes in business environments in general and in the accounting and auditing professions. Interest in the role of audit committees has increased in the last few years because it is the tool of corporate governance, whose aim is to increase the questioning of the board of management and to increase the role of audit and its independence, after several financial failures of many local and international companies (Hamdan & Mushtaha, 2011). The Wild (1994) study found that the credibility and fairness of financial reports issued by companies depend on the existence of an audit committee emerging from management councils of such companies, while Martinez and Fuentes (2007) found that an audit committee would be more active in the process of monitoring financial statements and limiting the differences between the management and the external auditor. This reduces the company's probability of receiving qualified opinions from the external auditor, resulting from accounting errors or non-commitment to accounting standards. Many countries and local and international vocational bodies now spend more effort issuing instructions and standards, which, when adopted, help restore credibility in the financial data declared.

This also helps in activating the audit committee's role, which consolidates the functioning and independence of the external auditor as an impartial party providing their opinion on the declared financial data fairly and objectively. In July 2002, the USA's Sarbanes-Oxley law was described by analysts to be the most significant and comprehensive American legislation since the formation of the SEC because of its impact on general companies and independent accountants. Some of the large reforms that the legislation included were the right of declaration, submission of financial reports by foreign general companies' corporate governance, and accounting auditors' monitoring. According to Article 301 of the legislation, a particular part was made stressing the duties and formation of an audit committee to secure the safety and credibility of the external auditor's report, who might be subjected to managerial pressure. As for Sri Lanka, much legislation supporting corporate governance was issued to regulate the work of audit committees in Sri Lankan companies. This study attempts to discuss such legislation related to audit committees to ensure their Sri Lankan companies. Afterwards, the study tries to test the role played by audit committees in improving earnings quality. Qaraqish (2009) sees that earnings quality means the absence of such earnings from estimations and substitutes by which the company tries to get a targeted net return.

This study fills a knowledge gap about the ways in which audit committee attributes affect the quality of earnings in developing nations, especially Sri Lanka. There is still a dearth of empirical data from Sri Lanka despite a wealth of studies conducted in developed settings. As a result, the goal of this study is to determine how ownership, financial knowledge, meeting frequency, audit committee size, and independence impact the quality of earnings. By employing data from Sri Lankan listed companies to explore these correlations empirically, the study particularly seeks to close this gap.

Therefore, the issue is that rising market frameworks lack adequate empirical research. Determining the degree to which these audit committee attributes affect profit quality and offering insights that guide governance improvements in Sri Lanka are the main goals. Therefore, this study's main goal is to investigate how audit committee features affect the profit quality of Sri Lankan listed businesses. By doing this, it hopes to improve knowledge of the governance frameworks that support the integrity of financial reporting in developing nations.

Literature Review

Resource dependence theory, stakeholder's theory and agency theory are theories that have been recognised by the most extensively employed theoretical framework in accounting and corporate governance studies. Thus, for the aim of this research, agency theory is used as the theoretical framework in order to give a powerful theoretical framework. In this perspective, agency theory provides an obvious understanding of audit committee characteristics and earnings quality and admits these as the most important overseeing mechanisms that attenuate agency costs, regulate conflict of interest, and mitigate earnings management in the Sri Lankan context. An agency relationship arises when one or more principals (e.g., an owner) engage another person as their agent (or steward) to perform a service on their behalf (Jensen and Meckling, 1976).

Thus, the theoretical background of this study relies on the agency theory for two reasons: First, agency theory explains the demand for monitoring provided by audit committees and external auditors. Indeed, auditors and audit committees are perceived as agents of principals, which can lead to further concerns about trust, threats to objectivity and independence and an ongoing need to find further mechanisms such as regulation to align the interests of different stakeholders. Second, corporate governance actors, such as audit committees and external auditors, provide monitoring whose main value is dependent on their ability to decrease the likelihood that the company's financial reports contain breaches. Agency theory predicts that as agency problems become more severe, management will demand higher quality monitoring in an effort to ensure financial reporting quality to stakeholders. The major goal behind forming the audit committee is to increase auditing quality and the

questioning of the board of directors. Arens et al. (2009) define it as a group of people selected from members of the board of directors who are responsible for retaining the independence of the auditor. Conflicts between managers and outside auditors may exist in choosing alternative accounting procedures. Since auditors are appointed by the firm, they are subject to dismissal if divergent opinions cannot be resolved.

To a lesser extent, financial reports are often negotiated. In order to produce unbiased financial reports, audit committee members are appointed to act independently in order to resolve conflicts between the managers and outside auditors (Klein, 2002). Many studies were concerned with checking the qualities of audit committees as one of the tools of corporate governance, with many influences like controlling earnings management, improving financial reports, and earnings quality. The study of Stewart & Munro (2007) from Australia focused on the results of frequent meetings on the audit committee. They determined that the presence of an audit committee, the number of its meetings and the auditor's attendance for such meetings reduces audit risks, and that the external auditor believes that the presence of an audit committee is an important factor in reducing substantial risks of auditing. They further determined that reducing such risks is also affected by frequent meetings of the audit committee and the auditor's attendance of such meetings. Many of the definitions of earnings quality revolve around the two previous ones. Earnings quality is the ability of the present earnings to provide a real picture of the company and its ability to survive in the future.

The significance of earnings quality stems from the earnings on which many parties depend when they make their decision (Dechow & Dichev, 2002). Baxter & Cotter (2009) studied the formation and characteristics of audit committees and their impact on improving earnings quality in a sample of Australian companies before obligatory requirements were introduced to audit committees in 2003. The results of that study showed that forming an audit committee reduces earnings management but does not reduce accrual estimation errors. The study also showed that there was a significant relation between the financial experience of members of the audit committee and earnings quality improvement. The other qualities of the audit committee did not have any relatively significant relationship with earnings quality. Various studies provided many other factors influencing earnings quality. Teitel & Machuga (2010) found that supporting rules of corporate governance contributed to the improvement of earnings quality. The Blue-Ribbon Panel raised the issue of the background and experience of the audit committee that can affect their effectiveness. The Panel suggests that audit committee members should be financially literate.

Although earlier studies looked closely at audit committee traits and profit quality in industrialised nations, there is still little data from Sri Lanka. By empirically investigating these links in a growing market framework, this study closes this knowledge gap and offers insights into how governance methods function in various institutional contexts. The findings add to the larger global conversation on audit governance in emerging economies, which extends beyond the Sri Lankan context. For other emerging economies with different institutional frameworks, enforcement strategies, and cultural norms than developed countries, they provide comparative insights. Thus, by demonstrating how contextual factors influence audit committees' effectiveness in guaranteeing profit quality, the study adds to the body of knowledge on global governance.

Methodology

This study's sample consists of companies listed in the Colombo Stock Exchange (CSE) except banks, finance and insurance companies because they are highly regulated and follow a different form for their financial statements. In choosing the sample for the study, the following were considered: the study period for the empirical study is five years (From 2020/2021 to 2023/2024), and data were drawn from 180 listed non-financial companies. Independent variables of the research study are audit committee characteristics of the listed entities in CSE. This has been measured by using audit committee independence, the number of audit committee meetings, the financial experience of audit committee members and the percentage of common stocks owned by audit committee members. The dependent variable is earnings quality. Panel data regression analysis was used with EViews as part of a quantitative research methodology. Discretionary accruals were measured using the modified Jones (1991) model, with audit committee characteristics acting as independent variables.

Having reviewed each methodology and in light of their differences, this study has chosen to adopt a quantitative approach as it is more suited to the purposes of this research. The research focuses on finding the relationship between audit committee characteristics on the earnings quality of listed companies in CSE. CSE consists of 283 companies representing 20 GICS industry groups as of 31st December 2020. The corpus of the study is composed of all companies listed on CSE; the final sample consists of 180 companies. The secondary data are collected from annual audited financial statements and annual reports of each company accessed through the CSE website. The secondary data extracted were analysed using the multiple regression technique to test the formulated hypotheses. Moreover, supportive analysis will be carried out using descriptive statistics, which provide information on mean, standard deviation, minimum and maximum values of the set of data analysed, testing the assumptions of the linear regression model (autocorrelation, multicollinearity and homoscedasticity). Since this research consists of

panel data, the analysis will be conducted using EViews statistical software. Regression analysis, correlational analysis, and descriptive statistics will be used in the analysis stage.

Earnings quality was evaluated using the modified Jones model from 1991, as refined by Dechow et al. in 1995, which focuses on estimating discretionary accruals, a well-known indicator of earnings management. This model is appropriate for the Sri Lankan context as it considers the differences in accrual-based accounting practices typical in developing countries. Likewise, the chosen characteristics of the audit committee—such as size, independence, frequency of meetings, financial expertise, and ownership—are in line with the corporate governance code requirements in Sri Lanka and align with previous research on governance effectiveness in emerging markets.

Accordingly following regression model is formulated for the current study.

$$DA_{i,t} = \beta_0 + \beta_1 ACSIZE_{i,t} + \beta_2 ACINDP_{i,t} + \beta_3 ACMEET_{i,t} + \beta_4 ACEXP_{i,t} + \beta_5 ACOWNER_{i,t} + \beta_6 BIG4_{i,t} + \beta_7 COMSIZE_{i,t} + \beta_8 FINLEV_{i,t} + \beta_9 MGTOWN_{i,t} + \beta_{10} EATURN_{i,t} + \varepsilon_{i,t}$$

Where:

$DA_{i,t}$: the dependent variable discretionary accruals (Represents Earnings Quality) measured by Jones (1991) model for the company (i) in the year (t)

$ACSIZE_{i,t}$: number of audit committee members for the company (i) in the year (t) $ACINDP_{i,t}$: number of independent non-executive members in the audit committee for the company (i) in the year (t)

$ACMEET_{i,t}$: number of audit committee meetings for the company (i) in the year (t)

$ACEAAP_{i,t}$: number of members who are qualified in accounting, financial and banking. (i) in the year (t)

$ACOWNER_{i,t}$: percentage of common stocks owned by the audit committee for the company (i) in the year (t)

$BIG4_{i,t}$: control variable, dummy variable, size of the audit firm with the value of 1 if audited by Big4 and 0 otherwise for the company (i) in the year (t)

$COMSIZE_{i,t}$: is the control variable, the company size measured by the natural log of total assets for the company (i) in the year (t)

$FINLEV_{i,t}$: control variable, financial leverage ratio, total debts/total assets of the company (i) in the year (t)

$MGTOWN_{i,t}$: control variable, the percentage of the Common Stocks Owned by Members of the Board of Directors for the company (i) in the year (t)

$EATURN_{i,t}$: control variable, external auditor turnover, measured by the natural logarithm of external auditors' fee (i) at the end of the year (t)

Results and Analysis

Descriptive statistics

The largest DA is 11.34, which indicates maximum, and the minimum of 5.36 represents the lowest DA in the selected sample period. The mean DA for the sample is 0.39 with a standard deviation of 0.58. In case of ACSIZE maximum and minimum values for this variable are 6 and 2, respectively. The mean ACSIZE for the sample period is 3.14 with a standard deviation of 0.71. The largest ACINDP is 5, which is the maximum, and the minimum of 3 represents the lowest ACINDP in the sample period. The mean ACINDP for the sample period is 2.59 with a standard deviation of 0.458. The minimum ACMEET represents 1, and the maximum ACMEET represents 18 in the selected sample period. The mean of ACMEET for the sample period is 4.56 with a standard deviation of 1.82. The largest ACEXP is 4, which is the maximum, and the lowest of 1, represents the total number of financial expertise in the sample period. The mean ACEXP for the sample is 1.58 with a standard deviation of 0.76. The table also demonstrates that the percentage of shares owned by audit committee members (ACOWNER) ranged from zero to 78 percent, with a mean of 0.7 percent.

Table 1
Descriptive statistics

	DA	ACSIZE	ACINDEP	ACMEET	ACEXP	ACOWNER
Mean	0.393316	3.148889	2.594444	4.565556	1.584444	0.007666
Median	0.249451	3.000000	3.000000	4.000000	1.000000	0.000000
Maximum	11.34491	6.000000	5.000000	18.00000	4.000000	0.781034
Minimum	5.36E-07	2.000000	1.000000	1.000000	0.000000	0.000000
Std. Dev.	0.589083	0.710676	0.693985	1.820393	0.763883	0.060693
Skewness	9.838929	0.633239	0.438935	3.239304	1.025136	11.73349
Kurtosis	163.0497	3.787278	3.087981	19.35943	3.728644	145.8805
Jarque-Bera	975117.0	83.39154	29.18990	11610.13	177.5453	786208.1
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	353.9843	2834.000	2335.000	4109.000	1426.000	6.899624
Sum Sq. Dev.	311.9698	454.0489	432.9722	2979.132	524.5822	3.311562
Observations	900	900	900	900	900	900

(Source: Authors' Compilation)

Correlation analysis

There is a positive correlation for ACSIZE with DA. The correlation between ACINDEP and DA represents a positive correlation. In the case of determinants of earnings quality, the correlation between the ACMEET and DA is negative. ACOWNER, BIG4 and COMSIZE negatively correlated with DA independently. ACEXP, FINLEV and MGTOWN positively correlated with DA independently.

Table 2
Correlation analysis

Variable	ACSIZE	ACINDEP	ACMEET	ACEXP	ACOWNER	BIG4	COMSIZE	FINLEV	MGTOWN
DA	0.0831	0.0502	-0.0372	0.0161	-0.0306	-0.1213	-0.0151	0.1112	0.0140

(Source: Authors' Compilation)

Table 3
Multicollinearity analysis

Correlation	DA	ACSIZE	ACINDEP	ACMEET	ACEXP	ACOWNER
DA	1.000000					
ACSIZE	0.083171	1.000000				
ACINDEP	0.050249	0.596196	1.000000			
ACMEET	-0.037209	0.154952	0.090187	1.000000		
ACEXP	0.016185	0.394810	0.296533	-0.014784	1.000000	
ACOWNER	-0.030628	-0.037480	-0.085344	-0.017978	-0.035726	1.000000

(Source: Authors' Compilation)

Further, all the regressions used in the current study are adjusted using the Huber White Sandwich estimator, which provides control for heteroscedasticity and autocorrelation using the E-views statistical package. Outliers were identified in every variable and were removed using Microsoft Excel software before proceeding with the regression analyses.

Table 4
Hausman test

Correlated Random Effects - Hausman Test			
Equation: Untitled			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	7.027141	10	0.7229

(Source: Authors' Compilation)

These results led to accepting the null hypothesis of the Hausman test, and therefore, the estimator of the random effect will yield identical results. Thus, the random effect model is more appropriate for the analysis.

Regression analysis

Since first objective of the current study is to examine the impact of audit committee characteristics and earnings quality. As discussed, based on the results of the Hausman test and redundant test, for which the results are summarised, the random effect model is proven to be more appropriate for the current study. Accordingly, the results of the random effect regression are summarised above. The results indicate that ACEXP significantly affects DA at the 5 percent level, and ACOWNER significantly affect DA at the 5 percent level, which leads to accepting H4 and H5. However, the ACEXP coefficient and ACOWNER coefficient are both negative. In contrast, ACSIZE, ACINDP, and ACMEET are not significant, which leads to rejecting H1, H2 and H3. In considering the probability value of the F-statistic, it reveals that the overall model is significant at the 5 percent confidence level, hence the probability value of the F-statistic represents 0.0005. When considering R-squared, all independent variables collectively explain 62% of the dependent variable of earnings quality. Since the Durbin-Watson value is around 2, there is no autocorrelation in the sample.

The study admits that Sri Lanka and developed market discrepancies may be explained by structural and institutional differences. For instance, the relationship between audit committees and profit quality may change as a result of Sri Lanka's concentrated ownership structures, relatively young capital market, and laxer implementation of governance standards. The inability to directly apply results from industrialised markets thus emphasises the importance of this study in placing governance effects in a developing country. The independence and efficacy of audit committees may be weakened by Sri Lanka's strong family ownership concentration, lax regulatory enforcement, and cultural norms that place a strong emphasis on relational governance. These elements impact the supervisory practices of audit committee members, which in turn impact the results of earnings quality. A more sophisticated understanding of why governance systems in Sri Lanka could produce different outcomes than in developed environments can be gained by acknowledging such institutional restrictions. The results show that while size, independence, and meeting frequency have no discernible impact on earnings quality, audit committee members' financial knowledge and ownership do. This implies that personal incentives and technical proficiency can be more important in gauging efficacy than just structural characteristics. The findings reveal contextual variations stemming from Sri Lanka's governance environment, while also aligning with other research (Hamdan & Mushtaha, 2011).

Conclusion

In light of the findings of the study and the critical discussion of the factors that impede the audit committee characteristics, it is possible to make the following recommendations to increase earnings quality in Sri Lanka: It was found that stock ownership by members of the audit committee reduces their independence and limits their ability to improve earnings quality. Based on these findings, it can be recommended to limit the ownership of the audit committee. In general, there is a recommendation to the organisers of works of listed companies, like the stock market and government authorities, to support the mechanism of corporate governance. This will secure more transparency in disclosures, reduce practices of earnings management, and improve earnings quality, as they all leave a significant impact on the economic decisions of many parties. This study aims to identify the impact of disclosure quality on the financial performance of the listed companies in Sri Lanka. There are lack studies have been conducted in relation to this topic. The importance of this study is to look for relationships between the audit committee characteristics and earnings quality in Sri Lanka, which regularly takes steps towards the regulatory and legislative structure to support economic development. This distinguishes this study from other studies conducted in the United States and Australia.

The benefit of this study is not limited to the investors but will help the whole stakeholders that affect and get affected by the organisation. Even though all knows that the audit committee is important to the company. This study will go one step further and explain the relationship between audit committees and earnings quality. So, it will help regulators and policymakers in coming up with appropriate policies. The findings of this study could be compared with other Asian or developing countries that share similar socio-economic environments, as well as with other developed countries. The results of this study should help researchers or other parties interested in the audit committee characteristics since they highlight the most significant factors that may cause earnings quality in the Sri Lankan context.

Anyhow, the reliance on secondary financial data may overlook qualitative factors, such as managerial attitudes and internal control quality. Hence, future research could adopt mixed methods or extend the study period to enhance generalizability. To validate the results, future research might do cross-country assessments across similar growing economies, such as Malaysia or India. Understanding the contextual governance issues in developing economies will also be strengthened by incorporating qualitative insights from board and audit committee member interviews.

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ENTREPRENEURSHIP, SME, INNOVATION AND BUSINESS DEVELOPMENT

THE ROLE OF SUPPORT ORGANIZATIONS IN PROMOTING YOUTH ENTREPRENEURSHIP IN SRI LANKA: ENTREPRENEURS' PERSPECTIVE

W.W.W Shehani¹, H.A.K.N.S Surangi²

Abstract

Youth entrepreneurship in developing countries like Sri Lanka has increasingly been recognised as a vital driver in economic growth, innovation capabilities and new venture creation. This study explores the role of support organisations in promoting youth entrepreneurship in Sri Lanka from the entrepreneurs' perspective. By conducting in-depth interviews and using qualitative analytical methods, the study has identified key forms of support: financial assistance, training programs, mentorship, networking opportunities and policy advocacy, that drive the success of young entrepreneurs. The findings of the study reveal both strengths and weaknesses of the existing support system in Sri Lanka by highlighting the key issues such as limited access to funding, bureaucratic barriers and inadequate guidance. The research also underpins the perceived impact of this mechanism on business innovation, sustainability and confidence of youth entrepreneurs. The insights offer pivotal implications for authorities and policymakers, educational institutions and support organisations focusing on creating a more practical environment for young entrepreneurs in Sri Lanka to thrive.

Key Words: Entrepreneurs, support organisations, support programmes, youth entrepreneurship

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DOI:

Introduction

Youth unemployment remains a pressing development challenge in Sri Lanka, even though national policy debates continuously point to entrepreneurship as an alternative way to decent work, innovation as well and inclusive growth. Studies conducted showcase that young people often enter the labour market with strong aspirations but face a lack of opportunities in the formal sector, which has led the micro and small enterprises founded by youth to play a crucial role in livelihoods and local economies in Sri Lanka (De Silva, 2023). Simultaneously, empirical studies show that the translation of entrepreneurial intention into a successful venture is uneven. Common structural problems are inadequate finance, network issues, bureaucratic challenges, lack of mentorship and etc. (Lewis et al., 2024). Yet, local and international reviews note that the mere presence of support organisations is inadequate to promote entrepreneurship as a critical solution to youth unemployment (Sato, 2024). These insights give rise to the main research problem by motivating this study: despite the increasing supply of entrepreneurial support organisations in the local context, there is limited evidence from entrepreneurs' own perception about whether these services help youth to start and scale their own venture and under what conditions and situations. The existing studies give short-term outputs where less is shown about entrepreneurs' lived experiences of support organisations (Lewis et al., 2024). Consequently, this study addresses the gap by examining young entrepreneurs' voices regarding the role of supporting organisations in promoting entrepreneurship among youth and the types of support (training, mentorship, finance, networking, etc.) young entrepreneurs expect from organisations. The research builds on recent studies by addressing the empirical gap by recognising the contextual limits documented in Sri Lanka, and gives practical insights to policy makers and support organisations in decision-making and future actions to be taken.

Literature review

Entrepreneurship

The capacity and willingness to plan, organise, and manage a business venture with all its risks to turn a profit is known as entrepreneurship. According to Diandra (2020), it is a part of business life that contributes towards a successful business organisation. Adopting a process perspective in entrepreneurship is useful for two reasons. The actions of discovering, evaluating, and exploiting opportunities constitute a process with a prelaunch, launch, and postlaunch phase through which entrepreneurs proceed (Baron et al., 2016). Entrepreneurs identify opportunities, develop managerial capabilities, and assemble resources to create organisations that contribute to economic progress (Christiansen & Kasarcı, 2017). Promoting an entrepreneurial mindset is also vital in developing individual capabilities and skills, important economically. Entrepreneurship is an important phenomenon in individual development because it comes along with innovation, risk-taking, and the ability to generate new ideas (Veeraraghavan, 2009).

Youth entrepreneurship in Sri Lanka

Youth in a country play a critical role in its economic growth. As Sri Lanka has a significant population of youngsters, youth entrepreneurship has been identified as a crucial factor in socio-economic growth. The population of Sri Lanka is over 21.8 million, of which young men and women account for 18.5%. It is expected that the total population will increase to around 23 million within the next ten years (Dambugolla, 2020). In addition to being large in number, the youth are energetic and courageous and pose new ideas that can make changes to the social-economic development if they are well coordinated and involved in the country's economic activities (Sato, 2024). Promotion of youth entrepreneurship is important, and many countries have been promoting the same. Sri Lanka has also taken different programs to promote entrepreneurship (Dambugolla, 2020). Some of the previous studies give prominence to the challenges and opportunities which youth entrepreneurs face within this domain. Ranasinghe, (2019) bring out some of those challenges as youth entrepreneurs often struggle to access funding for their ventures and traditional finance institutions that provide lending facilities for businesses may be hesitant to finance startups because of the perceived risks, complex regulatory backgrounds, bureaucratic processes, and lack of government support can make significant obstacles for young businesses and many young entrepreneurs are lack of essential business skills, including financial management, strategic planning, and marketing.

Supporting organisations

Supporting organisations play a critical role in improving business growth and development, particularly for small and medium-sized organisations, to expand their business operations. These organisations provide various forms of assistance, including financial aid, technical expertise, networking opportunities, and access to markets. Gorączkowska, (2018) argues that technology parks and training and consulting centres are a strong link in supporting the innovation of industrial enterprises in the region. There are a few studies on the impacts of business

support programs in various countries. Granja et al. (2022) studied the allocation and impacts of the Paycheck Protection Program (PPP) for Small and Medium-Sized Enterprises (SMEs) in the United States (US), which provided loans to troubled SMEs through private sector lenders approved by the US Small Business Administration (SBA). Financial support for businesses includes funds from both national governments and the European Investment Bank, which offers low-interest loans for SMEs in the European Union (Ferrando & Ruggieri, 2018). Financial support structure in developing economies is still developing and at the same time facing many challenges. As an example, government programs and microfinance institutions like the Pradhan Mantri MUDRA Yojana (PMMY) offer lending to SMEs without traditional requirements for any kind of collateral, by such means fostering inclusivity in India (Banerjee et al., 2015). The training and capacity building programs are important to ensure that businesses can operate effectively and adapt to changing market situations, as well as the financial support. As an example, the vocational education system provides a steady pipeline of skilled labour, which benefits SMEs in Germany. Same as in Japan, the government, through the Japan External Trade Organisation (JETRO), offers training programs on international trade to help businesses expand overseas (Jin, 2023). Conversely, in South Korea, the Small and Medium Business Administration (SMBA) provide technical and managerial training to SME business owners and their employees by collaborating with universities in their country (Park & Leydesdorff, 2010).

Theoretical background

Various theories give insights into these drivers and barriers youth entrepreneurs face, and the importance of supporting services in this phenomenon. Literature shows some key theories that relate, such as human capital theory, social capital theory and the entrepreneurial ecosystem model. Human capital theory suggests that the skills, knowledge and experiences that individuals possess are valuable assets that contribute to economic productivity (Becker, 2009). This theory explains how the education, training, and experience of young entrepreneurs are important in enhancing entrepreneurial capabilities. This study has employed the Human Capital Theory to evaluate how mentorship, training and capacity building programs offered by support organisations strengthen the human capital of young entrepreneurs, as Becker (2009) states that these services can increase the likelihood of survival and growth of businesses by improving their knowledge and managerial capacity. Social Capital Theory (STC) evaluates the value of social relationships and networks in both personal and social life. In the past decade, the concept of social capital has undergone a most interesting transition (Alshammari et al., 2023). Social capital becomes crucial for young entrepreneurs who lack of professional network to access the finance, knowledge and opportunities. Therefore, this study utilises Social Capital Theory to interpret how these organisations function as intermediaries to help youth expand their professional network and gain market information (Osama & Adam, 2024). The theory of the Entrepreneurial Ecosystem Model emphasises the interconnectivity of the factors such as culture, policies, institutions and resources which create an environment promoting entrepreneurship. This model explains the importance of supporting services in fostering youth entrepreneurship by reducing barriers they face and creating access to resources they need (Stam & Van De Ven, 2021). This research applies the model to assess the role of these organisations as key factors within the local entrepreneurial ecosystem by connecting government policy, education systems, finance and markets.

Methodology

This study employed a qualitative, exploratory research design grounded in the interpretivist philosophy, which recognises that reality is socially constructed and best understood through the lived experiences of individuals (Creswell & Poth, 2018). The interpretivism aligns well with the study's focus on understanding the young entrepreneurs' perspective and how they engage with local support organisations, while the exploration design is particularly appropriate when existing empirical evidence is limited. The study utilised purposive sampling to select youth entrepreneurs who had directly engaged with support organisations. This method ensured that participants had relevant, first-hand experiences critical to addressing the research questions (Yin, 2018). Data was collected using semi-structured in-depth interviews, allowing participants to reflect on their experiences with minimal constraints. Interviews were conducted in person or virtually, depending on participant preference and accessibility, and each session lasted approximately 30–60 minutes. Data was collected until the saturation was achieved with 10 participants. The analysis process included transcribing the interviews, generating initial codes, identifying recurring themes, and refining them to align with the research objectives (Braun & Clarke, 2006). To ensure credibility, the researcher engaged in prolonged interaction with participants and triangulated data sources where possible. Transferability was supported by providing detailed contextual information about participants and their business environments. Ethical approval was obtained from the affiliated academic institution. Participants were informed about the study's purpose, data use, and their right to withdraw at any time.

Findings and Discussion

The role of supporting organisations

Through the data collected from the participants, providing mentorship and guidance was derived as a key theme and a major finding, which is evident that mentorship is vital for young business owners in the initial stages, as well as in their way of growing their business in terms of scale, number of outlets and when moving to an international market. Findings show that organisations like Youth Business Sri Lanka provide this kind of mentorship and guidance for young entrepreneurs in numerous ways, such as guiding through exportation of products, regulatory processes, management and pricing practices. etc. Literature also proved that Youth Business Sri Lanka (YBSL) collaborates with local enterprises to enhance training and mentorship programs for youth entrepreneurs, specifically focusing on rural and underserved communities, and those programs have been demonstrated to be instrumental in developing the managerial capabilities of young entrepreneurs, helping them to strengthen the economy effectively (De Silva, 2023).

As self-made youth entrepreneurs in Sri Lanka are struggling with this issue, it can be an immense help for them if the government or external organisations step up and provide them with initiatives or credit scheme programs. According to the data gathered, in Sri Lanka, government organisations like the Export Development Board (EDB) and institutions like the National Economic and Development Authority (NEDA) are enhancing programs to provide young entrepreneurs with initiatives or loan facilities to promote their businesses. Literature also proves that this theory suggests that the competitive advantage of youth-led enterprises can be improved by programs provided by support services like financial assistance, infrastructure access and technology resources (Baron et al., 2016).

As most of the young entrepreneurs are new to the industry and lack experience in the industry, the network they have might be weaker, and their market expansion is less, which can be a huge barrier to expanding their business and entering new markets and industries. As per the collected data, they have gained a huge assistant in networking and market exposure from the training and workshops provided by both government and non-government organisations like YBSL, EDB and some Non-Governmental Organisations (NGO). Literature provides positive facts to this saying that peer networks help young entrepreneurs to share experiences, provide emotional support, and foster collaborative innovation (Stam & Van De Ven, 2021).

Even though young entrepreneurs start their businesses trusting their passion, willingness and other reasons, most of the time they do not have the required skills and capabilities to operate or expand their businesses locally or globally. Hence, the training programs that the support organisations enhance to upskill the young entrepreneurs with their knowledge and capabilities are vital for their business growth. The Sri Lankan government, as well as non-governmental organisations, have enhanced training programs about various kinds of skill development, especially focusing on individual markets. This proves the theory of human capital as which explains the contribution of the skills, knowledge and experiences that an individual possesses to economic productivity.

Challenges youth entrepreneurs face in engaging with support organisations

Bureaucracy creates administrative obstacles and slows down the processes. These types of issues demotivate entrepreneurs to reach out for support when they need it. This is a commonly faced issue in Sri Lanka. As the entrepreneurial ecosystem model explains the importance of the interconnectivity of the factors such as culture, policies, institutions and resources, literature proves that those encouraging policies like simplified business registration, tax incentives and youth-focused funding, positively affected youth entrepreneurship rates (Stam & Van De Ven, 2021).

Information availability and awareness issues challenge young entrepreneurs by creating barriers to access essential knowledge, resource availability, network sources and support systems. Most of the entrepreneurs may not be fully aware of the mentorship programs, training programs and financial assistance that they can access because of the limited information availability. That can lead them to miss opportunities, hinder their ability to make informed decisions, and this can lead to slowing down their business's success.

Geographical challenges can commonly be seen among entrepreneurs in rural areas, which lead them to go through barriers to access. Support services like mentorship programs, skill development and training programs, financial assistance, and workshops, which are readily available in urban areas, can be hard to reach entrepreneurs in rural areas because of these geographical challenges.

Scepticism is an attitude of questioning or doubt toward knowledge or ability. Scepticism in entrepreneurs can often seem hesitant to believe in new ideas, resources or support systems because of their doubt regarding their reliability or effectiveness. Scepticism and negative perception of support organisations towards youth

entrepreneurs can reduce their support towards youth entrepreneurship and complicate the access processes for them.

Conclusion and Future Research Agenda

This research on the role of supporting organisations in promoting youth entrepreneurship in Sri Lanka from the entrepreneurs' perspective is based on the main problem of how supporting services in Sri Lanka contribute to encouraging youth entrepreneurs, and it is explained from the entrepreneurs' perspective. The main objectives of this study were to understand the role of support services in this manner and the key challenges the young entrepreneurs face during accessing the support they provide. The related literature for this area was found through previous studies, journal articles and books published. This study was conducted as qualitative research and used interpretivism as the main research philosophy. As the sampling technique, the purposive sampling is mainly used, and the snowballing sampling technique was also adopted to some extent. Data were collected from ten young entrepreneurs about their views of the support services and the challenges they faced during accessing their support, and the data were analysed according to thematic analysis. Eight key themes were derived from the data collected from those participants, and the discussion of the findings also connected with the themes. The first limitation encountered while conducting this study was the lack of previous knowledge on the role of supporting organisations in promoting entrepreneurship in the Sri Lankan context. The prevailing research on youth entrepreneurship and support organisations in Sri Lanka does not give enough information on how the support organisations contribute to entrepreneurial development in Sri Lanka. This research on examining the role of support services in promoting youth entrepreneurship requires time and resources to conduct a reliable and rich data analysis. This study was conducted through a limited time frame, which restricts the depth of analysis or the ability to capture long-term impacts and trends accurately. As this is a qualitative study, the findings of this research cannot be generalised because the biasness can be included in the findings to a limited extent, and it is not the objective of this research to generalise the findings. This research has been conducted as a qualitative study in which the data only depend on interview data. This gives ideation to future researchers to conduct a mixed research approach to collect statistical data for the study. Future researchers can conduct longitudinal studies to collect the long-term impact of the support programs on youth entrepreneurship.

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THE SUCCESS DETERMINANTS OF RURAL AND URBAN MICROENTERPRISES: A CASE FROM NORTH-EAST INDIA

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Abstract

The disparities between enterprises in rural and urban areas have led to the question of determinants of success. This study assesses the success determinants of microenterprises in rural and urban areas of Northeast India. It evaluates microenterprise success (MS) using Entrepreneurial Resources (EPR), Enterprise Environment (ENE) and Enterprise Resources (ENR). A total of 210 samples in each of the rural and urban areas were collected from registered microenterprises. A quantitative approach employing t-test, Pearson correlation coefficient, ANOVA and multiple regression were used to assess the nature of the effect of EPR, ENE and ENR on microenterprise success and found a stronger percentage in urban areas than the rural areas. Further, based on individual analysis of the three variables, the finding indicates that EPR and ENR have a stronger effect in urban areas, whereas ENE has a stronger effect in rural areas, respectively. The findings of this study will be a driving force behind the determinants of microenterprise success.

Keywords: Enterprise environment, enterprise resources, entrepreneurial resources, microenterprise success, north-east India, rural and urban microenterprises

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DOI:

Introduction

The success of enterprises relies upon multiple determinants, both internally and externally. It is a collective effort of multiple stakeholders (Wang & Wang, 2024). Good cognitive capital enables entrepreneur to use their human and social resources to excel in an entrepreneurial venture (Alomani et al., 2022). In this process, an entrepreneur considers several resources to avail themselves of the benefits of entrepreneurship. Experts from diverse disciplines have distinct emphases and considerations on the issue related to the elements of entrepreneurial success (Huang, 2016). Further, the business environment and government regulations prompt a preference for certain businesses (Gunasekaran & Ngai, 2005). Therefore, the success factors have to align and stay up to date with the business environment (Mendoza et al., 2007). In addition, the quality of life in terms of economic and emotional motivation for entrepreneurs to succeed in business (Toledo-López et al., 2012). Singh (2016) opined that the availability of adequate finance, training and motivation to the enterprise owners is the determinant of microenterprise success. But the unbalanced environment between rural-urban enterprises gives rise to the question of inclusive enterprise development for both regions. With the change of time, entrepreneurs face a decline in business opportunities in rural areas (Bird & Sapp, 2004). The present study evaluates microenterprise success in rural and urban areas, incorporating resources and environmental features of such enterprises.

Literature Review

The theoretical framework of this study is based on the Resource-Based View (RBV) Theory that argues that the success of an enterprise depends on the firm's unique internal resources and capabilities (Wernerfelt, 1984). The relevant literature is reviewed in the following themes:

Entrepreneurial resources (ENR) and enterprise success

The concept of entrepreneurial resources has multifaceted views from past studies. Mosakowski (1998) defined entrepreneurial resources as creativity, foresight, intuition, and alertness of an individual about innovation and entrepreneurship among the different employees of an organisation. In addition, entrepreneurial resources with the intervention of entrepreneurs' personality traits affect entrepreneurial activity (Obschonka et al., 2012). Chen et al. (2015) reiterate the availability of information and resources to aid entrepreneurial success. Resources need to be consolidated to add value, of which entrepreneurship acts as a vital component to execute entrepreneurial resources to speed up entrepreneurial success (Huang, 2016). Likewise, access to resources creates a positive influence on business and additionally, when utilised along with complementary assets, influences the economic performance of an enterprise (Ge & Li, 2019). The ethnic social system featuring family, community and ethnic capital forms part of entrepreneurial resources; the integration of these resources produces an entrepreneurially oriented community (Dana et al., 2020). The internal capabilities through finance, information technology, and entrepreneurial orientation positively affect performance and are effective for business model innovation (Ullah et al., 2023). Entrepreneurial resources positively affect organisational management, opportunity development and self-efficacy of entrepreneurial behaviour (Sun et al., 2023). The commitment of entrepreneurs determines the level of investment in resources, which subsequently has a favourable influence on entrepreneurial performance (Wang & Wang, 2024). Entrepreneurial resources among the academicians are essential as they lead to innovativeness that aids entrepreneurship (Odetunde, 2022). However, entrepreneurial resources are insufficient at the initial stage (Ge & Li, 2019). Considering the state of importance of entrepreneurial resources, this factor is considered for the assessment of microenterprise success.

Enterprise environment (ENE) and enterprise success

Enterprises operate in a dynamic environment. The evolving business environment results in the emergence of issues and challenges for small enterprises (AlMuhayfith & Shaiti, 2020). The complex business environment necessitates high-performing firms to adopt a flexible approach (Chi et al., 2009). The ability of businesses to adapt to the evolving business landscape results in a responsive capability to consumer trends (León-gómez & López, 2023). Further, Panetto et al. (2012) stress the effect of business environment dynamism on enterprises and suggest that enterprises evaluate the compatibility of the enterprise environment to operate. The constant change in the business environment results in firms incorporating organisational design, which prompts instant feedback to the firms (Bremser & Chung, 2005). The nature of environmental dynamics necessitates a business for a differential strategy (Chi et al., 2009). Without which business experiences a significant loss of share when it faces an unfavourable environment, such as regulatory measures, substandard facilities and illegal practices (Bah & Fang, 2011). The productive growth of a business organisation relies on the environment in which it operates (Babatunde & Adebisi, 2012). The dynamism of the business environment affects product innovation in business, leading to productive performance. (Chi et al., 2009; Prajogo, 2016). The ever-changing business environment necessitates businesses to bring in techniques such as gamification to motivate individuals' performance in an organisation. (Encarnação et al., 2021). In view of the environmental complexity, businesses

pursue a strategy that considers the environmental dynamics. (Babatunde & Adebisi, 2012). Maduku et al. (2016) opined that in a business environment, there are other factors other than competitive pressure which influence the decision-making of an enterprise. The knowledge and understanding of the business environment act as a key factor in enterprise success (Adewole & Umoru, 2021). The right execution of innovation with a given environment dynamics drives enterprise development and success. (León-gómez & López, 2023). Kniecik (2024) Highlighted the constant enhancement and versatility of organisations in the evolving business environment for success over an extended period. Whereas, Shehu and Mahmood (2014) The indicated business environment has no association with business performance. However, some studies prove otherwise that the business environmental factors significantly influence the survival, growth success of a business. (Adewole & Umoru, 2021).

Therefore, there were several studies which advocate for a suitable enterprise environment. Bah and Fang (2011) examined the various dimensions of the business environment to understand business productivity and endorses a favourable business environment to facilitate business development. In line with this, this study chooses to incorporate the environmental aspect into microenterprise success.

Enterprise resources (EPR) and enterprise environment

Enterprise resources are essential elements of a business. Other elements constitute the enterprise resources, and they elevate the performance of an enterprise. Enterprise resources like human resources and technological exploration, positively affect the performance and success of enterprises (Ding et al., 202; García-Muiña & Navas-López, 2007). Similarly, a technology-driven organisation enables to development strategy leading to efficient firm performance (Benitez-Amado & Walczuch, 2012). Enterprise resources, such as information technology, explicitly affect the business process performance (Jurisch et al., 2014). It paves the way to performance and competitive advantage (Garrison et al., 2015). A business firm inculcating dynamic capabilities evades success traps and possesses adaptive capabilities (Wang et al., 2015). The resource-based advantages lead to favourable firm performance (Grimmer et al., 2017). Resources and capabilities correlate with performance in terms of efficiency and innovation (Lorenzo et al., 2018). The application of business-driven resources, like enterprise resource planning, enhances business performance (AlMuhayfith & Shaiti, 2020). Business and structural resources provide a favourable influence on enterprise success (Campbell & Kubickova, 2020). Different elements of enterprise resources contribute to the success of an enterprise with the change in pace of the business environment. In the backdrop of these dynamics, factors such as technology affect business, and the successful execution of technology elevates the efficiency (García-Muiña & Navas-López, 2007). So eventually, a business's capability and ability to review past performance and adapt to the dynamic environment lead to productive performance, leading to the generation of exceptional performance (Lorenzo et al., 2018; Wang et al., 2015).

Rural-urban areas and enterprise success

Regional features of entrepreneurship is a constant issue of concern, considering the inclusivity for development. Rural and urban areas constitute a particular business region which differs in its characteristics. Rural areas are located in the countryside, wherein agriculture and allied activities take place; whereas, urban areas are cities and towns wherein non-agricultural activities take place (Li et al., 2019). A potential threat to rural and urban economies estranged with the rise in urbanisation (Mayer et al., 2016). In light of this, entrepreneurs comprehending the entrepreneurial dynamics in urban and rural areas offer caution to the policy makers (Freire- Gibb & Nielsen, 2014). Specifically, rural areas encounter the threat of human talent in particular due to other advanced regions (Huggins et al., 2017). Hence, rural entrepreneurs deliberately use rural-urban linkages to add value to the traditional rural asset (Mayer et al., 2016). Rural enterprises need external assistance as it is constrained by environmental factors (Musinguzi et al., 2023), and should possess qualities such as resilience, risk awareness, non-conforming and self-belief (Iwara et al., 2021). Business survival in the peripheral region relies on the support of growth motivation, human capital and locational factors (Huggins et al., 2017). In the context of the urban set-up, the scenario is relatively alike. The urban system of innovation, considering the presence of assets in the form of its location, diverse city resident facilitates business success (Markatou & Alexandrou, 2015). Enterprises in the city lead to job creation and an increase in household income (Drbie & Kassahun, 2013). In addition, innovation results from the entrepreneur's self-employment in urban areas (Faggio & Silva, 2014). Urban areas avail the benefits of infrastructure, factors of production, and growth (Markatou & Alexandrou, 2015). Further, entrepreneurial capacity such as infrastructure, risk taking, and innovation, is are factors that influence enterprise success in peri-urban areas (Mmbengwa et al., 2013). Again, enterprise in peri-urban areas depends on the quality of products, customer relationships, the motivation and creativity (Sroka et al., 2023). Paul & Shahiduzzaman (2024) highlighted that Government initiatives and training are important for enterprise development in North-East India. From the literature review, it is acknowledged that earlier studies have overlooked the various determinants of microenterprise success in the rural and urban context of North-East India.

Against this backdrop, the diverse perspectives of the EPR, ENE and ENR are considered to assess microenterprise success in rural and urban areas in North-East India. To achieve the given purpose, three hypotheses were framed to assess the influence of EPR, ENE, and ENR on microenterprise success in rural and urban settings. The formulated hypotheses are as follows:

H1: There is a significant effect of EPR on microenterprise success between rural and urban areas.

H2: There is a significant effect of ENE on microenterprise success between rural and urban areas

H3: There is a significant effect of ENR microenterprise success between rural and urban areas.

Research Methodology

The study aimed to evaluate the microenterprise success in rural and urban areas in Nagaland, one of the states in North-East India, considering EPR, ENE and ENR, respectively. Dimapur and Kohima districts of the state, which are the main business hubs in Nagaland, were considered. The registered microenterprises that have existed for a minimum of five years on the day of data collection were considered for the study. In this regard, the number of microenterprises was 247 and 244 in rural and urban areas, respectively, existed. A set of questions was prepared based on the determinants of microenterprise success drawn from the literature review. Informed consent was given by all the respondents, and their participation was voluntary. A pilot study was conducted for schedule finalisation, and data were collected through the well-structured Five-Point Likert Scale schedule. Only 210 valid responses, each from both rural and urban areas, were collected, having a total sample of 420 respondents. The secondary data were collected from the Statistical Handbooks of Nagaland. Purposive sampling method was adopted for data collection, and the analyses have adopted Cronbach's alpha, independent sample t-test, Pearson correlation coefficient and multiple regression.

Findings and Discussion

Reliability assessment

Before administering any statistical tool to analyse the collected data, Cronbach's alpha reliability test was conducted and the overall alpha value is measured at .868, whereas the alpha values of EPR, ENE and ENR (independent variables) are measured at .870, .829 and .878, respectively, indicating that the items in the schedule are highly correlated and that the scale is reliable. The items under microenterprise success (dependent variable) are fewer, and the alpha value is measured at .680, which is also accepted. Then, the appropriate tests were administered to analyse the data.

Independent sample test

An independent sample t-test was carried out to assess the hypotheses of the study. It compares the rural and urban microenterprises in terms of their success. The study endeavours to compare the effect of the variables, namely EPR, ENE, and ENR, on microenterprises' success between the rural and urban areas. An independent sample t-test analyses the effect of the given variables on micro-enterprise success in rural and urban areas. Firstly, the effect of EPR on microenterprise success in rural and urban areas was conducted, wherein the output indicated a significant difference with $t(418) = 3.488$, $p = 0.001$. The mean score for the rural area ($M = 1.785$, $SD = .086$) was lower than the urban area ($M = 1.819$, $SD = .110$). The mean difference between the two areas with (mean difference = .033, 95 per cent CI = .014 to .052) was significant. Hence, H1 was supported, which states, there is a significant effect of EPR on microenterprise success between rural and urban areas. The result suggests EPR do influence microenterprise success in both rural and urban areas. However, the influence of EPR on microenterprise success is stronger in urban areas. Secondly, the effect of ENE on microenterprise success in rural and urban areas revealed a significant difference. The t-test result was significant with $t(418) = 2.730$, $p = 0.007$. The meaning of ENE for rural ($M = 3.223$, $SD = .329$) is higher than the urban area ($M = 3.131$, $SD = .361$). The extent of the mean difference between the rural and urban states stood at (mean difference = -.09219, 95 per cent CI = .158 to .02581) and was significant. Therefore, H2 was supported as there is a significant effect of ENE on microenterprise success in rural and urban areas. The result affirms ENE influences microenterprise success both in rural and urban areas. The influence of ENE on micro enterprise success is stronger in rural areas than in urban areas. Thirdly, the t-test compares the effect of ENR on microenterprise success in rural and urban areas. There was a significant difference with $t(418) = 5.258$, $p < 0.001$. The mean score for the rural area ($M = 1.530$, $SD = .031$) is lower than the urban area ($M = 1.549$, $SD = .041$). The mean difference = .01895, 95 per cent CI = .01186 to .02603 was significant. Accordingly, H3 was supported, which means that there is a significant effect of ENR on microenterprise success in rural and urban areas. The result suggests the influence of ENR on micro-enterprise success in both rural and urban areas. However, the influence of ENR on microenterprise success is stronger in urban areas than the rural areas.

Correlation analysis on microenterprise success

The hypothesis test presents the difference in the effect of the variables under consideration on microenterprise success. This section further delves into the strength of the relationship between EPR, ENE and EPR on microenterprise success in rural and urban areas. The study applied the Pearson correlation coefficient to draw the relationship between the dependent and independent variables. As a result of the analysis, regarding the microenterprises in rural areas, EPR and microenterprise success have a strong positive and statistically significant correlation ($r = .747$, $p < .001$). Hence, an increase in entrepreneurial resources would lead to an increase in microenterprise success in rural areas. Similarly, EPR and microenterprise success in urban areas have a very strong positive and statistically significant relation ($r = .818$, $p < .001$). This indicates that with an increase in entrepreneurial resources, it would result in an increase in microenterprise success in urban areas. Further, the relationship of ENE with microenterprise success in rural areas indicated strong positive and statistically significant relations ($r = .735$, $p < .001$). The result implies that with an increase in ENE, there would be an increase in Microenterprise Success. Likewise, there was a strong positive and statistically significant result with ($r = .604$, $p < .001$). This shows that with an increase in ENE, it would lead to an increase in microenterprise success. Again, the relation between ENR and microenterprise success was examined for the rural area. The result shows a strong positive and statistically significant outcome ($r = .671$, $p < .001$). The result signifies that with increase in ENR paves the way for an increase in microenterprise success. Conversely, for urban areas, ENR and microenterprise success have a strong positive and statistically significant result ($r = .763$, $p < .001$). The output shows that the increase in ENR leads to microenterprise success.

Multiple regression

For rural enterprises

After the correlation analysis, EPR, ENE, and EPR were further analysed in relation to microenterprise success in rural and urban areas. Two separate regression analyses on rural and urban areas, respectively, were performed to get insights into the explanatory power of the predictors on microenterprise success. As a result of regression analysis, the independent variables, namely EPR, ENE and ENR, with $F = 197.199$, $p < 0.001$, collectively have a significant influence on microenterprise success in rural areas. Further, the $R^2 = .742$ indicates that the EPR, ENE, and ENR explain 74.2 per cent of the variance in microenterprise success. Individual regression analysis of EPR [Beta (B) = 1.301, $t = 10.533$, $p < 0.001$], ENE (B = .297, $t = 8.188$, $p < 0.001$), ENR (B = 1.268, $t = 10.533$, $p = 0.001$) each has a significant and positive influence on microenterprise success in the rural setup.

For urban enterprises

Again, for the microenterprises in urban areas, the independent variables, namely EPR, ENE and ENR, with $F = 650.155$, $p < 0.001$, collectively have a significant influence on microenterprise success for rural areas. Further, the $R^2 = .904$ indicates that the EPR, ENE, and ENR explain 90.4 per cent of the variance in microenterprise success. Individual regression of EPR (B = 1.480, $t = 20.219$, $p < 0.001$), ENE (B = .276, $t = 13.760$, $p < 0.001$), and ENR (B = 2.812, $t = 14.201$, $p = 0.001$) each have a significant and positive influence on microenterprise success in the rural setup.

Conclusion

The study aimed to evaluate the microenterprise success in rural and urban areas, considering the factors, namely EPR, ENE and ENR. The result disclosed the influence of EPR, ENE and ENR towards microenterprise success in rural and urban areas. This finding is aligned with the findings of Alom, Abdullah, Moten & Azam (2016). These factors collectively and individually contribute to microenterprise success in rural and urban areas. The study indicates that EPR, ENE and ENR together account for a very high influence on microenterprise success in urban areas. Individually, the resource factor, i.e. EPR and ENR, exerts a stronger influence in urban areas, whereas ENE has a stronger influence in rural areas. The results provide a valuable insight into the significance of resource-based and environmental factors in rural and urban-based microenterprise success. The study reaffirms the necessity of entrepreneurial and enterprise resources of urban-based microenterprises. Further, it sheds light on the significance of environmental aspects on microenterprise success in rural areas. It indicated that the rural-based microenterprises rely on the friendly business environment to excel.

The study provides insights into the influence of resources and environmental features on microenterprise success. It paves a way for future research for a depth enquiry into environmental factors in the rural setup. This would channel a way for further knowledge on rural entrepreneurship. The findings reveal the significance of resources and environmental aspects on entrepreneurship. Policy makers and entrepreneurs could consider entrepreneurial resources, enterprise environment and enterprise resources in their agenda for entrepreneurship development and enterprise success. The concern could take into consideration the suitable environmental factors for rural

entrepreneurs and entrepreneurial & enterprise resources for the urban enterprises. It would benefit the micro-level entrepreneurs for sustainable business. The paper is limited to the rural and urban microenterprises in two districts of a state in North-East India. More districts and states can be considered in future research for better generalisation of findings.

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SRI LANKAN SOCIAL ENTREPRENEURS IN THE CREATIVE INDUSTRY: THE UNDERLYING REASONS

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Abstract

Social entrepreneurship is an emerging domain that generates both economic and social value by addressing societal problems. Although the literature on social entrepreneurship has expanded in recent years in Western contexts, studies in developing countries remain relatively scarce. Concurrently, the creative industry has gained notable momentum in the twenty-first century; however, the intersection of social entrepreneurship and the creative sector in Sri Lanka on a contextual basis is under-researched. Therefore, this qualitative study investigates the reasons why social entrepreneurs engage in Sri Lanka's creative industry. We conducted in-depth interviews with nine social entrepreneurs located in the Western and Central Provinces, drawing on a narrative research approach grounded in a social constructionist philosophical framework, to explore motives derived from their personal experiences. Thematic analysis was employed to identify core driving forces. Consequently, the findings reveal several key themes: preservation of cultural legacy and innovation in traditional practices, intrinsic passion for creativity, orientation towards consumer well-being and happiness, commitment to addressing social issues and dissatisfaction with conventional employment. Based on these themes, the study proposes a model linking the inner experiences of social entrepreneurs with socio-cultural and industry contexts. Finally, the study offers implications for policymakers and stakeholders, suggesting strategies to align institutional support with these principal motivational dimensions. This research fills a gap in Sri Lankan social entrepreneurship literature within the creative industry and suggests avenues for future research in other industries by contributing new empirical insight into the motives of social entrepreneurs in the creative industry.

Keywords: Creative industry, motives, narrative inquiry, social constructionism, social entrepreneurship

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DOI:

Introduction

Social entrepreneurship is an innovative and emerging field that integrates economic activities with social advancements and utilises both economic and social resources sustainably (Elliott, 2019; Hossain & Shamsuddoha, 2021). Global statistics indicate that social entrepreneurship appears to be more entrenched in the developed economies than in the developing economies (Premadasa et al., 2023). For instance, the United Kingdom estimated that there were about 131,000 social enterprises, contributing 78 billion pounds to the economy and employing 9.5% of the workforce in SMEs (Doshi et al., 2023). In Australia, 518 registered social enterprises are employing about 31,000 individuals, 45% of whom are from marginalised communities (Social Traders, 2023). Similarly, more than 1,000 social enterprises are present in Canada, and they are contributing more than 4.1 billion dollars in revenue and employing over 9,000 individuals (Buy Social Canada 2023). For Africa, social entrepreneurship is more advanced in Nigeria, with an estimated 443,000 social enterprises (British Council & Qualiquant, 2022). In contrast, Sri Lanka has a comparatively less social entrepreneurship landscape, experiencing rapid expansion, with 38% of social enterprises established in recent years. Currently, there are between 6,000- 15,000 social enterprises, actively widespread between 25 districts in 9 provinces across many industries in Sri Lanka (British Council, 2018; Jayasinghe & Greitane, 2022). The Thomson Reuters Foundation ranked 44 countries for social entrepreneurs, but even Sri Lanka was not included (Mudalige, 2023). Therefore, it is evident that the social entrepreneurship contribution in Sri Lanka is comparatively low. The study of the factors that have led to a lack of social enterprise in Sri Lanka and the driving forces behind growth is crucial.

Despite its relevance having been increasing in wider circles, definitions of social entrepreneurship remain inconsistent across disciplines, making it difficult to define theoretical limits (Chaudhary et al., 2021; Saadaoui & Belgaroui, 2013; Shavyrina, 2021). For some authors, it includes everything that comes within nonprofit organisations or charitable philanthropic endeavours (Mair & Martí, 2006). A debate exists whether it is considerably different from traditional entrepreneurship or social work, particularly when considering its broad range of nonprofit to hybrid for-profit entities, with respect to its various forms (Choi & Majumdar, 2014; Weerawardena & Sullivan Mort, 2006). Other authors, like Jayasinghe and Greitane (2022), define it much more broadly as the use of entrepreneurial approaches to reach social outcomes. This ambiguous definition makes it difficult to develop both theoretical knowledge and create effective policies.

Meanwhile, creative industries are seen as agents of economic growth and innovation. The creative industry is essential to the inception of social entrepreneurship by promoting innovation, cultural expression, and inclusive economic development (Stosic-Mihajlovic & Nikolic, 2017; UNCTAD, 2022). Social entrepreneurs involved in creative industries fuse artistic intent with social purpose through creative and community engagement to address societal issues, as well as achieve some level of economic sustainability (Agung et al., 2018; Mathory et al., 2023). The creative industries, alongside their associated trades around the world, are expanding more quickly than many traditional sectors. This trend applies not just to developed nations but also to developing countries (British Council, 2018). The Export Development Board of Sri Lanka has revealed, 'oil served as the main fuel of the economy in the 20th century, meanwhile creativity serves as the fuel of the economy in the 21st century' (Sri Lanka Export Development Board, 2021). In addition, this sector is largely made up of small businesses and sole entrepreneurs, supporting aspects such as cultural preservation and local development. Sri Lanka's creative sector is gradually evolving, and increasingly, as social entrepreneurs are entering the field. According to the Institute of Policy Studies of Sri Lanka, the creative sector in Sri Lanka consists of eight sub- sectors, including crafts, fashion design, literature and publishing, advertising, photography, performing and visual arts, IT, architecture, and interior design (Hirimuthugodage et al., 2020). However, research into social entrepreneurship in the creative sector is limited (British Council, 2018; Jayasinghe & Greitane, 2022).

Furthermore, the Department of Census and Statistics collaborated with the United Nations Children's Fund (UNICEF) to estimate the Multidimensional Poverty Index (MPI) in Sri Lanka, which demonstrates three main areas that show poverty: education, health, and overall living standards. It found that about one in six people in Sri Lanka face multidimensional poverty, and this number is roughly half in urban areas. This suggests that prior efforts by the government, non-profit organisations, and traditional development programs specifically funded by the Asian Development Bank (ADB) and World Bank were competent but not adequate in remedying social problems. Herein, social enterprises are becoming more popular with public officials and government policymakers as an alternative to address social problems and improve lives, as well as reduce inequality (Department of Census and Statistics et al., 2021).

Similarly, existing literature identifies several motivational factors driving social entrepreneurs. As stated by Omorede (2014), Nigerian social entrepreneurs are driven by local conditions, an international mindset, passion, and a social network that supports them to enter social enterprises. Entrepreneurs in the creative industry are influenced by socio-cultural factors and social contexts, and leveraging creative abilities can help facilitate life choices and ideal career choices (Patten, 2016). In addition, innovativeness, proactiveness, risk management,

passion, and collaborativeness also drive social entrepreneurship in the creative industry (Agung et al., 2018).

While existing Sri Lankan implications have identified broad motives of social entrepreneurs such as self-efficacy, perceived feasibility, socio-cultural influences and passion, few have indicated how motives are shaped specifically within the creative industry and creative social entrepreneurs balance the desire for social value with creative expression in a context where creative careers are often undervalued (Mudalige, 2023). In contrast, entrepreneurs' motives in the creative sector are even more complex as audiences shift according to the artistic sub-sector, the impact of cultural heritage, and the identity of the artist. Similarly, the creative industry in Sri Lanka has an economic value that is undeniable. Existing literature on the small art and craft enterprises in the creative industry has highlighted the contextual significance, but specific studies focusing on the creative industry in Sri Lanka are rare (Hafsa et al., 2023). Moreover, while the study by Mafasiya and Gunasinghe, (2023) explores motivational factors behind start-ups of social ventures generally in Sri Lanka, it does not differentiate between sub-industries or consider how motives may differ for those operating in novel creative sectors such as crafts, performance arts, or fashion design. Hence, the present study seeks to fill that gap by examining social entrepreneurs within the Sri Lankan creative industry, exploring how artistic passion, cultural legacy, and creative innovation specifically influence their decision to engage in social entrepreneurship. More precisely, academically, this contribution to a more nuanced understanding of motive variation by industry is practical, implying that creative social enterprises benefit from cultural policy, funding, and support specifically tailored to their needs. Furthermore, this provides social contribution to the creative sectors through which inclusion and cultural preservation might be enabled or supported by the public. Hence, the lack of literature raises the fundamental research question: What are the motives to engage in social entrepreneurship among the social entrepreneurs in the creative industry in Sri Lanka?

Literature Review

Entrepreneurship, widely determined as the creation of economic value by means of risk-taking and innovation, is identified as the most significant factor in the economy. The sphere of entrepreneurship is substantial that encompassing not only corporate but also female and social types of entrepreneurship. Among these, Social Entrepreneurship has gained the greatest interest for its promise of solving social problems in the marketplace with novel business models (Dees, 1998; Pless, 2012).

Scholarly interest in social entrepreneurship has increased significantly over the last two decades (Chaudhary et al., 2021; Choi & Majumdar, 2014; Teasdale et al., 2023). The concept of "social entrepreneurship" was revealed for the first time in the 1960s and 1970s, but it was only about twenty years later that it became widely acknowledged in the literature of international management (Shavyrina, 2021; Saadaoui & Belgaroui, 2013). When G. Dees addressed the issue of social entrepreneurship for the first time, he identified that it had always existed, but in the past, researchers lacked the tools to address it effectively (Dees, 2007). It evolved through various phases of civic innovation, inclusive models of diversity, collaboration, and supporting institutions (Teasdale et al., 2023). Zahra et al. (2009) defines it as pursuing opportunities to enhance social wealth through innovative ventures, while Monge (2016) notes differences in models, scalability, and revenue. Global examples include Professor Muhammad Yunus' Grameen Bank establishment in Bangladesh in 1976, which introduced microfinance to eradicate poverty and empower women (Martin & Osberg, 2007). Similarly, public-private social services in Sweden (Gawell, 2014). While youth employment initiatives in the Balkans (Stosic-Mihajlovic & Nikolic, 2017).

Within the Sri Lankan context, the social entrepreneurship ecosystem in Sri Lanka is relatively novel, growing quickly with 51% established or led by young people aged between 25-44. This illustrates an elevated level of youth involvement and leadership with possibilities for gender parity and market diversification (British Council, 2018). Similarly, social entrepreneurs are more likely to be well-educated and middle-aged women compared to commercial business (Elliott, 2019; Hoogendoorn et al., 2011). This leads to a critical need for social entrepreneurship research in Sri Lanka.

Creative industry and social entrepreneurship in the creative industry

Creative industries contribute to both economic development and social improvement through the creation of jobs, supporting cultural diversity, and attracting investments (UNCTAD, 2022). Adversely, the creative industries function with challenges receiving digital disruption, copyright infringement, and gaps in skills. Notwithstanding these challenges, opportunities abound in the creative industries for strong growth owing to increased demand, innovations in technology, entrepreneurship, and the impact of globalisation (Božić, 2024). Creative industries entrepreneurs also contribute strongly to economies, but their unique dynamics, grounded in innovation and unconventional partnerships, require a better understanding of the inside to be fully realised in terms of potential impact on economies (Patten, 2016).

This literature explores entrepreneurship in creative industries, highlighting its unique characteristics and research potential as passion drives entrepreneurial behaviour, which can be transformed into a symbolic value system (Schulte-Holthaus, 2018). The UK's creative sector makes up 7.3% of the economy, and it generates ideas, pictures, symbols, design, and cultural expression on a large scale. It employs one million people and supports 800,000 creative workers. The growth of the sector is crucial for the livelihoods of British residents. Creativity and innovation are overlapping concepts, with creativity focusing on the origination of innovative ideas and innovation on successful exploitation (The Work Foundation, 2007). In the context of the Sri Lankan creative industry, there were almost 240,000 job opportunities in the creative industries in 2017 across eight sectors, as discussed above in the introduction. Creative industries employ about 62% of their workers in the arts and crafts sector. The publishing and IT sectors have taken up the second and third, in that order. For example, the export earnings for Sri Lanka's IT industry in 2018 grew to USD 1 billion (Sri Lanka Export Development Board, 2021).

Nowadays, there is a rising trend towards social entrepreneurship within the creative industry with good potential for positive social change (Sri Lanka Export Development Board, 2021). For example, an initiative on ethical manufacture and increased exports within the world of art, crafts, design, fashion, and the performing arts looks at the 'Creative Sri Lanka 2030' project now underway. Creative entrepreneurs often harness traditional crafts and cultural narratives to develop novel approaches to social issues, combining creative practice and social entrepreneurship (Sri Lanka Export Development Board, 2024). It consists of many small businesses and self-employed individuals; hence, measuring their contribution to economic activities is crucial for policymakers and industry professionals (Hirimuthugodage et al., 2020). In Sri Lanka, as the creative industry integrates into the economy, creative enterprises confront new difficulties and possibilities. Existing literature revealed that unavailability of supplies, poor consumer purchase intention, short-term vision limitations, and social network building, while opportunities included digital presence exposure, closed innovation practices, and specialisation (Hafsa et al., 2023).

Moreover, scholars contend that the social entrepreneurship movement in the creative industries is one of the supporting factors for the development of socially responsible innovations in these industries. This collection of creativity and social obligation, therefore, determines the difference between social entrepreneurship in the creative industry and regular commercial ventures, revealing the motivation as well as the approaches that the social entrepreneurs have employed in this domain (Mathory et al., 2023). As Agung et al. (2018) provides a detailed model for social entrepreneurship that recognises five dimensions of behaviour: innovativeness, proactiveness, risk-taking, passion, and collaboration. It points out the barriers regarding the environment, sustainability, and social mission that the creative industries deal with, and it indicates that the creative industries incorporate social entrepreneurship for sustainable and inclusive development.

Despite this growth in the creative industry, most studies focus on a Western context, and there is scarce empirical research on developing countries on why individuals engage in social entrepreneurship, especially in Sri Lanka. The creative industry, including arts, crafts, and design, is a unique place where economic, cultural and social purposes collectively drive (UNCTAD, 2022). Accordingly, less evidence indicated how the specific socio-economic, cultural, and institutional conditions in Sri Lanka influence the motivations of social entrepreneurs. The observation of motives in the Sri Lankan creative context will thus result in examining the gap in the literature.

Motives for social entrepreneurship

Social entrepreneurship consists of a variety of internal and external sources of motivation, as the empirical evidence indicates globally, such as personal value systems, socio-cultural environments, and the contextual environment (Agung et al., 2018; Gawell, 2014; Mudalige, 2023). Motivation derives from internal motivation, meaning readiness, and rejection is influenced by internalised attitudes, predispositions, and methods of proactivity internally rather than externally (Shavyrina, 2021). As an internal motive, passion helps to build up the social entrepreneur (Ryan & Deci, 2000). Moreover, scholars have highlighted that entrepreneurial passion and frustration also stem from an instinctive motive (Ruskin et al., 2016). It was further stated that occupational dissatisfaction acts as a catalyst for entry into social entrepreneurship (Yitshaki & Kropp, 2011). Furthermore, enhancing consumer well-being and happiness flourishing to a person becomes a social entrepreneur (Bacq & Janssen, 2011; Akar & Doğan, 2018; Sharma, 2016). Meanwhile, four major themes emerged as motivators for young social entrepreneurs: early life experiences, inspiration from customers and coworkers, work-related experiences, and personal significance (Ahrari et al., 2019). Gender also significantly influences social entrepreneurship intentions, with men motivated by 'pull factors' and women by 'push factors' like gender prejudice, frustration, and poverty. Younger individuals may be more influenced, necessitating entrepreneurship education for women to explore social entrepreneurship as a viable career choice (Hoogendoorn et al., 2011). It is evident in Sri Lanka, as a study reveals a gender bias in social entrepreneurship, with 81% being male (Mudalige, 2023).

Additionally, people in the creative industry frequently adopt distinctive motives for social entrepreneurship. Social entrepreneurs in this field may aim to address serious social or environmental concerns by developing novel solutions that draw on their creative ability. The combination of creativity and social impact may be a strong motivator for anyone looking to effect positive change in their communities (Stosic-Mihajlovic & Nikolic, 2017). Meanwhile, creative industry entrepreneurs are influenced by socio-cultural factors and social contexts, with personal or family circumstances. For example, the death of close family members affects their dreams and actions. However, even when career choices are not ideal, leveraging creative abilities can facilitate life choices (Patten, 2016). Protecting cultural heritage in an era of rapid globalisation is also motivated by authors (Hawkes, 2001). Additionally, Peredo and McLean (2006) reviewed cultural conservation as a major driver. Further, it is proved by Hesmondhalgh (2013) that social entrepreneurs enhance the perceived value of cultural heritage through this.

Similarly, in the Sri Lankan context, it is proven that social entrepreneurial motivations are derived from personality factors and social factors. Personality factors, such as personality traits, academic background, and career experience, influence an individual's decision to become a social entrepreneur (Mafasiya & Gunasinghe, 2023). In addition, social factors derived as social family background, personal experiences, connections with others, and religion (Mafasiya & Gunasinghe, 2023; Sellaheewa & Samarasinghe, 2022). Furthermore, these authors argued that while social entrepreneurship has been studied globally, the motives in the creative industry context in Sri Lanka remain underexplored. Therefore, this clearly stated the purpose of this research.

Theoretical framework

Examining the motives of Sri Lankan social entrepreneurs in the creative industry is both contextually pertinent and theoretically significant. In Sri Lanka's creative sector, social entrepreneurs engage in social entrepreneurship for several reasons. Researchers have adopted a wide range of theories, such as Self-Determination Theory (SDT) and Theory of Planned Behaviour (TPB), to accommodate this. First, Self-Determination Theory, developed by Ryan and Deci (2000), offers a solid framework for researching social entrepreneurs' intrinsic and extrinsic motivations. According to SDT, people are motivated by the need for autonomy, competence, and relatedness, which form the basis for intrinsic, self-driven, purpose-directed behaviour. Autonomy refers to the social entrepreneurs who usually need to have autonomy and freedom to pursue personally meaningful goals. This may stem from dissatisfaction with working in a traditional workplace or bureaucratic constraints (Tandon et al., 2023). Competence refers to the number of people who are inspired to use their skills to effectively engage and address social problems, which gives them a sense of agency and success when creating impact (Mafasiya & Gunasinghe, 2023). Next component, relatedness, means social entrepreneurs also often feel a strong affiliation with community engagement or the community in which they are engaged. They are inspired by their empathy and engagement in a social cause (Hemingway, 2005).

Based on the key points of self-determination theory is that the factors that lead people to join and remain engaged in social enterprises are due, at least in part, to non-financial or tangible extrinsic rewards. Typically, social entrepreneurs in Sri Lanka's creative industries present intrinsic motivations, contributing towards social impact, creative expression, and cultural preservation, all of which are not triggered by an economic incentive. This also supports earlier studies that report on social entrepreneurs' motivations of self-fulfilment and social value rather than profit maximisation (Tandon et al., 2023). For creative entrepreneurship, Cnossen et al. (2017) applied SDT to Dutch creative industry entrepreneurs and found 'autonomous intrinsic' motivation was high; however, their study did not attempt to research SDT and social entrepreneurship specifically.

Within the Sri Lankan context, entrepreneurs often demonstrate a combination of motivations, highlighting a strong emphasis on the well-being of the community and the preservation of culture (Hafsa et al., 2023). Hence, there has not been an empirical study found that directly studies social entrepreneurship specifically within the creative industries through an SDT lens.

Furthermore, the TPB adds to SDT to explain how attitudes, subjective norms, and perceived behavioural control affect entrepreneurial intentions (Ajzen, 1991). In Sri Lanka, where societal expectations are emphasised in the community, TPB clarifies how social norms and perceived feasibility influence entrepreneurial intention to start social ventures in creative sectors. They not only define individual intentions but also incorporate an understanding of how cultural and social structures influence entrepreneurial motivation. In contrast, Sri Lankan researchers identified entrepreneurial self-efficacy and perceptions of feasibility as significant proximal predictors of social entrepreneurial intentions (Mudalige, 2023). Within the framework of social entrepreneurship, TPB sheds light on how moral obligation, empathy, and perceived social support interrelate with these three components to predict their social entrepreneurial intention. Mair and Noboa (2006) broadened the TPB framework by integrating empathy and moral judgment into the model because they recognised that social entrepreneurs may be motivated by altruistic and prosocial values rather than traditional profit motivation.

Despite the increasing interest in social entrepreneurship, research on the creative industries in Sri Lanka is scarce. Empirical research rarely focuses on the motivations behind the social entrepreneurs in the creative industry. This leaves an unexplained gap in the existing literature. Theorising, there is a framework-building opportunity to build a more comprehensive framework that combines the TPB and SDT with social capital to design a framework that can explain the complex interactions among individual, social, and contextual influences of motivation. Methodologically, as most empirical studies in the Sri Lankan context are quantitative and absence in creative industry specific, this means the broader implications of qualitative approaches to social entrepreneur motivation will be overlooked. Addressing these research gaps may provide a more theoretical understanding and address the research question of why Sri Lankan social entrepreneurs engage in the creative industry.

Methodology

Qualitative research studies human behaviour, focusing on body language, attitudes, opinions, and experiences, while inductive research generates new theories and generalisations (Patel & Patel, 2019). Hence, this qualitative study employed an inductive approach and a social constructivist research philosophy, which is best suited for the study. Social constructivism refers to the fact that there is no objective reality; it exists through individuals' experiences, culture, and social relations (Berger & Luckman, 1991; Crotty, 1998). The aim of qualitative research, particularly grounded theory, is to generate ample data to explain concepts, categories, properties, and dimensions of phenomena. The ontological perspective of grounded study design, influenced by early sociological theory, pragmatism, and symbolic interactionism, focuses on controlling empirical phenomena and abstract notions through an iterative data collection and analysis process (Frost & Nollaig, 2011). Thus, it is inappropriate for this study. Concurrently, phenomenology is a qualitative method that delves into individuals' actual experiences to understand how they navigate their personal and social lives regarding a specific phenomenon (Creswell & Poth, 2018). Since the study does not look at a specific phenomenon, experiments and survey approaches are thus inappropriate.

Meanwhile, Narrative research allows individuals' experiences to be explored through storytelling and enables the researcher to understand their motives (Creswell, 2007; Reis, 2023). With the emphasis on individual experiences and contextual constraints, the narrative research method was determined to be the best approach. In this study, narrative design was employed as a philosophical stance and as a methodological framework. It directed how stories were elicited, interpreted and represented narrative design and appropriately structured the interviewing process in this area if the participants were asked to narrate their professional journey as social entrepreneurs, including their experiences at that time. The interviewing techniques were designed specifically to evoke narrative reflection rather than brief responses, affording each practitioner to develop a succinct presentation or tell their story of lived experience.

Sample, sampling technique and data collection

Koerber and McMichael (2008) identified three relevant sample approaches for qualitative research: convenience, purpose, and theoretical. It is utilised to choose the sample since the planned study involves people with various viewpoints. Purposive sampling encompasses a wide range of techniques, including heterogeneous sampling, extreme deviant examples, and snowballing (Patel & Patel, 2019). This study employed a purposive sampling approach as it ensured that participants possessed direct experience as creative social entrepreneurs.

Meanwhile, Snowball sampling is useful in research that investigates underground cultures, social movements, or secret societies. Each person is asked to select a different person in the population, where there is a predefined integer. For example, each person in the sample may be asked to name his 'best friends,' or the 'people he most regularly associates with,' or the 'those whose opinions he most frequently seeks,' etc (Frost & Nollaig, 2011). Therefore, snowball sampling was utilised to expand the participant base through professional referrals to this study, which enhanced diversity in perspectives (Koerber & McMichael, 2008). Initially, the sampling process began with purposive sampling using the personal and professional network. Accordingly, snowball sampling was adopted, where after interviewing one creative social entrepreneur, the researcher asked that entrepreneur to suggest other creative social entrepreneurs in their network. This method was specifically used early in the data collection process but was not successful in identifying sufficiently diverse participants. To address this problem, the researcher also used personal and professional contacts to help invite participants to the data collection.

Accordingly, as per the Institute of Policy Studies' Sri Lanka's classification, the participants represented a wide range of creative industries, including fashion design, crafts, performing arts, and others (Hirimuthugodage et al., 2020). In this manner, this study collected data from nine social entrepreneurs considering diversification in the creative industry as saturation was reached. The rationale behind the smaller number of samples was that researchers recognised the recurring patterns and similar narratives emerged among participants in subsequent interviews, after no new code emerged across successive interviews. To be eligible for the selection, they had to

have at least three years of experience running a creative business, be actively involved in activities that have a positive impact on society and be recognised as social entrepreneurs in their local communities or networks. Table 1, shown below, gives a detailed look at the participants' background and business details, showing how varied and representative the sample is. Similarly, research sites were selected as the Western and Central provinces due to their rich cultural value.

Data collection was done from semi-structured in-depth interviews, observations and photos, which allowed participants to describe individual stories and experiences relevant to the research focus. The researcher contacted participants via several networks, then contacted participants over the phone and via email. Interviews were in a face-to-face setting at a mutually convenient location, were approximately fifty minutes in length, and were tape-recorded with participants' consent for accuracy. For the follow-up clarification, an average of twenty minutes of phone calls was conducted with each respective participant. The researcher experienced challenges with finding participants, scheduling interviews, and travel delays, but managed the issues effectively to get all the interviews completed.

Table 1
Demographic factors of the sample

Respondent	Age (years)	Gender	Education level	Experience in business	Creative Sector	Living Province
A	50	Male	A/L	18	Crafts	Central
B	46	Male	A/L	8	Crafts	Central
C	26	Female	Graduate	4	Crafts	Western
D	27	Male	Graduate	5	Architecture and interior design	Western
E	47	Male	A/L	6	Crafts	Western
F	49	Female	Masters	15	Literature and Publishing	Western
G	32	Female	Masters	9	Fashion design	Central
H	40	Female	Masters	8	Fashion design	Western
I	26	Female	Masters	14	Fashion design	Central

(Source: Developed by authors based on literature (2025))

Data Analysis

In qualitative research, data analysis refers to the methodical process of analysing non-numerical data, such as observations, interviews, and documents, to identify themes, patterns, and significance and glean important insights. There are many ways to analyse qualitative data, including thematic analysis, narrative analysis, and grounded Theory analysis (Weckesser & Denny, 2022). Narrative Analysis focuses on tales and how individuals utilise them to create meaning. Stories are analysed for their language, structure, and context to comprehend viewpoints and experiences (Riessman, 2005). Grounded Theory analysis is an inductive methodology: theories based on facts that may be developed and that create hypotheses based on the data itself by identifying ideas, categories, and their relationships as you evaluate the data (Razavi et al., 2014).

Compared to the other analysis methods, this study used the thematic analysis to interpret participants' stories by identifying recurring patterns, as it offers flexibility and depth (Braun & Clarke, 2006; Weckesser & Denny, 2022). This framework consists of compiling stories and examining them to identify important plot points. In this study, thematic analysis followed four main stages: getting familiar with the data, coding, creating themes, and reviewing the work. At first, researchers created transcripts that included every single word as well as sporadic annotations by listening to the audio recording to understand deeply what the participants experienced and the context they were in. During the coding stage, important parts of the data were given labels that described the main ideas and repeating patterns. These labels were then grouped into bigger themes that showed common meanings and connections related to the research goals. Also, to make sure the themes were accurate and reliable, inter-coder reliability was ensured through peer debriefing, which made the whole analysis more trustworthy. Furthermore, we categorised these motives in relation to existing motivational theories, including self-determination theory and prosocial motivation theories, to establish a theoretical orientation and show how our findings contributed to understanding theory. Concurrently, the researchers performed the analysis manually, and no analysis software was used.

Similarly, when conducting qualitative research, ethical considerations are crucial to understanding participants' experiences. Denscombe (2010) identifies three primary ethical considerations: participant safety, no dishonesty, and informed consent. As a result, all interviews were held in locations convenient for the participants. Participants are informed that the data obtained will be utilised just for the study, and their names will not be revealed. Before data collection began, all participants were informed about the study's aim and role. Finally, the researcher acquired informed consent from each of them. Participants were guaranteed their confidentiality. The research employed code numbers to represent individuals. Participants were advised that they might withdraw from the research at any moment, as participation was voluntary. They might refuse to answer unpleasant inquiries. Additionally, data triangulation, thick description, and member checking strategies were applied for the research to be trustworthy.

Findings and Discussions

This section presents interview data from participants to address the research question of the study. Accordingly, five major themes emerged using thematic analysis. Such as preservation of cultural legacy and innovation in traditional practices, intrinsic passion for creativity, orientation toward consumer well-being and happiness, commitment to addressing social issues and dissatisfaction with conventional employment. Then each theme is explained using instances from their own words. Additionally, the researcher's interpretations provide insight into each theme. The researchers contextualised their findings by reviewing relevant literature for each theme. Finally, researchers have developed a model using the research findings.

Preservation of cultural legacy and innovation in traditional practices

As Hawkes (2001) argues, this motive is significant as it addresses the broader societal need to protect cultural heritage in an era of rapid globalisation, where unique local crafts, skills, and cultural identities are at risk of erosion. Similarly, the current study found that social entrepreneurs in Sri Lanka are inspired by the country's cultural heritage and traditional practices. Respondent commentaries are as follows.

Respondent I: *I use natural dyes like turmeric and indigo for my sustainable batik, ensuring eco-friendliness and cultural authenticity. My work was featured on 'Nuga Sewana' to highlight the value of preserving Sri Lankan traditions.'*

Respondent B: *'I introduced brush and broom packaging in Sri Lanka while preserving cultural heritage. After 10 years abroad, I saw the value of our traditions to the world and opened a local brand showroom in One Galle Face Mall.'*

Respondent E: *'I noticed that the traditional ekel brooms were slowly being replaced by plastic ones, which harm the environment and lack the charm of our cultural heritage. I decided to innovate sustainably, ensuring that the production process was completely eco-friendly.'*

These commentaries postulate the concept of subjective norms within the Theory of Planned Behaviour, where the influence of social pressure from community members plays a role in shaping entrepreneurial choices (Ajzen, 1991). An important aspect of the creative sector is the engagement of traditions and cultural heritage, since it provides a space for creators to innovate. Social entrepreneurs use these traditions as the basis for creating products that consumers recognise and understand as authentic and culturally tangible, as stated by Respondent B. When these entrepreneurs combine traditional practices into modern-day products and services, both cultural memory and market ubiquity increase the value of cultural heritage. Hesmondhalgh (2013) claims that products with cultural meaning can yield experiential value, a global value of authenticity, and cultural diversity. Similarly, Peredo and McLean (2006) illustrate that conserving culture is a crucial element for social entrepreneurs, especially in creative industries.

Meanwhile, in Sri Lanka, the handicrafts entrepreneurs held similar insights to these findings but remain lacking in the intersection with social entrepreneurship (Hafsa et al., 2023). Hence, this showed a clear gap between motives for social entrepreneurship in the Sri Lankan creative industry and added a new contribution to existing literature. These major findings are extended from previous research (Hafsa et al., 2023; Tandon et al., 2023). By showing that in growing cultural economies, creativity is not just about making art, it becomes a moral and social action. It connects how artists see themselves with how they help change society. This offers a better understanding of why social entrepreneurs are motivated and lays the groundwork for developing new theories about creative industries.

Intrinsic passion for creativity

Creativity is the ability to create novel and useful ideas by thinking differently and getting out of routine patterns. The importance of this passion for creativity serves as a driver of innovation and resilience among social entrepreneurs, suggesting that individuals passionate about creative expression are more likely to address social

challenges through artistic or cultural endeavours (Schulte-Holthaus, 2018). To derive this theme, the researcher analysed the respondent commentaries as follows.

Respondent A: *‘I’ve always been passionate about creativity since childhood. Even in school, I spent most of my time doing creative things and thinking outside the box. Today I solved social problems by using my creativity. That is why I started this business.’*

Respondent F: *‘I’m passionate about creating unique things that showcase my skills and potential. I think from the future and work in the present. This is called reverse engineering.’*

Respondent E: *‘Creativity is in my genes. I’ve always done art and crafts. As an entrepreneur, I believe creativity and innovation are essential. Starting a business based on my creative skills was a dream because I knew I had the potential to do something unique in this industry.’*

Three respondents, A, F, and E, identified passion for creativity as the primary motivation for social entrepreneurship. Respondent A stated that she had spent her whole life ‘doing creative things,’ and how this passion naturally extended into their business, whereas Respondent F explained that creating unique things using his creative skills. Like this, Ruskin et al. (2016) have identified that passion drives social entrepreneurial activities. Zahra et al. (2009) stated that entrepreneurs are commonly driven by the process of intensive involvement in the creative, enchanting process of innovative and creative innovation. Stosic-Mihajlovic and Nikolic (2017) highlighted the contribution of creative passion to social entrepreneurship, which is mainly in creative industries, where social entrepreneurs use their creative potential to solve social issues.

Moreover, Self-Determination Theory argues that people are most productive and satisfied when they engage in activities that align with their intrinsic motivations and passions. According to Deci and Ryan (2000), sustaining creativity requires an organisation of work conditions that promotes autonomy and intrinsic motivation. This has also been supported in the multidimensional model of social entrepreneurship in the sense that passion leads to social entrepreneurship in the creative sector (Agung et al., 2018).

Furthermore, it was stated that people who have passion are more likely to make progress. But not specifically mentioning the creativity in the Sri Lankan context (Mafasiya & Gunasinghe, 2023). Ultimately, this creative drive is the main source of motivation for people who wish to have a positive impact on society, emphasising the creative power that specific creative industries can have to create economic and social value, which has been overlooked in the existing literature on social entrepreneurship in the creative industry in Sri Lanka.

Orientation towards consumer well-being and happiness

Consumer well-being refers to the degree to which a product, service, or business model impacts mental, physical, emotional, and social consumer health. Social entrepreneurship in creative industries brings much-needed well-being to consumers by elevating the quality of life with innovative, socially responsible goods and premium value that is more than just money (Elkington & Hartigan, 2008). Respondent commentaries are as follows.

Respondent D: *‘My goal is not profit but people’s happiness. Even if I face a loss, I offer my products to bring joy. If someone isn’t satisfied, I redesign it to meet their needs.’*

Respondent G: *‘I want to give my product as ‘what they want’, not as ‘what I want.’ If they get any mental health from my product, that is my real happiness.’*

Respondent I: *‘Through Sustainable textiles, I would be able to enhance people’s quality of life. My fashion items make people feel good.’*

The perspectives of respondents D, G, and I emphasised the focus of their business away from profit and leveraging emotional and personal value to drive value creation, highlighting a people-based perspective. Specifically, respondent D prioritises happiness over profit, treating themselves as a commercial endeavour with not so much benefit to themselves but with benefits to the consumer as much as possible. These statements align with the literature that social entrepreneurs within this sector are acutely mindful of the opportunity to improve quality of life and contentment, indicating a movement away from the conventional business emphasis solely on financial gain towards one that prioritises beneficial social influences (Bacq & Janssen, 2011). The focus is on customer satisfaction and happiness as important driving forces in social entrepreneurship. Social entrepreneurs enhance their relationship with their audience and have a lasting impact on consumer loyalty and social value by creating products that prioritise the mental and emotional well-being of consumers (Akar & Doğan, 2018). Social entrepreneurship allowed for a pathway that was more self-directed, purposeful, and impactful (Zahra et al., 2009).

This approach aligns with theories of happiness and well-being in that if entrepreneurs emphasise human impact, their ventures can help build a more meaningful and emotionally enriching consumer experience with the product or service (Sharma, 2016). This theme is consistent with the related aspect of SDT, the need for meaningful connection with others and the attitudinal dimension of the TPB, where the perceived overall value of social good

determines entrepreneurial intentions. As Bacq and Janssen (2011) noted, participants highlighted human well-being and satisfaction as intrinsic rewards, implying that emotional connection to end-users is central to sustaining the social purpose of creative enterprises.

Ultimately, this theme emphasises that a social entrepreneur's motive is to redefine business success to include its impact on human happiness-that customer well-being is a business asset and a socially responsible outcome. Although evidence suggests that social entrepreneurial motivations exist in Sri Lanka, specific to this motive in creative industries in social entrepreneurship is scarce. Thus, this contributes novel insights into existing literature.

Commitment to address social issues

The desire to solve significant social problems often drives social entrepreneurship (Gandhi & Raina, 2018). In fact, in the creative industry, social entrepreneurs often seek to create change by addressing issues such as inequality, education, mental health, community development, and environmental issues (Hossain & Shamsuddoha, 2021). The current study presents how social entrepreneurs are motivated by this theme as follows.

Respondent F: *'I saw many social issues in Sri Lanka: suicides, divorces, harassment, and discrimination. Though people are educated, they struggle to face life's challenges. I started this business to create a positive change in response to these problems.'*

As per respondent F, she started the business to advocate for the burning social problems for positive social change as literature.

Stated (Gandhi & Raina, 2018). While Sri Lankan literature hosted a similar argument that social entrepreneurial orientation promotes the triple bottom line via dynamic capability and social innovation utilized and social entrepreneurs discover new creative methods to solve the most urgent social problems (Premadasa et al., 2023).

Further, respondent F stated that,

Even though we are schooled and get an education, we do not have the quality education to become real gentlemen. People do not have that mindset.

This motivation is essential as it highlights the unique role that the creative industry plays in fostering social dialogue and raising awareness. This highlights that, unlike traditional industries, the creative sector has a distinct power to influence public perception and evoke emotional responses through art, design, media, and storytelling (Hawkes, 2001). Similarly, this motivation holds great significance, aligning perfectly with the upward trend of businesses embracing the role of change-makers, a shift underscored by the research of (Doherty et al., 2006).

Besides, respondents address various burning social problems as below.

Respondent C: *'Environmental pollution makes an impact from the high spread of invasive plants like Japan Jabara, Ali mana. It is a threat to the environment. I need to address a social problem which was burning in society. I want to make a significant impact on society as a social entrepreneur.'*

Respondent G: *'I started the business to address key social issues like poverty, women's empowerment, and climate change. I'm passionate about Sustainable Development Goals (SDGs) and have completed nine related certifications.'*

The above statements proved that they became social entrepreneurs, neither seeking financial gain nor harming society, while considering sustainability. Existing literature stated that this approach emphasises that social entrepreneurship goes beyond economic gains to create shared value for both entrepreneurs and communities (Hockerts, 2010). In evidence to the Sri Lankan context, addressing social problems drives the social entrepreneurs, but it lacks the specification into the creative industry (Mafasiya & Gunasinghe, 2023).

Dissatisfaction with conventional employment

Dissatisfaction with traditional employment, restrictive creativity, lack of fulfilment, and hierarchical structures leads many people in the creative sector to pursue social entrepreneurship. The insights from respondents as below.

Respondent A: *'When I was doing a job, I was stuck at eight to five. I was frustrated after doing a job for more than 10 years. Now I am pretty much satisfied with what I am doing right now.'*

Respondent E: *'I worked at Sirasa TV for over 15 years with a good package, but I realised it wasn't my true path. I wanted more freedom and to reach my full potential.'*

Respondent F: *'I've worked in software, computer engineering, consulting, and lectured at the Open University while also engaging with a Non-Government Organization (NGO). With experience in both public and private*

sectors, I felt I had more to offer and grew frustrated with the limitations of permanent employment.'

In the respondents' comments, there are clear sentiments of frustration with existing employment conditions that led to thinking about social entrepreneurship (Ruskin et al., 2016). Respondents E and F perceived that having a conventional job was stifling and did not fit in line with their own goals.

According to the available literature, this has been reported using the life stories approach in which the author conducted interviews with a sample of 18 social bricoleurs or micro-level social entrepreneurs comprising 8 countries to understand reasons for initiating social entrepreneurship. Some such motivations included pull factors: an awareness of social injustice or push factors: job dissatisfaction (Yitshaki & Kropp, 2011). Social entrepreneurs often seek to break free from profit-driven models, aiming to balance personal satisfaction with societal impact, driven by dissatisfaction with traditional work environments (Zahra et al., 2009).

The Sri Lankan study showed that both work and life experiences drive social entrepreneurs to create social enterprises. yet the participants have not explicitly highlighted the frustration with conventional employment (Mafasiya & Gunasinghe, 2023).

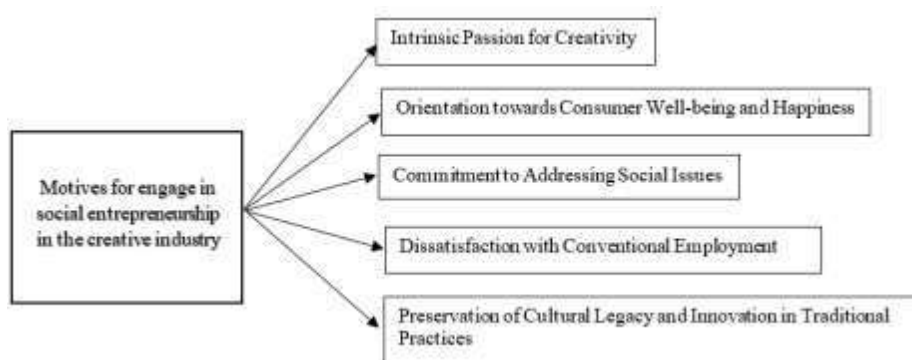
Although work-related experiences were seen as the driving force behind social entrepreneurship, they didn't clearly express the dissatisfaction directly (Ahrari et al., 2019). According to the Self-determination theory, clear that the dissatisfaction with working in a traditional workplace or bureaucratic constraints led social entrepreneurs to seek their goals (Tandon et al., 2023). But it was generally indicated that creative industries are not specifically mentioned. The reviewed literature mostly indicated that many scholars found their previous career to be positively impacting their social entrepreneurial journey, though there are a few contributing researchers driven by job dissatisfaction to take up a social entrepreneurial journey.

Based on these research findings, this study proposes a model as follows.

Proposed model of the study

Figure 1- By examining the motives of social entrepreneurs in the creative industry in Sri Lanka, this model was proposed for this study, which emphasises the need to understand a developing country with a multitude of social problems. This describes that there are five major motives that affect the motives for engagement in social entrepreneurship in the creative industry as follows. These various motivations are connected and work together to influence entrepreneurial activity. External factors like support from institutions, market conditions, and societal demands can affect how these motivations operate. Although the model is based on qualitative insights and isn't statistically generalizable, it offers a strong conceptual basis for future research, especially for testing these relationships with quantitative methods. This study provides a novel theoretical framework to an under-researched area that adds to the existing body of literature on social entrepreneurship in creative industries in Sri Lanka.

Figure 1:
Proposed model for the study



(Source: Developed by authors based on literature (2025))

Conclusion and Future Research Agenda

Social entrepreneurship delivers social impact and economic value across the globe. Meanwhile creative industry is becoming more popular through its contribution to the economy and unique business models. Studies on the interrelationship of social entrepreneurship and the creative industry are yet to be explored in developing countries, specifically concerning Sri Lanka. Consequently, the current study addresses the above theoretical gap,

focusing on the social entrepreneurs' motivations around the triangle of creative industry, which gives a great contribution to the economies, offering a crucial, context-specific field primarily focused on developed economies. This study investigated the passion towards creativity, enhancing well-being and happiness, efforts towards resolving socially oriented problems, dissatisfaction with traditional employment, promoting the revival of culture, empowering communities, and contributing to economic development and growth. The overlap of Sri Lanka's creative sector provides an exciting opportunity for social entrepreneurship. Social entrepreneurs in this space are not only driven by international factors but are rather locally based, as they harness their enterprises as opportunities to safeguard and utilise their culture while also engaging with pressing social issues today. This continually shapes the value of the economy and enables greater solidarity in the creative industry.

In this study, several theoretical contributions have been made. This study provides a contribution to existing research and a basis for future empirical research surrounding this nascent area of study. Accordingly, the model outlined here provides an initial step for future research in this area. It explains the approaches applied by social entrepreneurs in a developing nation to manage them via motives to engage in social entrepreneurship in the creative industry. Empirical studies on social entrepreneurship can be used as a testable hypothesis. Those dearth areas are covered by the current study. Thus, this study addresses the key gaps above-mentioned in the literature. Therefore, these implications show that the current study has shown the significance of theoretical implications to literature.

When considering the practical contribution of the study, this offers actionable insights for multiple parties. First, an understanding of the concept of social entrepreneurship is crucial for the government and policymakers to tackle burning social problems in the country. Second, the study's proposed model would have an impact on policy development by implementing various programs to support social entrepreneurship. Furthermore, the study recommends several recommendations for the respective authorities. Social entrepreneurs within the creative industry have the capacity to lead to innovative solutions for societal problems, cultural revival, community empowerment and economic growth, not only helping solve societal concerns, but also for the sake of the country's growth. As findings revealed, creative social entrepreneurs in the industry especially gain attention for their environmental responsibility as well. Hence, institutional support is strategically aligned with these motivational dimensions. Through the encouragement of collaboration and the development of strong supporting structures, stakeholders can realise the transformative power of creative social entrepreneurship for sustainable economic and societal change.

While providing rich, novel data, this study is subject to limitations inherent in its design. The qualitative study primarily focuses on social entrepreneurs in Sri Lanka's creative industry, highlighting limitations in generalisation. The study used a selection of participants, which could have caused selection bias. This study is cross-sectional and contains interviews. However, longitudinal studies could provide more valuable data using ethnography to accustom themselves to the development of these enterprises over a long period. While studying is subject to the creative industry and subjective, future research could attempt to replicate the study in other industries or use triangulation methods and quantitative validation of the proposed model. In addition, the study is limited to Sri Lanka, and future research could be conducted in other countries to look at differences between demographic factors, such as gender, in the creative industry, thus prolonging the comprehension of social entrepreneurial behaviour in this nascent sector.

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ENTREPRENEURIAL PERSONALITY TRAITS AND DEVELOPMENT OF ENTREPRENEURIAL SKILLS AMONG FARMERS IN KNUCKLES REGION, SRI LANKA

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Abstract

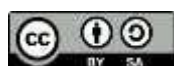
In recent years, entrepreneurship has played a critical role in adapting and innovating for the sustainable livelihoods of farming communities, particularly in developing countries like Sri Lanka. Farmers' entrepreneurial traits, including self-confidence, entrepreneurial interest, commitment, innovation ability, and leadership, influence the adoption of new practices. However, there is a lack of validated scales to assess these traits within the Sri Lankan context. This study primarily aimed to develop and validate a scale, secondarily to examine the influence of entrepreneurial traits on the skills of smallholder farmers. A cross-sectional study was conducted among 203 smallholder farmers in the Knuckles region of Matale District, Sri Lanka. Exploratory Factor Analysis (EFA) was carried out through Principal Component Analysis (PCA) followed by Confirmatory Factor Analysis (CFA) to establish the validity of the proposed measurement model. CFA indicated a satisfactory model fit with robust validity and reliability measures. Greater Cronbach alpha values for the measurements clarified that the obtained factors were reliable for measuring entrepreneurial traits. Apart from that, the convergent and discriminant validity of the scale was also established to assess its validity. The results of predictive validity revealed that personality traits like leadership and innovative ability had a significant impact on the skill levels. The findings highlight the need to strengthen these traits through targeted training and capacity-building initiatives to enhance farmers' practical skills and promote resilient, innovative-driven agricultural communities.

Keywords: Entrepreneurial skills, entrepreneurial traits, scale validation, smallholder farmers

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DOI:

Introduction

Agriculture is a vital component of the rural economy in developing countries and remains a primary source of livelihood for a significant proportion of Sri Lanka's population. In regions such as the Knuckles range of the Matale district, smallholder farming is a dominant economic activity that supports both household income and local food security. However, traditional subsistence-based farming systems are increasingly challenged by limited resources, market competition, and the impacts of climate change. To ensure sustainability and resilience, farmers are required to move beyond conventional practices and adopt an entrepreneurial mindset that enables innovation, market responsiveness, and effective decision-making. Entrepreneurial behaviour among farmers has therefore emerged as a crucial strategy for improving productivity, income stability, and rural development. Accordingly, farmers exhibiting entrepreneurial traits are more likely to innovate, adapt to market changes, and make sound judgments that improve farm performance (Gunathilaka & Samarakoon, 2021; Manuja et al., 2022). However, farmers' practical skill level, which includes financial planning, marketing, communication, and customer service, is frequently influenced by entrepreneurial traits (Rosairo & Potts, 2016). The Knuckles region of Sri Lanka's agricultural sector is an excellent study location for investigating the relationship between entrepreneurial personality traits and skill development among farmers. Specifically, this study aims to identify the key entrepreneurial personality traits of smallholder farmers, to examine their influence on entrepreneurial skill development, and to validate these relationships through Confirmatory Factor Analysis (CFA) and SEM. The findings are expected to offer practical insights for policymakers, development organisations, and agricultural extension services by providing a validated tool to assess entrepreneurial traits and inform the design of training programs, leadership development initiatives, and entrepreneurship support schemes.

Literature Review

It has been demonstrated that several entrepreneurial traits, including self-confidence, entrepreneurial interest, leadership, innovativeness, and commitment, have a significant impact on farmers' practical skill levels, particularly in areas such as financial planning, marketing, communication, and customer service. Fostering a more entrepreneurial agricultural sector requires understanding how these attributes interact with their practical ability. According to recent research findings, entrepreneurs' decision-making skills and general efficacy in various agricultural operations are significantly shaped by their level of self-confidence (Dong et al., 2022). High levels of self-efficacy have been linked to improved performance in entrepreneurial endeavours and offer a solid basis for efficient resource management and financial planning (Naminse & Zhuang, 2018). Those with greater levels of commitment also typically take a more active role in creating business plans and strategies necessary for profitability (Pindado & Sánchez, 2017).

Additionally, commitment directly contributes to a greater awareness of market dynamics and the development of positive client relationships, which are critical for agricultural entrepreneurial success. Farmers who view themselves as entrepreneurs are more likely to implement proactive marketing. Plans and customer service programs enhance their overall business success (Álvarez et al., 2021).

Another crucial entrepreneurial trait influencing practical skill levels is innovation ability. Innovative farmers investigate several revenue sources and implement contemporary business strategies, such as integrating technology into farming operations (Waqingah et al., 2022). Similarly, Etriya et al. (2019), confirmed that innovative farmers perform well in both financial and operational measures.

Leadership promotes cooperation and a group approach to problem-solving in farming communities, which are critical for effective market participation and customer service (Pliakoura et al., 2020). This emphasises the importance of providing farmers with leadership skills as part of their entrepreneurial training (Sher et al., 2019).

Entrepreneurial interest has a substantial impact on practical skill development. Research shows that farmers with a strong interest in entrepreneurship are more likely to participate in training programs that increase their managerial skills, such as financial literacy and market analysis. (Li et al., 2022).

Furthermore, several studies show that instruction can improve farmers' communication skills and customer service practices, revealing a strong correlation between education, entrepreneurial qualities, and practical skill development (Tonner & Wilson, 2015). Therefore, a strong entrepreneurial attitude also improves marketing strategies and customer service methods, which are crucial for maintaining productivity improvements (Yang et al., 2022). Studies also reveal that self-confidence and commitment greatly improve financial planning skills. The importance of networking in developing entrepreneurial capabilities cannot be overstated. Networks provide access to information, resources, and collaborative opportunities required for skill enhancement (Manuja et al., 2022). Overall, previous studies highlight the importance of entrepreneurial traits for farmers, but inconsistencies in findings and the absence of a validated, context-specific scale in Sri Lanka, particularly in the Knuckles region, create a clear gap that this study addresses through scale development.

Research Methodology

The current study was conducted to validate the entrepreneurial scale and explore the impact of entrepreneurial traits on entrepreneurial skills of smallholder farmers who live in the Knuckles region, Matale, Sri Lanka. The constructs were selected referring to the existing literature and modified for the dimensions of entrepreneurial characteristics derived in the conceptual framework: Self-Confidence, Commitment, Entrepreneurial interest, Innovation Ability and Leadership. For predictive validity, a set of items for the group farmers' Skill Level was included in the questionnaire. Then, a cross-sectional survey was conducted using face-to-face interviews. The research followed an exploratory phase for scale validation and an explanatory phase to test relationships among variables. Stratified random sampling methods were used, representing 11 GN Divisions, and two hundred three samples responded to the survey, out of which 176 replies were found to be eligible and are included in the study. The majority (79.5%) of respondents were over 45. Male respondents made up 33.3% of the sample, while female respondents made up the majority (66.7%). 54.1% of the farmers were full-time farmers, and more than half (54.9%) reported earning less than 5 lakh per year. 45.4% of respondents had more than 25 years of farming experience. Informed consent was obtained from each respondent they had to rate their responses on a five-point Likert scale. Data analysis was done using IBM SPSS version 23 and IBM AMOS version 23.

Results

Validation of the entrepreneurial scale

Exploratory factor analysis (EFA)

EFA transforms a large set of variables into a smaller number of factors based on their patterns of correlations, enabling the finding of the structure of interactions between items without forcing an established model. (Olkin & Sampson, 2001). EFA was conducted on 23 items, and Kaiser-Meyer-Olkin (KMO) Measures of Sampling Adequacy and Bartlett's Test of Sphericity confirm that the dataset is appropriate for factor analysis. The KMO value should exceed 0.5, and the significance level for Bartlett's Test of Sphericity should be ($p < 0.05$) (Osborne, 2014). Principal Component Analysis (PCA) was used in conjunction with varimax rotation. All the measures have substantial communalities ranging from 0.60 to 0.95 Table. 1. According to Hair et al., the minimum cut-off criteria for item deletion were less than 0.5 factor loadings.

Table 1
Factor extraction results

Variables and Constructs			Factor Loading
Self confidence	I am confident about my abilities	SC1	0.789
	I can handle challenges successfully	SC2	0.838
	I am confident in my decision-making ability	SC3	0.853
	I am confident I can achieve my goals	SC4	0.796
	I to lead others	SC5	0.661
Commitment	I complete what I start	CO1	0.717
	I work hard to achieve objectives	CO2	0.841
	pay attention to all details	CO3	0.800
	I persist despite obstacles	CO4	0.862
	I fulfil my responsibilities	CO5	0.784
Entrepreneurial interest	I have plans to start my own business	EI1	0.843
	I prefer being an entrepreneur to being an employee	EI2	0.754
	I actively seek business opportunities	EI3	0.898
	I have a strong determination to start a business	EI4	0.912
Innovation Ability	I prefer trying new methods over existing ones	IA1	0.873
	I seek new ways to improve processes	IA2	0.906
	I am interested in new technology and methods	IA3	0.908
	I like to try new approaches	IA4	0.916
	I seek novel solutions for problems	IA5	0.873
Leadership	Others recognise me as a leader	LD1	0.906
	I can guide others towards goals	LD2	0.885
	I take the lead in group activities	LD3	0.890
	I make important decisions confidently	LD4	0.679

(Source: Authors, based on survey results)

Confirmatory factor analysis

CFA is typically performed as part of SEM and allows testing the convergent, discriminant, and construct validity of measurement instruments. Then, CFA was conducted to confirm the data structure. No items were removed, and the threshold for factor loadings was considered >0.5 (Hair et al., 2018).

Reliability and validity analysis

All constructions were reliable according to the Cronbach's alpha values, as their individual composite reliability (CR) values are higher than the recommended 0.7 value. (Hair et al., 2018). Furthermore, construct validity was analysed by estimating Cronbach's alpha (CA). All the CA values are closer to 0.9, affirming that the internal consistency of constructions was achieved. (Hussey et al., 2025) (Table 2) Average Variance Extracted (AVE) is another measurement that is used to analyse the convergent validity. AVE values for all constructs exceeded the suggested threshold of 0.50 (except self-confidence), indicating that the constructs account for a significant proportion of variance rather than error (Peterson et al., 2020). AVE for self-confidence is marginally below the 0.50 threshold; the construct was retained as its composite reliability (0.87) and factor loadings (>0.66) indicate adequate convergent validity (Hair et al., 2019). Thus, the measurement model demonstrates satisfactory convergent validity across all constructs (Table 2).

Table 2
Results of the measurement model

Construct	CA	CR	AVE
Self Confidence	0.833	0.8667	0.4950
Commitment	0.856	0.8796	0.5956
Entrepreneurial interest	0.875	0.8800	0.6506
Innovation Ability	0.938	0.9390	0.7556
Leadership	0.864	0.8752	0.6438

(Source: Authors, based on survey results)

Further, the Heterotrait-Monotrait (HTMT) method was used to assess Discriminant Validity (DV). DV was assessed to determine how effectively a latent variable differed from other latent variables. It indicates that a hidden variable should account for more of the variance in its indicators than in other constructs or external factors. Since all the HTMT ratios are less than 0.9 (Table 3), no discriminant validity issues are likely present in the model (Hair et al., 2018).

Table 3
Discriminant validity matrix

	LD	IA	EI	CO	SC
Leadership (LD)					
Innovation Ability (IA)	0.4803				
Entrepreneurial interest (EI)	0.4033	0.7242			
Commitment (CO)	0.4834	0.4542	0.4363		
Self Confidence (SC)	0.5630	0.4751	0.4617	0.8866	

(Source: Authors, based on survey results)

Model fit

Goodness-of-Fit measures can be categorised into Absolute Fit Indices, Incremental Fit Indices, and Parsimonious Fit Indices. Absolute fit indices were calculated using the Root Mean Squared Approximation (RMSEA) value and the Expected Cross-Validation Index (ECVI). The following Incremental Fit Indices were used: Comparative Fit Index (CFI), Tucker Lewis Index (TLI), Normed Fit Index (NFI), and Incremental Fit Index (IFI). Parsimonious Fit Indices were calculated using the CMIN/df value and the Parsimonious Normed Fit Index (PNFI) (Khairi et al., 2021). The recommended cut-off values for the above indices are mentioned along with the values obtained in Table 3. Based on the results, all these indices collectively suggest that the

model demonstrates good construct validity with a satisfactory fit for most of the considered indices. However, only NFI shows a lower value than the acceptable cut-off. This difference could be attributed to the small sample size ($n = 176$) and model complexity; However, this tiny deficiency does not significantly weaken the overall validity of the model, as other indices are at a better fit.

Table 4
Model fit indices

Indices	Value	Acceptable limit	Reference
RMSEA	0.075	<0.08	(Hair et al., 2018)
CFI	0.926	≥ 0.90	
TLI	0.915	≥ 0.90	
NFI	0.863	≥ 0.90	
IFI	0.927	≥ 0.90	
PNFI	0.750	> 0.50	
ECVI	3.129	<Saturated model value (3.018)	
CMIN/df	1.980	1-3	(Hair et al. 2010)

(Source: Authors, based on survey results)

Discussion

SEM was utilised to assess the survey instrument's predictive validity. Skill levels were used as the dependent variable to find the predictive validity of the tool since entrepreneurial traits were predicted according to the literature. The SEM model gave an R^2 value of 0.20 for skill levels. This relatively low R^2 indicates that additional contextual factors, such as access to capital, extended support, and market exposure, etc., may influence entrepreneurial skills. The significance values and standard regression coefficients for each construction are reported in Table 5. According to the findings, leadership has the most significant influence on skill levels ($r = 0.129$, $p = 0.008$) at the 5% significance level; meanwhile, innovation ability also shows a significant impact ($r = 0.107$, $p = 0.073$) at the 10% significance level. According to Isah et al. (2019), effective leadership generates an environment of collaboration and shared learning, which is critical for advancing agricultural skills (Isah et al., 2019). Furthermore, leadership skills are highly connected with productivity among farmers, implying that motivated and effective leaders improve farmers' ability to complete various operational tasks efficiently (Olagunju et al., 2021). Baliyan et al. (2018) also found a direct correlation between leadership excellence and improved managerial and operational capacities in agricultural techniques (Baliyan et al., 2018). Gardezi and Arbuckle (2018) claim that farmers with innovative thinking are more likely to face problems and uncertainties, particularly in climate change adaptation. Their ability to innovate fuels the development of practical abilities required for effective resource management, financial planning, and marketing tactics (Gardezi & Arbuckle, 2018). Innovative farmers who participate in new technologies and approaches are likely to build a varied skill set, allowing them to negotiate multiple market settings to negotiate multiple market settings efficiently. In contrast, self-control, commitment, and entrepreneurial interest did not significantly impact skill level since they did not reach statistical significance. According to Rosairo & Potts (2016), the availability of resources and opportunities major significant influence on improving skill levels, rather than entrepreneurial interest or related personal traits (Rosairo & Potts, 2016). Moreover, the low correlation between self-control, commitment, and entrepreneurial interest and farmer skill levels can be associated with a complicated interaction of individual traits, specific limitations, and broader socioeconomic environments that do not promote the development or application of these skills in traditional farming settings (Fidelugwuowo, 2022). Some methodological limitations should be considered. The AVE for self-confidence (0.495) is slightly lower than the recommended 0.50 threshold. The model's NFI (0.863) and R^2 (0.20) show potential for improvement. These modest limitations highlight the need for further investigations with larger samples and additional explanatory factors to improve model fit and predictive power.

Table 5
Influence path

Influence path	Regression coefficient	p value	Decision
Self-Confidence → Skill Level	0.118	0.518	Not supported
Commitment → Skill Level	-0.135	0.476	Not supported
Entrepreneur Interest → Skill Level	-0.015	0.774	Not supported
Innovation Ability → Skill Level	0.107	0.073*	supported
Leadership → Skill Level	0.129	0.008**	supported

*Significant at 10%; **significant at 5%

(Source: Authors, based on survey results)

Conclusion

Minimal studies have been conducted in the local context to evaluate the entrepreneurial traits among farmers. Therefore, this study created and validated a five-factor scale to assess entrepreneurial attributes among smallholder farmers in Sri Lanka, including self-confidence, commitment, entrepreneurial interest, innovative ability, and leadership, and investigated how these traits influence entrepreneurial skill levels. The validated model showed high psychometric qualities, and structural analysis proved that leadership and innovation ability greatly improve farmers' entrepreneurial skills, accomplishing the study's goals. The findings contribute to advancing theory by providing a credible, context-specific instrument for assessing entrepreneurial qualities in agricultural settings, as well as practice by giving insights for policymakers, extension workers, and training organisations. Using this scale, stakeholders can identify farmers with strong leadership and inventive capabilities to design tailored training that improves decision-making and market adaptability. Although the study provides useful insights, it is limited to a single geographic location and only explains 20% of the variation in skill levels, implying that other contextual factors, such as financial availability and institutional support, may also influence outcomes. Future research could broaden this study to include different geographies and demographics, make cross-cultural comparisons, and use longitudinal designs to follow how entrepreneurial traits build abilities over time. Overall, this study fills a gap between entrepreneurial psychology and agricultural development by introducing a proven instrument and practical framework for encouraging innovation-driven, resilient, and opportunity-oriented farming communities in Sri Lanka.

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CLOUD COMPUTING ENABLED BUSINESS MODEL INNOVATION FOR RETAIL SMES: A DIFFUSION OF INNOVATION BASED SYSTEMATIC LITERATURE REVIEW

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Abstract

Cloud computing has become a transformative driver of Business Model Innovation (BMI), yet its strategic role in retail small and medium-sized enterprises (SMEs) in developing economies remains underexplored. This study addresses this gap by applying the Diffusion of Innovation (DOI) theory to examine how cloud adoption enables BMI within Sri Lankan retail SMEs, a context characterised by infrastructural constraints, policy gaps, and varying managerial readiness. Through a systematic literature review of peer-reviewed studies, six enabling factors are identified: relative advantage, organisational readiness, cost, top management support, government support, and trialability. The study extends DOI theory by situating these adoption drivers within a developing-economy setting, highlighting how environmental and institutional factors reshape classical DOI attributes. Practically, the framework offers guidance for SME managers seeking digital transformation and for policymakers designing targeted incentives and infrastructure development to foster cloud-enabled innovation.

Keywords: Business model Innovation, cloud computing, diffusion of innovation, retail sector, small and medium enterprises

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DOI:

Introduction

In today's global business environment, rapid technological advancement has emerged as a decisive factor influencing competitiveness, agility, and innovation (Salleh & Hussin, 2016). Firms across industries face constant pressure to adapt and evolve in response to shifting market dynamics and increasing customer-driven expectations (Ayoobkhan & Asirvatham, 2017). Among the many digital technologies shaping this transformation, cloud computing has gained prominence as a key enabler of strategic innovation (Ayoobkhan, 2019). It offers benefits such as cost reduction, scalability, and improved operational efficiency, enabling organisations to remain agile and competitive in volatile market conditions (Salleh & Hussin, 2016; Shetty & Panda, 2021). The impact of cloud computing is particularly evident in retail, where it supports real-time inventory management, personalised marketing, data-driven pricing, and omnichannel customer engagement (Suciu et al., 2014). These applications enhance operational flexibility and enable firms to innovate their business processes and customer interactions.

To respond to such evolving conditions, organisations increasingly turn to Business Model Innovation, which involves reconfiguring how value is created, delivered, and captured, often through shifts in structure, processes, and stakeholder engagement (Chesbrough, 2010). In retail, Business Model Innovation (BMI) strategies powered by cloud technologies integrate mobile commerce, personalisation, and analytics to meet the needs of digitally empowered consumers (Dutta & Sandhane, 2022; Jocevski, 2020). Despite these global advancements, small and medium-sized enterprises (SMEs) in Sri Lanka lag in digital transformation (Kapurubandara & Lawson, 2006). Small and medium-sized enterprises contribute approximately 45% to total employment and 52% to Gross Domestic Product (GDP) (Nawaz & Thelijagoda, 2025) but face constraints such as limited infrastructure, insufficient government support, low digital literacy, financial barriers, and weak organisational readiness (Ayoobkhan, 2019; Gunawardana & Wedasinghe, 2021). Only 31% of online-business SMEs regularly use cloud computing, with most relying on in-house systems or local outsourcing (Ayoobkhan, 2019).

The adoption of cloud computing in SMEs can be examined using established models such as the Technology Acceptance Model (TAM) and the Technology-Organisation-Environment (TOE) framework, which highlight factors such as organisational support, readiness, and environmental influences (Skafi et al., 2017). This systematic literature review adopts the Diffusion of Innovation (DOI) theory alongside the BMI perspective to identify enabling and inhibiting factors influencing cloud adoption in retail SMEs. While prior studies have explored cloud adoption in general SME contexts, there remains a limited understanding of how cloud computing specifically drives business model innovation in retail SMEs within developing economies such as Sri Lanka. Addressing this gap, the study examines how DOI attributes shape the relationship between cloud adoption and business model innovation, offering both theoretical clarification and practical insights for digitally lagging retail sectors. Therefore, this study investigates how cloud computing adoption, guided by DOI attributes, enables business model innovation in Sri Lankan retail SMEs.

This study is significant because it provides a structured understanding of how cloud computing can drive business model innovation in Sri Lankan retail SMEs a sector that forms the backbone of the national economy yet remains digitally under-leveraged. The insights generated can help SME owners and policymakers formulate evidence-based strategies to enhance digital readiness and competitiveness. By contextualising the DOI theory within a developing-economy setting, the study also advances theoretical understanding of innovation diffusion under infrastructural and institutional constraints.

Theoretical foundation

The DOI theory, developed by Rogers (2003), provides a robust framework for understanding how innovations such as cloud computing are adopted and how this adoption supports BMI in retail SMEs. DOI conceptualises adoption as a process involving awareness, persuasion, decision-making, implementation, and confirmation. Its applicability is particularly relevant in emerging market contexts, where adoption dynamics are shaped by both technological potential and local constraints. DOI identifies five key innovation characteristics influencing adoption: relative advantage, compatibility, complexity, trialability, and observability (Rogers, 2003). In Sri Lankan retail SMEs, relative advantage includes cost savings, operational efficiency gains, and improved customer service capabilities (Nuskiya, 2017), often linked to reduced infrastructure costs and better data access (Nawaz & Thelijagoda, 2025). Compatibility with existing business practices is essential to avoid disrupting established customer relationships. Complexity remains a challenge, as many SME owners lack the technical expertise required for seamless adoption. Trialability enables experimentation with limited features before full-scale adoption.

DOI also categorises adopters into innovators, early adopters, early majority, late majority, and laggards (Rogers, 2003). In Sri Lanka, innovators are typically tech-savvy entrepreneurs in urban areas adopting point-of-sale and e-commerce solutions, while early adopters are forward-thinking SME owners with the resources to implement new systems. The early majority adopts after observing proven benefits and reduced risk, often influenced by peer networks and government initiatives (Nawaz & Thelijjagoda, 2025). The late majority adopts under competitive or economic pressures, and laggards remain resistant to change. Communication channels and social systems are central to the DOI's application. In Sri Lanka, personal networks, industry associations, and government programs facilitate knowledge sharing (Amaradiwakara, 2016), while digital media increasingly reach younger entrepreneurs. Cultural tendencies toward relationship-based trust and risk aversion influence adoption, with opinion leaders and early adopters serving as change agents (Nawaz & Thelijjagoda, 2025).

DOI's integration with the TOE framework captures the role of technological, organisational, and environmental influences on adoption (Nawaz & Thelijjagoda, 2025). Similarly, the TAM aligns with DOI's relative advantage and complexity dimensions by emphasising perceived usefulness and ease of use. Together, these perspectives provide a comprehensive lens for examining how cloud-enabled BMI adoption in Sri Lankan retail SMEs is shaped by innovation attributes, organisational capacities, and user perceptions (Amaradiwakara, 2016).

Methodology

This study adopts a theory-driven Systematic Literature Review (SLR) approach to examine the enabling aspects of cloud computing that support BMI in retail SMEs, using the DOI theory as the guiding framework. The review addresses the research question: What potential aspects of DOI theory enable cloud computing to support business model innovation? The methodology follows a six-phase process adapted from established innovation and information systems research frameworks (Cong-Lem et al., 2025; Urquhart et al., 2025).

Phase 1: Mapping the field through a scoping review

A preliminary scoping review was conducted to understand the research landscape on cloud computing adoption and its role in enabling BMI in SMEs. This involved identifying key publications, frequently cited frameworks such as the DOI, TOE, and TAM, and recurring themes such as scalability, cost efficiency, and innovation capability. The insights gained informed the search string, keyword refinement, and the development of inclusion/exclusion criteria.

Article inclusion criteria

Table 1
Article inclusion criteria

No table of figures entries found.	Inclusion Criteria
Type of Publication	Peer-reviewed Journal Articles indexed in Scopus
Language(s)	English
Research Design	Conceptual and Empirical
Content	Studies related to Cloud Computing and SMEs
Source	Scopus Database

(Source: Developed by authors based on literature (2025))

Phase 2: Comprehensive search

Only peer-reviewed journal articles indexed in SCOPUS were accepted, consistent with recommendations by the author Prancutė, who identifies SCOPUS and Web of Science as the most comprehensive databases for bibliometric reviews. The initial search term 'Diffusion of Innovation' returned 38,051 records. Refinement to journal articles reduced this to 25,789, and filtering by 'Diffusion of Innovation' as an exact keyword yielded 12,266 records. Applying a domain-specific filter targeting the retail context narrowed the results to 169 articles. The final search string used was: (TITLE-ABS-KEY (diffusion AND of AND innovation)) AND (retail) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (EXACTKEYWORD, "Diffusion of Innovation")). Titles and abstracts were manually screened to identify studies addressing cloud computing, SMEs, and/or BMI in conjunction with DOI constructs, resulting in a shortlist of 39 articles.

Phase 3 and 4 - Quality assessment and data extraction

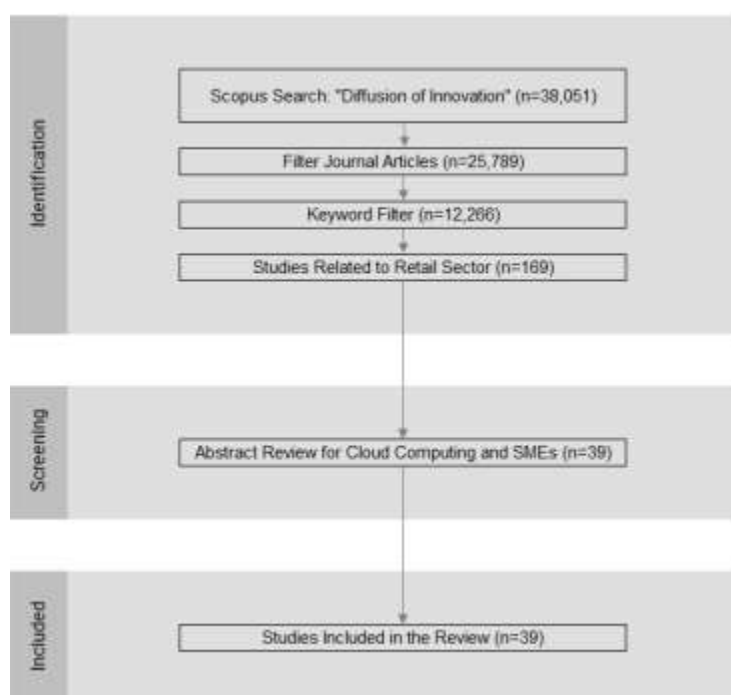
Only peer-reviewed, Scopus-indexed articles were included to ensure methodological quality. Titles and abstracts of the 169 retrieved studies were assessed for alignment with cloud computing, SMEs, and/or BMI in conjunction with the DOI theory. This process resulted in a final dataset of 39 articles deemed methodologically sound and conceptually relevant. Following Braun and Clarke's (2006) thematic approach and Cong-Lem et al. (2025), each article was reviewed to identify factors showing how cloud computing enables SMEs to innovate

their business models. Recurring themes were mapped to DOI attributes, with extraction conducted independently and cross-checked to ensure consistency, reduce bias, and maintain quality.

Phases 5 and 6: Data synthesis and write-up

From the extracted factors, the most appropriate ones were selected through expert opinions obtained from 3 companies generating over LKR 10 million in monthly revenue and providing cloud solutions to Sri Lankan SMEs. Top-level employees, such as owners and managers, were selected as experts. Six key factors were identified: relative advantage, organisational readiness, cost, top management support, government support, and trialability. These were organised according to DOI attributes and used to develop a framework illustrating how cloud computing supports BMI in retail SMEs. The framework was validated through the same expert review for relevance and applicability in the Sri Lankan context, providing both theoretical contributions and practical guidance for SME owners, policymakers, and technology advisors.

Figure 1:
Article selection process (PRISMA flow diagram)



(Source: Developed by authors based on literature (2025))

Findings

Relative advantage

Relative advantage, central to DOI theory, measures the degree to which an innovation is perceived as better than the system it replaces (Boonsiritomachai et al., 2016). In the context of cloud computing, benefits include scalability, operational efficiency, broader market access, and enhanced decision-making (Oliveira & Martins, 2010a; Ruivo et al., 2012). SMEs are more likely to adopt when such benefits clearly outweigh perceived risks and costs. For example, Thai SMEs reported faster decision-making and improved information accuracy with cloud-based BI systems, driving full adoption (Boonsiritomachai et al., 2016), while Portuguese and Spanish SMEs valued ERP's lower initial investment and better data integration (Ruivo et al., 2012). In retail, cloud-enabled tools support omnichannel sales and digital loyalty programs, leading to new revenue channels (Hu & Cao, 2018; Banerjee & Seetharaman, 2022). In developing markets, relative advantage is magnified, as seen in the UK's rural SMEs adopting pay-per-use cloud models to overcome resource constraints (Alshamaila et al., 2013). For Sri Lankan SMEs, where infrastructure gaps and high competition prevail, perceived advantage must be compelling to justify switching from legacy systems (Peltier et al., 2012). Its repeated empirical validation across sectors strengthens its inclusion in the framework for cloud-enabled business model innovation.

Organisational readiness

Organisational readiness reflects an SME's preparedness in technology, resources, and culture to adopt innovations. Within the DOI theory, it relates strongly to compatibility and complexity, as higher readiness reduces perceived difficulty and ensures smoother integration. In the cloud computing context, readiness includes robust IT infrastructure, sufficient financial and human resources, and openness to change (Ruivo et al., 2012; Oliveira & Martins, 2010a). Studies show SMEs with advanced technological capabilities are more likely to adopt and sustain cloud-based services (Oliveira & Martins, 2010a; Alshamaila et al., 2013). Ruivo et al. (2012) further demonstrated that readiness not only facilitates adoption but also enhances post-adoption performance. In retail, where operations span sales systems, inventory control, and analytics, readiness ensures these components work seamlessly with cloud platforms (Martins et al., 2019). Conversely, low readiness manifested in weak infrastructure or skill gaps can cause partial or failed adoption (Peltier et al., 2009). For Sri Lankan SMEs, readiness is critical due to existing infrastructure limitations and small management teams. Establishing stable internet, secure data practices, and cloud literacy among staff can bridge the gap between cloud potential and realised business model innovation. Empirical evidence across sectors positions readiness as both a precondition and driver for cloud-enabled transformation.

Cost

Cost encompasses all financial commitments for adopting and sustaining cloud technology, including subscription fees, migration expenses, integration costs, and potential hidden charges (Martins et al., 2019). In terms of DOI, cost influences perceptions of relative advantage and trialability, thereby affecting adoption decisions. While the pay-as-you-go model can reduce upfront investment and appeal to SMEs with limited capital (Ruivo et al., 2012), high or unpredictable costs may deter long-term engagement (Boonsiritomachai et al., 2016). Alshamaila et al. (2013) found that SMEs in the UK often revised expectations when additional costs like training emerged. Similarly, in India, ongoing operational expenses delayed e-commerce adoption in low-income regions (Banerjee & Seetharaman, 2022). In Sri Lanka, SMEs' narrow margins amplify sensitivity to costs, leading some to adopt cloud only in specific operational areas, such as invoicing or marketing, rather than full integration. Conversely, transparent pricing and alignment with budget capacity can make cost a strategic enabler, allowing experimentation without significant capital risk. The dual role of cost, either as a barrier or a catalyst, means it must be considered as a standalone factor to understand adoption dynamics and its influence on cloud-enabled business model innovation in resource-constrained contexts.

Top management support

Top management support refers to leadership's role in advocating, resourcing, and legitimising technology adoption. In SMEs, where decision-making is often centralised, leadership influence can directly shape innovation outcomes (Liang et al., 2007). Within DOI, strong top management backing can lower perceived complexity and enhance observability by setting clear strategic intent. Empirical studies show that leadership commitment significantly improves adoption rates and post-adoption satisfaction (Oliveira & Martins, 2010a; Ruivo et al., 2012). In the retail sector, managers' openness to change is a decisive factor for adopting CRM or omnichannel systems (Peltier et al., 2009). In developing contexts, leadership can offset infrastructural or policy deficiencies by proactively driving innovation (Alshamaila et al., 2013). For Sri Lankan SMEs, where owner-managers often hold both strategic and operational control, support from the top legitimises change, secures resources, and fosters a culture of experimentation. This influence extends beyond adoption, impacting organisational readiness and employee confidence in new systems. Given its consistent presence as a predictor of successful adoption in both developed and developing contexts, top management support is critical for enabling cloud computing to deliver business model innovation in Sri Lankan retail SMEs.

Government support

Government support includes policy initiatives, fiscal incentives, infrastructure investments, and promotional campaigns that create a conducive environment for innovation diffusion (Alshamaila et al., 2013). In DOI, it serves as an external enabler influencing trialability and observability. Evidence from multiple contexts shows government action can directly accelerate adoption, for example, broadband expansion in the United Kingdom (UK) improved SME cloud adoption rates (Alshamaila et al., 2013), while targeted logistics investments in India boosted e-commerce uptake (Banerjee & Seetharaman, 2022). In Thailand, policy incentives positively shaped perceptions of energy-sector innovations (Chitchaitheekul et al., 2024). For Sri Lankan SMEs, where internal capacity for digital transformation may be limited, government programs such as the Digital Economy Strategy can address cost and infrastructure barriers. Indirect measures like digital literacy campaigns or cybersecurity standards also help reduce uncertainty and build trust among SMEs. This dual role, lowering

barriers and signalling strategic alignment, makes government support an essential factor in cloud-enabled BMI. Its absence can slow adoption, while well-targeted support can catalyse innovation, particularly in sectors like retail that face rapid competitive and technological shifts.

Trialability

Trialability is the extent to which a new technology can be tested or piloted before full adoption. In the DOI framework, it is defined as ‘the degree to which an innovation may be experimented with on a limited basis’ (Rogers, 2003). In cloud computing, this often takes the form of free trials, sandbox environments, or modular subscription models (Chauhan et al., 2023). Such opportunities allow SMEs to assess technical compatibility, evaluate performance, and build operational familiarity without committing substantial resources (Peltier et al., 2012).

Studies show that trialability reduces adoption risk and accelerates learning. Boonsiritomachai et. al. (2016) found that SMEs with pilot projects achieved higher business intelligence maturity, while Chauhan et. al. (2023) confirmed its significant positive effect on both adoption intention and usage, especially in developing countries. For Sri Lankan retail SMEs, the cloud’s pay-as-you-go model enables gradual experimentation, aligning with their preference for reversible decisions. Including trialability in the conceptual framework is essential, as it bridges the gap between initial interest and transformative business model innovation outcomes.

Conclusion

This systematic literature review identified six key factors influencing cloud-enabled BMI in retail SMEs: relative advantage, organisational readiness, cost, top management support, government support, and trialability. The integration of these factors into a conceptual framework extends DOI’s applicability to SME innovation contexts in developing economies, offering both theoretical and practical insights.

Though this review was conducted within the DOI framework, the analysis revealed a broader range of potential enablers beyond DOI’s original constructs. This prompted further validation through consultation with experts from 3 leading Sri Lankan organisations that provide cloud solutions to SMEs and generate over LKR 10 million in monthly revenue. Based on their industry experience and market knowledge, these experts recommended the most appropriate factors for the Sri Lankan retail SME context.

However, the review is limited by its reliance on the Scopus database and English-language peer-reviewed journal articles, which may exclude relevant studies from other sources or languages. Additionally, while this study focuses on retail SMEs, cross-sectoral variations were not explored in depth.

Future research should empirically test the proposed framework using quantitative methods such as structural equation modelling in the Sri Lankan retail SME sector. Comparative studies between sectors or across countries could provide further insight into how contextual differences shape the interplay between DOI attributes and enabling factors. Longitudinal research could also explore how these factors evolve as SMEs progress from adoption to full integration of cloud solutions in their business models.

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EXPLORING MOTIVATIONS AND CHALLENGES OF FEMALE ENTREPRENEURS IN THE CREATIVE INDUSTRY OF SRI LANKA

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Abstract

This study investigates the motivations and challenges of female entrepreneurs in the creative industry of Sri Lanka. This industry has attracted limited academic attention in previous Sri Lankan studies, particularly in view of gender based entrepreneurial experiences. Purposive sampling was used to identify 19 female entrepreneurs for the qualitative study, and data were gathered through semi-structured interviews. The data were analysed using thematic analysis. The findings show that these entrepreneurs are motivated by a need for creative expression, financial independence, and the support of their social networks, which include family and friends. Resilience, preserving cultures, and social impact fuel their business endeavours. However, they face significant challenges such as financial and resource limits, societal expectations, gender biases, and issues integrating their business and artistic identities with personal and familial obligations. The study highlights the need to eliminate structural challenges and enhance support structures to help entrepreneurs succeed. This study provides new empirical evidence on how Sri Lankan female entrepreneurs manage creativity, resilience, and gendered limitations, providing theoretical implications for entrepreneurship and creative industry development.

Key Words: Challenges, creative industry, female entrepreneurship, motivations

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Proceedings of the 16th International Conference on Business and Information - ICBI 2025 © 2025 by The Faculty of Commerce and Management Studies, University of Kelaniya, Sri Lanka is licensed under CC BY-SA 4.0.

DOI:

Introduction

Entrepreneurship is an essential key to economic growth, innovation, and social development, especially in emerging economies like Sri Lanka. (Perera, 2019). Entrepreneurship offers individuals the ability to reach their full potential, contribute to national goals, and respond to socioeconomic issues by creating self-sufficiency and increasing job possibilities. Sri Lanka has steadily pushed private sector-led development since economic liberalisation in 1977, seeing entrepreneurship as a means of reducing impoverishment, creating jobs, and supporting balanced growth (Pathirannehelage & Rajapaksha, 2018). In recent years, the country has experienced an increase in entrepreneurial activity, with an increasing number of women entering the field. (Jayawardane, 2016). This development is influenced by several factors, including increased access to education, shifting gender roles, and technical improvements that allow for flexible and remote company operations. (Fauzi et al., 2020). Despite these advancements, women's engagement in the formal economy remains low, at approximately 35% (Mallika et al., 2023). This low participation highlights the necessity of entrepreneurship as a second option to economic participation and development for females. The creative industry is an especially important sector for female entrepreneurs in Sri Lanka. The creative industry, which includes fashion, crafts, media, and design, places a high value on personal skill, innovation, and cultural heritage. (Herawaty & Raharja, 2018). Creative businesses allow women to balance economic needs with personal expression and societal purpose. (Bujor & Avasilcai, 2016). As stated by Rudenko et al., entrepreneurship in the creative industry generates both cultural and economic value, contributing to a nation's power of influence and export potential. (Rudenko et al., 2022) Important instances in Sri Lanka include sustainable fashion brands and culturally infused craft enterprises led by female entrepreneurs. (Babović & De Santo, 2023). However, women in the creative industry often face various types of challenges. Limited access to finance, underdeveloped support systems, societal expectations about gender roles, and difficulties in balancing work and family responsibilities are some of these. (Pathirannehelage & Rajapaksha, 2018; Soomro et al., 2022). Furthermore, the combination of artistic identity and business management presents unique conflicts, with many struggling to expand operations while maintaining creative authenticity. (Bujor & Avasilcai, 2016). Although women's entrepreneurship has been thoroughly researched, there hasn't been much empirical research done in Sri Lanka on women entrepreneurs in the creative industry. Recent studies from Sri Lanka (Jayawardane, 2016; Lakmal, 2023) Also shows that there is a major understanding gap in this field due to the lack of gender-focused studies. Various theories have influenced this research. Self-Efficacy Theory emphasises the impact of believed capability on entrepreneurial behaviour; Adaptive Expertise Theory supports awareness of how entrepreneurs adapt to situational challenges, and the Social Entrepreneurship Theory explains the combination of creative and social and social value creation (Bandura, 1986; Dees, 1998; Vera & Crossan, 2004). Despite these challenges, there is limited research that investigates the motivations and challenges of female entrepreneurs in the creative industry in the Sri Lankan context. This study fulfils this gap by investigating the lived experiences of 19 female entrepreneurs engaging in several types of creative sectors. This research uses qualitative methodology and thematic analysis to provide perspectives about female entrepreneurs' motivations, challenges, and adaptive strategies contributing to both theoretical and practical understanding in the sector

Literature Review

Entrepreneurship motivation and challenges

Entrepreneurship is widely recognised as a driver of innovations, economic growth, and social transformation (Global Entrepreneurship Monitor, 2024). Entrepreneurs can be identified by the ability to recognise opportunities, take reasonable risks, and create innovations that benefit both society and the market (Schulte-Holthaus, 2018). Independence, inventiveness, inner sense of management, and Strategic thinking are all characteristics that are usually connected with business success (Bujor & Avasilcai, 2016). The motivational factors for entrepreneurial enterprises are different from each other. While some are motivated by necessity, such as lack of job opportunities, others are motivated by intrinsic objectives like independence, commitment, or community service. (Rangarajan & Lakshmi, 2013). Bandura's Social Learning Theory adds to the argument that people are driven by seeing the actions and accomplishments of others (Bandura, 1986). Furthermore, according to the Resource-Based View (RBV), entrepreneurs who take advantage of internal resources such as creativity, knowledge, and networks can gain long term competitive advantages (Barney, 1991). And according to Dees' Social Entrepreneurship Theory, entrepreneurs are motivated by more than simply creativity when they address social issues through creative, ethical, and sustainable economic solutions (Dees, 1998). Despite these motivations, entrepreneurs face various challenges, such as a lack of money, regulatory issues, and human resource difficulties (Ardiana, 2020). Environmental factors like access to market, infrastructure, and institutional support have a considerable impact on entrepreneurial success, particularly in developing countries

Female entrepreneurship

Female entrepreneurship is receiving global attention as a significant factor of economic growth and gender empowerment (Jayawardane, 2019). Although females represent an increasing number of ownership of businesses worldwide, there are significant gaps concerning access to capital, decision-making authority, and market opportunities (Bruin et al., 2006). Also, women in many economies continue to be undervalued due to the lack of societal support and resources (Global Entrepreneurship Monitor, 2024). In Sri Lanka, females represent over half of the population, but they still participate in economic activities at a low rate. (Mallika et al., 2023). Female entrepreneurs in the country usually depend on informal support structures like family and community networks to manage their business operations (Surangi, 2022). According to the research, Sri Lankan females adopt a combination of social and task-oriented decision-making and leadership strategies, which is often needed due to institutional and cultural limitations (Illandaraage & Kodituwakku, 2023). Female-led businesses prefer to reinvest their earnings in family wellbeing, education, and improving the community, which increases their socio-economic impact. (Jayawardane, 2016). However, studies highlight the necessity for specific region research to understand how culture, policy, and informal institutions influence female entrepreneurship (Sarfaraz et al., 2014; Simoes et al., 2016). Recent local studies (Jayawardane, 2019; Lakmal, 2023) show less attention to female entrepreneurship in creative industries, even though some research in Sri Lanka has focused on women in traditional sectors (Almeida, 2014; Sarfaraz et al., 2014). This confirms the limited empirical evidence within this context.

Motivations and challenges of female entrepreneurs

It is essential to understand that what are the motivations and challenges faced by female entrepreneurs to develop a diverse and effective support system. Female entrepreneurs are motivated by a variety of internal and external reasons, including autonomy, creativity, financial necessity, and a desire to create a positive social effect (Almeida, 2014; Kraja & Berberi, 2023). In the Sri Lankan context, motives include a lack of career possibilities, family flexibility, and the desire for independence (Lakmal, 2023). Family support and networking connections increase motivation and confidence (Mustapha & Subramaniam, 2016; Pasha et al., 2023). According to Vallerand's Passion Theory, having a healthy passion boosts long-term drive and creativity. (Vallerand, 2012). Additionally, human and social capital, like financial literacy, entrepreneurial education, and institutional access, directly impact motivations and outcomes (Martin et al., 2020). Gender Theory in Entrepreneurship shows that cultural values impact women's views, which often limit their business opportunities. (Ahl, 2006). Despite increasing support, women still face structural and cultural challenges, such as limited financial access, fear of failure, and common gender stereotypes (Global Entrepreneurship Monitor, 2024; Verheul et al., 2006). Social Capital Theory includes women's separation from crucial connections, as well as problems such as a lack of digital awareness (Jayawardane, 2019)

Creative entrepreneurship

Creative entrepreneurship combines both business activities and cultural expression with highlighting innovation, uniqueness, and identity (Bujor & Avasilcai, 2016). The creative industry includes sectors such as arts, crafts, design, animation, media, and fashion. What are the areas where female entrepreneurs often succeed due to aesthetic sensitivity and cultural foundation (Babović & De Santo, 2023). Studies separate creative entrepreneurs based on their unique motivational behaviours, such as passion, independence, and cultural significance (Černevičiūtė, 2011; Cnossen et al., 2019). Compared to traditional ventures, creative firms can involve balancing personal vision with market demands, which results in conflict that results in both opportunity and exhaustion (Moreno-Gavara & Jiménez-Zarco, 2019).

Methodology

This research adopted a qualitative methodology to investigate the motivations and challenges of female entrepreneurs in the creative industry of Sri Lanka. An interpretivist research paradigm was used, focusing on the subjective interpretations that participants allocated to their entrepreneurial motives and challenges. The qualitative approach facilitated an in-depth understanding of individual narratives, making it particularly suited for a dependent context and descriptive study of this nature. The sample included 19 female entrepreneurs engaged in various creative industries, including fashion design, event organising, cosmetics, batik, and other art-related companies. The sample size was determined using the data saturation principle, which indicates that no new themes or insights occurred during the final stage of data collection. Snowball sampling assisted in identifying more entrepreneurs through personal and professional networks, increasing diversity across industries and reaching those hard to reach through formal methods. Purposive sampling was used to collect information-rich cases of women directly involved in creative industries. Primary data were gathered using semi-structured interviews in both Sinhala and English, allowing participants to communicate easily and express complex thoughts

in their chosen language. Thematic analysis was utilised to identify common patterns and topics throughout the entire collection. The procedure included open coding, classification, and theme building. Ethical approval was obtained before data collection, and all participants provided informed consent. Confidentiality and anonymity were ensured with pseudonyms and secure handling of interview transcripts. The study utilised credibility, transferability, dependability, and confirmability criteria to ensure trustworthiness, with member verification, gathering of data, peer review, and detailed documentation for transparency.

Findings and Discussion

This study investigated the motivations and challenges of 19 female entrepreneurs engaging in the creative industry of Sri Lanka. The thematic analysis could identify 8 main themes and 4 main sub-themes from both motivations and challenges. These findings highlighted the complex relationship of internal desires, external support, institutional limitations, and personal resilience that shape females' entrepreneurial journey in the creative industry. These results are in line with other studies that emphasise the interaction of creativity, gender, and resource limitations (Bruin et al., 2006; Bujor & Avasilcai, 2016). However, this study shows how cultural expectations affect entrepreneurial resilience by applying such ideas to the Sri Lankan context.

Motivations of female entrepreneurs in the creative industry of Sri Lanka

Intrinsic drive for creative expression

A strong desire for creative work emerged as a primary motivator. Many participants stated that their entrepreneurial journey started not as a business idea but to express their creativity and identity.

'I enjoyed painting and design since I was in school. I started creating things just for fun, then it slowly became a business.' (participant 13)

'I would do this even if I didn't earn much. This is who I am.' (participant 7)

Such narratives align with studies that identify intrinsic passion as an essential characteristic of creative entrepreneurs and passion theory (Černevičiūtė, 2011; Vallerand, 2012). This inner motivation gave participants a sense of purpose and emotional fulfilment, which often exceeded strictly economic motives.

Financial independence & stability

The desire for financial independence, which is frequently influenced by cultural expectations and a lack of job options, was essential for maintaining their firms and gaining security for themselves and their families, even if most entrepreneurial journeys started with creative fulfilment.

'I don't want to depend on my husband for everything. I want to stand on my own feet.' (Participant 4)

'After my marriage ended, I had no choice; I had to support my children somehow. This saved me.' (Participant 10).

These findings align with the observations of Lakmal, who observed that this economic necessity is an essential motivator among females with limited career opportunities in the South Asian context (Lakmal, 2023).

Social support & Influence

Family encouragement and support

Family played a significant role in encouraging confidence and providing resources, especially during the initial stage. *'My mother gave me money to buy the first batch of materials.'* (Participant 15)

'Even when I doubted myself, my husband kept pushing me to continue.' (Participant 3)

This confirms Mustapha & Subramaniam's statement that family support serves as an emotional and practical support for female entrepreneurial development (Mustapha & Subramaniam, 2016).

Influence of role models and peer networks

Peer influence and inspiration from successful females, especially through social media, proved to be a powerful motivator.

'When I saw others succeeding on Instagram, I thought, Why can't I?' (Participant 9)

'My friend introduced me to the handcrafted jewellery. She guided me in the beginning.' (Participant 6)

These relationships increased self-efficacy and provided opportunities for learning and cooperation, confirming Coleman's concept of social capital as a foundation for opportunity, as in social capital theory (Coleman, 1988). Also, this is consistent with Bandura's Social Learning Theory, which holds that individuals learn and are motivated by seeing others' actions, successes, and outcomes (Bandura, 1986.).

Resilient growth with cultural and social purpose

Resilience and growth mindset

Despite failures and hardships, many women handled problems with a growth mentality, interpreting failure as a learning experience.

'I failed twice before. But I never give up. "I learned and improved." (Participant 1)

'Even when customers rejected my designs, I kept going. I assured myself, "Next time will be better." (P12)

These experiences align with Ardiana's discussion on resilience, which emphasises flexibility as a fundamental attribute in sustainable business (Ardiana, 2020). and align with Adaptive Expertise Theory, which emphasises adapting and utilising new abilities to address developing challenges (Vera & Crossan, 2004).

Commitment to cultural representation and social impact

Several females expressed a great desire to present Sri Lankan heritage through their ventures and encourage others in their communities.

'Batik is a part of our identity. I want to keep it alive and take it globally.' (Participant 2)

'I trained young females in my village. They are also earning money now. It makes me proud.' (Participant 17)

This dual purpose of economic and social is a unique feature of creative entrepreneurship (Bujor & Avasilcai, 2016). This proves the social entrepreneurship theory (Dees, 1998).

Challenges of female entrepreneurs in the creative industry of Sri Lanka

Financial and resource-related challenges

Lack of capital and resource limitations were the most stated challenges. Many females are unable to access bank loans due to limitations on equity and credit history.

'Three banks refused me. They stated I had no property and no consistent income.' (Participant 11)

'Materials are expensive. I can't always afford restocking after a successful month.' (Participant 14)

These findings support studies that highlight financial access as a gendered barrier (Global Entrepreneurship Monitor, 2024).

Gender and societal challenges

Several participants reported their experiences of facing gender bias, cultural expectations, and mistrust from stakeholders, especially in male-dominated environments.

'They don't treat women seriously. Suppliers talk down to me, thinking I'm clueless.' (Participant 18)

'Some relatives still ask me when I'm going to "get a real job".' (Participant 8)

These difficulties are like those raised by Verheul et al., who emphasise the cultural burden that women in traditional nations must bear in entrepreneurial roles (Verheul et al., 2006). Also, this proved the Gender theory (Ahl, 2006.)

Challenges in business and artistic balance

Operational and competitive challenges

Entrepreneurs without proper business training noted issues with pricing, digital marketing, handling competition, logistics, etc.

'I create beautiful items, but I struggle with price. "I lose money without realising it." (Participant 5).

'My designs are copied by other stores and sold at lower prices. "I can't compete like that." (Participant 19). This reflects the findings of Dsouza and Panakaje (2023), who underline the need for business literacy among creative entrepreneurs (Dsouza & Panakaje, 2023).

Balancing entrepreneurial and artistic identities

The pressure to prioritise sales over authenticity challenged participants' creative freedom.

'I enjoy creating new designs, but clients want the same old ones. "It is boring." (Participant 16)

'Sometimes I feel I'm losing myself in what sells.' (Participant 07)

This internal tension is deeply documented in the literature on creative entrepreneurship, where identity maintenance often conflicts with market demand (Moreno-Gavara & Jiménez-Zarco, 2019).

Balancing personal and family dynamics

Work-life balance

Participants recognised their difficulties of balancing many roles - mother, wife, and entrepreneur - without institutional or spousal assistance.

'I do housework in the morning, attend orders in the afternoon, and finish packing at night.' (Participant 10) *'I work constantly. I don't even have time for myself.'* (Participant 9)

Soomro et al. describe how such imbalances lead to exhaustion and prevent business development (Soomro et al., 2022). Also, this is consistent with work-life balance theory (Pattusamy & Jacob, 2017).

Emotional challenges & support systems

Emotional exhaustion, loneliness, and a lack of appreciation were common. Some participants felt alone throughout their entrepreneurial journey.

'Some days I feel invisible. Nobody sees the hard effort that went into this.' (Participant 13)

'When you don't have a team, you feel like giving up some days.' (Participant 06)

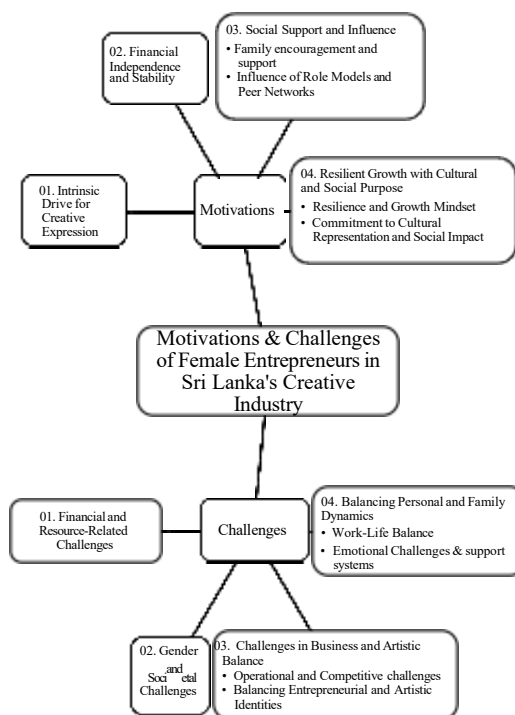
Emotional and mental health assistance is rarely included in entrepreneurship programs, despite its crucial role. (Martin et al., 2020) A significant result is that, while financial autonomy is frequently described as a main motivator in emerging countries, it was frequently subordinated to artistic expression and personal fulfilment in this environment. Many participants focused on continuing their profession even without financial compensation, highlighting a strong psychological attachment to their skill. This finding supports Černevičiūtė's perspective of creativity as an identity, not just an occupation (Černevičiūtė, 2011). Another surprising part was the intentional goal of cultural preservation. Several women were motivated not just to earn money, but also to promote national identity and inspire social change using their efforts. This charitable factor underlines a unique feature of female creative businesses in Sri Lanka. It combines personal success with societal cultural improvement. Furthermore, while digital platforms helped with transparency, they also increased emotional labour, particularly around comparison, self-presentation, and consumer feedback. This dual effect of digitalisation, enabling and psychologically draining, emerged as an understated but powerful topic. Finally, the emotional cost of invisible status, a lack of encouragement, and cultural misunderstanding indicate that entrepreneurial development needs to go beyond financial and skill development. Community recognition, psychological support, and cultural recognition are all essential for sustaining female-led creative businesses.

Proposed model

A conceptual model was created based on the thematic analysis to show how operational challenges, sociocultural factors, and inner and extrinsic motivators interact to shape the experiences of female entrepreneurs in Sri Lanka's creative sector. The model provides an organised framework for further study and the creation of policies by incorporating viewpoints like passion, social learning, gendered restrictions, and social entrepreneurship.

Figure 01

Thematic framework of motivations and challenges among female creative entrepreneurs



(Source: Developed by authors based on literature (2025))

Conclusion and Implications

This research examined the motivations and challenges faced by female entrepreneurs in Sri Lanka's creative industry. Based on the lived experiences of 19 women, the findings demonstrate a complex and dynamic relationship between personal desires, cultural identity, social institutions, and structural limitations. The study discovered that intrinsic motivation, particularly the need for creative expression, was a strong motivator of entrepreneurial activity. For many people, business was more than just a way to make money; it was a deeply personal journey of self-expression, cultural preservation, and societal responsibility. While participants were motivated by independence, resilience, and a development mentality, they also encountered ongoing problems such as limited financial access, gendered cultural expectations, and emotional exhaustion. The unique interaction between creative authenticity and economic needs developed as a recognised challenge for many. Despite these challenges, women displayed great adaptation, relying on family support, peer networks, and internet platforms to establish their businesses. The results emphasise the necessity of focused support systems, including training programs, mentorship, and microfinance, to encourage female entrepreneurs. To address the frequently neglected mental health needs of women in the creative sector, policymakers, educators, and support groups should incorporate the development of the creative industry into gender and entrepreneurship strategies. This will guarantee that women in the creative sector have access to funding, culturally appropriate mentorship, and emotional support.

By highlighting female representation in the creative industry and the necessity of diverse, culturally grounded entrepreneurial ecosystems, this study adds to the expanding body of research on gendered entrepreneurship in South Asia. It identifies areas for future research, including comparative studies across regions or sub-sectors, quantitative approaches for wider applicability, and examination of long-term impacts, digital transformation, and various socioeconomic challenges faced by female entrepreneurs, despite being constrained by a small qualitative sample restricted to urban creative businesses.

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MARKETING, INTERNATIONAL BUSINESS AND STRATEGY

NAVIGATING THE DIGITAL ECOSYSTEM: AN ANALYSIS OF BRAND CUSTODIANS' CROSS-PLATFORM CONTENT STRATEGIES FOR BRAND ENGAGEMENT IN SRI LANKA

R.D.N.L. Rammandala¹, D.M.R. Dissanayake², Divanka Podduwage³, Bimali Wijesundara⁴

Abstract

This study explores the strategic decision-making processes of brand custodians in managing cross-platform content to enhance brand engagement within an emerging market context. While the tactical execution of omnichannel marketing is widely documented, the internal strategic governance guiding these efforts remains underexplored. This study addresses this gap through a qualitative phenomenological approach, conducting in-depth, semi-structured interviews with 12 senior brand custodians from Sri Lanka's telecommunications, FMCG, and entertainment sectors. Thematic analysis of the data revealed three central themes: (1) Strategic Platform Alignment, a deliberate process of channel selection based on resource-to-impact analysis; (2) The Challenge of Personalisation-at-Scale, which involves balancing brand consistency with platform-specific content adaptation; and (3) Agile Governance Frameworks, highlighting the critical role of integrated organisational structures. The findings contribute a nuanced, managerial perspective to the literature, demonstrating that successful brand engagement is contingent not only on tactical execution but also on a coherent internal strategy and organisational agility. This research provides actionable insights for marketing leaders on structuring teams and allocating resources for effective omnichannel marketing.

Keywords: Brand custodians, brand engagement, cross-platform strategy, emerging markets, omnichannel, thematic analysis

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DOI:

Introduction

In the contemporary digital landscape, brands interact with consumers across a fragmented ecosystem of platforms, elevating the importance of cross-platform strategies designed to create a seamless omnichannel experience (Verhoef et al., 2015). While a significant body of literature documents the effectiveness of such strategies in boosting consumer-facing metrics like reach and awareness (Chen & Wu, 2019), the focus has predominantly been on tactical execution and campaign outcomes.

However, a critical gap persists regarding the internal, strategic dimension of these activities. While the literature is saturated with studies on the tactical outputs of cross-platform campaigns (what is known), there is a distinct lack of research into the internal, strategic decision-making processes of brand custodians that drive these campaigns, particularly in an emerging-market context (what is missing). The purpose of this study is to explore the lived experiences and strategic frameworks of brand custodians as they navigate the complexities of cross-platform brand engagement.

Accordingly, this paper is guided by the following research questions:

RQ1: How do brand custodians decide which platforms to prioritise and what resources to allocate for effective brand engagement?

RQ2: What organisational governance and processes enable or constrain the implementation of a coherent cross-platform content strategy?

This research offers significant contributions for marketing leaders by illuminating the operational models that facilitate success. Theoretically, it adds a much-needed managerial perspective to the literature on Integrated Marketing Communications (IMC) and omnichannel marketing in an emerging market context. The remainder of this paper is structured as follows: Section 2 reviews the literature, Section 3 describes the variables, Section 4 outlines the methodology, Section 5 presents the findings, and Section 6 discusses the conclusions and implications.

Literature Review

The evolution from multi-channel to omnichannel marketing marks a significant paradigm shift. While multi-channel marketing focuses on providing consumers with multiple, often siloed, touchpoints, the omnichannel model emphasises creating a seamless and integrated brand experience across all channels (Verhoef et al., 2015). This integration is crucial, as modern consumers expect consistency in their interactions with brands, regardless of the platform. The principles of Integrated Marketing Communications (IMC) further support this, advocating for the synchronisation of all marketing activities to deliver a unified brand message (Schultz & Schultz, 2016). Our study builds on these frameworks by investigating the internal organisational structures required to deliver on the promise of a truly integrated omnichannel experience.

While much of the literature focuses on consumer behaviour, the role of the brand custodian is critical yet often overlooked. These managers are tasked with safeguarding brand equity—a construct comprising brand awareness, associations, and loyalty (Keller, 1993). In the digital age, this role has expanded to include the complex task of managing brand narratives across a fluid and fragmented media landscape (Gensler et al., 2013). However, the specific decision-making processes, resource allocation challenges, and governance models they employ, particularly in non-Western contexts, remain a significant gap in literature. This study aims to fill that gap by focusing directly on their professional lived experiences.

For this study, brand engagement is the central phenomenon being explored. It is conceptualised as a multi-dimensional construct reflecting the cognitive, emotional, and behavioural interactions a consumer has with a brand. This includes behavioural aspects (e.g., likes, shares, comments), affective components (e.g., brand loyalty, emotional connection), and cognitive elements (e.g., brand awareness, top-of-mind recall). This research investigates the strategies custodians use to enhance these dimensions.

As a qualitative study, this paper does not use independent variables in a statistical sense. Instead, it focuses on the following key areas of investigation that are understood to influence brand engagement:

Cross-Platform Content Strategies: This is the broad area of investigation, referring to the coordinated creation, adaptation, and distribution of brand content across multiple digital channels.

Strategic Decision-Making: This is the core focus of the analysis. It encompasses the qualitative exploration of the processes, rationales, and frameworks brand custodians use, including platform selection, resource allocation, content adaptation processes, and internal governance frameworks.

Methodology

To investigate the nuanced decision-making processes of brand custodians, this study adopted a qualitative phenomenological research design, which is ideal for exploring perceptions of professional practice. A qualitative approach was chosen because the research questions are concerned with the "how" and "why" of strategy formation, requiring rich, contextual data that quantitative surveys cannot capture. We conducted in-depth, semi-structured interviews with 4 senior brand custodians (n=4) from leading companies in Sri Lanka's telecommunications, FMCG, and entertainment sectors. Participants were selected using a purposive sampling strategy based on a minimum of five years of experience in a brand management role with cross-platform responsibilities. Each interview, lasting approximately 60 minutes, was audio-recorded, transcribed verbatim, and analysed using the six-phase thematic analysis process outlined by Braun and Clarke (2006). This rigorous process ensured the credibility and trustworthiness of the findings.

Table 1
Participant demographics

Participant Name	Industry	Position/Title	Years of Experience
Mr.Imadh Irshad	Telecommunications	Campaign Manager Digital Marketing (Dialog Axiata)	7 years
Ms.Lahiri Balagalle	FMCG	Manager Digital Strategy (Mind Share Sri Lanka – Advertising Agency works with Unilever Sri Lanka)	5 years
Mr.Chanaka Perera	Entertainment	The Director of the movie Gajaman 2023	8 years
Mr.Nilaksha Srimal	Entertainment	Social Media campaign manager at Studio 101	10 years

(Source: Authors' Compilation)

Ethical approval for this study was granted by Senior Supervisor Senior Lecturer Divanka Randula Podduwage, Department of Drama, Cinema and Television of the University of Kelaniya. All participants provided informed written consent before the interviews. To ensure confidentiality, all personally identifiable information has been anonymised. Data is stored securely and will be destroyed after five years. No conflicts of interest are declared by the authors.

Findings and Discussion

The thematic analysis revealed three primary themes characterising the strategic management of cross-platform brand engagement in Sri Lanka.

Theme 1: Strategic Platform Alignment Contrary to the narrative of needing to be "everywhere," custodians described a deliberate, data-driven process of platform selection. This was a strategic choice, balancing audience presence against internal resource capacity and brand alignment. The mechanism involves a trade-off analysis where potential reach is weighed against the cost of creating bespoke content, preventing brand dilution and ensuring a higher return on investment. This aligns with IMC principles emphasising synergy over ubiquity (Schultz & Schultz, 2016).

"In the early days, we tried to be on every new platform. It was a disaster. Our content was generic, and our team was burned out. Now, we focus on three core platforms where our key demographic lives. We'd rather have a deep, meaningful conversation there than shout into the void on ten others". – (Manager Digital Strategy (Mind Share Sri Lanka – Advertising Agency works with Unilever Sri Lanka))

Theme 2: The Challenge of Personalisation-at-Scale. A central tension identified was maintaining brand consistency while delivering personalised content adapted to the unique syntax of each platform. Custodians explained that true personalisation requires understanding the user's mindset on a specific platform (e.g., entertainment-seeking on TikTok vs. professional development on LinkedIn). The mechanism for achieving this involves creating a central "brand playbook" with core messaging pillars, which local teams are then empowered to adapt. This avoids a "one size-fits-all" approach known to reduce engagement (Kim et al., 2020).

“Our brand voice is consistent—that's non-negotiable. But how that voice speaks on Instagram Stories is very different from how it speaks in a YouTube tutorial. The challenge is scaling that adaptation without losing the core of who we are”. – (Campaign Manager Digital Marketing (Dialog Axiata)).

Theme 3: Agile Governance Frameworks is the ability to execute a responsive strategy was found to be heavily dependent on internal organisational structures. Custodians in siloed organisations reported significant friction and delays. In contrast, those with integrated, agile governance models characterised by cross-functional teams and devolved decision-making power were able to launch more timely and coherent campaigns. This finding underscores that effective external communication is a direct result of effective internal organisation.

“We can have the best strategy in the world, but if it takes a week to get a tweet approved, we've already missed the moment. We moved to a pod structure where content, design, and analytics sit together. It's the only way to move at the speed of culture.” – (The Director of the movie Gajaman 2023)

Conclusion

This study explored the strategic decision-making of brand custodians in Sri Lanka. Our findings contribute a crucial managerial perspective to the literature, revealing that the success of cross-platform engagement is less about the volume of content and more about the coherence of the underlying strategy and the agility of the organisation. These themes resonate with the Omnichannel Marketing Model (Verhoef et al., 2015), but our research illuminates the internal mechanisms required to deliver it.

Managerial Implications: For practitioners, this study offers key insights. First, leaders should adopt a data-driven, resource-aware approach to channel selection. Second, balancing brand consistency with personalisation requires investment in both central guidelines and empowered creative teams. Finally, marketing leaders must champion organisational redesign, breaking down silos to create agile teams capable of responding to the digital ecosystem.

Limitations and Future Research: This study has limitations. As a qualitative study with a small sample size focused on Sri Lanka, the findings are not statistically generalizable, though they offer deep contextual insights. Future research could build upon these findings through quantitative studies to test the relationship between specific governance models and brand engagement metrics across a larger sample.

In conclusion, achieving effective brand engagement is a dynamic process profoundly shaped by the strategic foresight and organisational design championed by brand custodians. By adopting a data-driven, audience-centric, and organizationally agile approach, brands can forge deeper connections and thrive in an ever-evolving digital landscape.

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IMPACT OF INSTAGRAM ADVERTISING ATTRIBUTES ON PURCHASE INTENTION OF GENERATION Z IN SRI LANKA'S FASHION INDUSTRY

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Abstract

Social media has significantly transformed the way individuals communicate, connect, and engage with one another, while also becoming a powerful tool for digital marketing. Instagram has emerged as a leading platform for visual-based advertising, especially within the fashion industry. In Sri Lanka, Instagram has become one of the most popular social media platforms for fashion brands to reach youth audiences. The local fashion industry is a rapidly growing segment, with Generation Z, comprising nearly one-fifth of the country's population, emerging as a key consumer base that actively engages with social media content. This study examines the influence of Instagram advertising on the purchase intentions of Gen-Z users in Sri Lanka, concentrating on three key advertising attributes: trustworthiness, informativeness, and hedonic motivation. A quantitative research approach was employed, with data collected through a structured questionnaire administered to Gen-Z Instagram users. The relationships between the variables were analysed using regression analysis. The findings reveal that all three advertising attributes have a significant and positive influence on purchase intention. Among them, informativeness emerged as the most influential predictor, indicating that Gen-Z consumers are more likely to respond to advertisements that provide clear, relevant, and comprehensive product information. Trustworthiness and hedonic motivation were also found to play vital roles, suggesting that credible and emotionally appealing advertisements are more effective in engaging this demographic. These results highlight the importance of designing Instagram advertisements that are not only informative but also trustworthy and enjoyable. The study offers valuable insights for marketers in the fashion industry who aim to influence the purchasing decisions of Gen Z consumers in Sri Lanka. By understanding which advertising attributes matter most, brands can develop more effective strategies to connect with and convert this digitally savvy audience. Theoretically, this study extends the Technology Acceptance Model (TAM) by integrating advertising attributes as determinants of purchase intention, thereby contributing to the understanding of social media marketing behaviour in developing country contexts.

Keywords: Fashion industry, Generation Z, Instagram advertisements, purchase intention, Sri Lanka

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DOI:

Introduction

Social media has emerged as a transformative force in digital communication and marketing, particularly among younger demographics. Instagram has evolved into a dominant visual platform since its launch in 2010, attracting nearly two billion monthly users worldwide (Zote, 2023), including approximately 1.51 million users in Sri Lanka (Team, 2023). Initially created for photo sharing (Ting et al., 2015), Instagram now plays a central role in digital advertising, providing businesses with a visually driven medium to engage consumers, particularly within the fashion industry, where aesthetics is of paramount importance. Numerous studies have indicated that Instagram users are highly responsive to advertisements on the platform. In the Sri Lankan context, fashion retailers increasingly depend on Instagram as a promotional medium; however, despite high engagement levels, actual conversion to purchase remains limited. This indicates a need to identify which advertising attributes most effectively drive purchase intention among local Generation Z consumers. Research shows that 90% of Instagram users follow at least one business, and 83% report discovering new products through the app (Bojkov, 2023; Zote, 2023). These insights suggest that Instagram is not only a social platform but also a strategic marketing tool for increasing brand awareness and influencing consumer behaviour.

Purchasing intention, defined as a consumer's willingness or likelihood to buy a product or service (Morwitz, 2012), has become a critical outcome in assessing the effectiveness of digital advertisements, particularly in visual-heavy domains like fashion (Raney et al., 2003; Sharma & Lijuan, 2015). Generation Z, those born between 1995 and 2010, represent a digitally native cohort with a deep familiarity with online environments. Often referred to as 'digital natives,' this generation exhibits strong engagement with social media platforms, particularly Instagram (Dolot, 2018; Newberry, 2023; Turner, 2015). Their consumption patterns, media preferences, and expectations differ from previous generations, making them a strategically important audience for marketers. Within the fashion industry, where visual branding and aesthetics are crucial, Instagram serves as an ideal platform to influence purchasing decisions among this demographic (Aragoncillo & Orus, 2018; Shan et al., 2018).

While global literature has explored the relationship between social media advertisements and consumer behaviour, research focused on the Sri Lankan context remains sparse. Although several local studies have examined general aspects of social media marketing (Gaber et al., 2019; Sigdel, 2021), most have focused on millennial behaviour or influencer-driven marketing (Wimalaratna & Ranwala, 2021), rather than the specific mechanisms through which Instagram advertisements affect purchasing intention among Generation Z. Furthermore, attributes such as trustworthiness, informativeness, and hedonic motivation despite being significant in global literature have not been sufficiently studied within the Sri Lankan fashion sector. In response to this empirical gap, the present study focuses on Generation Z Instagram users in Sri Lanka and examines how specific characteristics of Instagram advertisements affect their purchasing intentions in the fashion industry. As fashion brands increasingly turn to Instagram for consumer engagement, understanding the perceptions and motivations of Gen Z consumers becomes essential. The study contributes to the body of knowledge by applying and testing established digital advertising constructs in a developing country context, providing new insights into the effectiveness of non-influencer Instagram marketing.

Research Objectives

RO1: To examine the impact of the trustworthiness of Instagram advertisements on the purchasing intention of Generation Z in Sri Lanka's fashion industry.

RO2: To examine the impact of the informativeness of Instagram advertisements on the purchasing intention of Generation Z in Sri Lanka's fashion industry.

RO3: To examine the impact of the hedonic motivation of Instagram advertisements on the purchasing intention of Generation Z in Sri Lanka's fashion industry.

This research holds both theoretical and practical significance. Theoretically, it extends the current literature by focusing on a relatively underexplored population: Sri Lankan Gen Z consumers, and offering insights into how they respond to different advertisement attributes on Instagram. Practically, the findings can help fashion marketers and digital advertisers design more effective, tailored campaigns that align with the expectations and preferences of this segment. Insights derived from this study may also support strategic decisions on content development and media planning, enhancing consumer engagement, brand loyalty, and ultimately, purchase behaviour in a digital-first marketplace.

Literature Review

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), proposed by Davis (1986), is an adaptation of the Theory of Reasoned Action (Fishbein & Ajzen, 1980) and focuses on understanding user acceptance of information systems. Its core constructs, Perceived Usefulness (PU), Perceived Ease of Use (PEU), and Behavioural Intention (BI), predict attitudes and actual technology usage. PU reflects the belief that a system enhances performance, while PEU relates to the ease of its use. Both influence BI, which strongly predicts voluntary system use (Davis et al., 1989; Venkatesh et al., 2003). TAM's adaptability has led to its application across various domains, including e-commerce and social media. Scholars have extended the model by integrating factors such as hedonic motivation, informativeness, and trustworthiness to better explain user behaviour in digital contexts (Florenthal, 2019). Given its robustness and relevance, this study adopts TAM to investigate how Instagram fashion advertisements influence purchase intentions among Sri Lankan Generation Z consumers. Building upon the TAM, this study incorporates key advertising attributes-trustworthiness, informativeness, and hedonic motivation- as external factors influencing behavioural intention. While trustworthiness and informativeness represent advertisement quality, hedonic motivation captures the emotional and experiential value created by Instagram ads, extending TAM to include affective dimensions relevant to social media marketing.

Instagram Advertising Attributes and the Purchase Intention

Trustworthiness

In today's information-saturated environment, the credibility of information sources is more critical than ever (Karadeniz & Kocamaz, 2019). Trustworthiness is defined as the degree to which a consumer perceives an information source as conveying messages in a truthful and unbiased manner (Ohanian, 1991). As such, trust forms a cornerstone of long-term organisational success and is particularly vital in the context of advertising. The trustworthiness of advertisements plays a pivotal role in shaping consumer perceptions of a brand's credibility. Goldsmith et al. (2000) assert that the credibility of a brand is closely tied to the perceived trustworthiness of its advertisements. Similarly, MacKenzie and Lutz (1989) define advertising credibility as the extent to which consumers perceive a brand as honest and sincere. Prior studies have consistently demonstrated a strong positive correlation between advertising credibility and consumer attitudes toward advertisements (Harshini, 2015). Trust has a tangible impact on consumer behaviour. According to Brown and Hayes (2007), 54% of consumers who trust a brand are likely to recommend its products to others. Conversely, consumers who perceive advertisements as untrustworthy tend to develop negative sentiments and are more likely to ignore or avoid such content. On the other hand, when advertisements are viewed as credible, they foster positive consumer attitudes and higher engagement (Baek & Morimoto, 2012; Eisend & Knoll, 2012; Neijens & Smit, 2000).

Informativeness

Informativeness refers to the extent to which an advertisement effectively educates the target audience about available product or service options, thereby aiding in efficient decision-making (Ducoffe, 1996). Informative advertisements provide consumers with clear, relevant, and comprehensive details, enabling them to make more informed choices (Pyun & James, 2011). Empirical findings indicate that informativeness is often cited by consumers as the primary justification for accepting advertisements (Saadeghvaziri & Hosseini, 2011). The efficiency with which information is delivered significantly enhances user experience, allowing users to locate desired information quickly (Sakinahmohdshukri et al., 2020). Moreover, when advertisements offer substantial and up-to-date product information, consumers perceive them as more useful and trustworthy (Alalwan, 2018). On social media platforms, users often engage with content specifically to learn about products they are considering purchasing (Muntinga et al., 2011). In this context, informativeness has a significant impact on consumers' perceptions of social media advertisements (Ducoffe, 1996; Taylor et al., 2011). According to Wimalarathna and Ranwala (2021), consumers view access to accurate advertising content as an expectation, not a privilege. Hence, informativeness is considered a foundational attribute of effective advertising (Karadeniz & Kocamaz, 2019).

Hedonic Motivation

Hedonic motivation refers to the intrinsic desire of consumers to engage in consumption activities for pleasure, enjoyment, and emotional satisfaction (Sulthana et al., 2021). It is closely tied to experiential consumption, where shopping becomes an enjoyable and emotionally fulfilling activity. Although hedonic motivation is often viewed as a consumer-driven factor, in this study, it is conceptualised as an advertising attribute that stimulates emotional responses through creative, visually rich, and entertaining advertisement design. Shafnaz (2021) describes hedonic motivation as the drive stemming from entertainment and enjoyment, while Kaczmarek (2017) views it as the

motivation to pursue positive experiences and avoid negative ones. Hedonic consumption often encompasses elements such as excitement, fantasy, arousal, and escapism (To et al., 2007). Understanding these psychological dimensions is critical for marketers aiming to enhance consumer engagement on digital platforms (López et al., 2016). As social media platforms like Instagram are inherently visual and interactive, they provide an ideal environment to stimulate hedonic motivations. Alalwan (2018) notes that incorporating multimedia elements such as images, videos, and music into social media advertisements significantly enhances user engagement by appealing to consumers' emotional states. This, in turn, can lead to increased impulse buying behaviour. Mustikasari et al. (2022) affirm that visually rich advertisements on platforms like Instagram can effectively capture attention and stimulate purchasing desire by reinforcing consumers' hedonic motivations.

Hypotheses Development

Trustworthiness is widely recognised as a crucial determinant in shaping consumer attitudes and behaviours toward advertising, particularly in the digital landscape. Ha and Lam (2016) emphasise that trustworthiness serves as a key mechanism for building consumer confidence and enhancing perceived reliability toward a brand. Ducoffe (1996) and Brackett and Carr (2001) further support this by identifying advertising credibility as a core component of advertising value in online contexts. In line with this, Van-Tien Dao et al. (2014) found that trust in social media advertisements significantly enhances consumers' perceived value and exerts a positive influence on their online purchase intentions. Similarly, Wimalarathna and Ranwala (2021) reported that consumers, particularly millennials, are inclined to develop favourable attitudes toward advertisements they perceive as trustworthy, which in turn heightens their intention to purchase. Trust has also been identified as a critical factor influencing online purchase decisions in broader contexts (Meskaran et al., 2013). Grounded in these insights, this study proposes the following hypotheses:

H1: There is a positive impact of trustworthiness on the purchasing intention of Generation Z.

Informativeness, defined as the extent to which advertisements provide relevant and useful information, is another significant factor influencing consumer behaviour in the social media environment. Social platforms serve as key sources for product-related information (Hewage, 2019), and consumers often assess advertisements based on the value of the information they provide. Tsang et al. (2004) argued that informative content has a positive impact on overall perceptions of advertising. Earlier studies, such as those by Chen and Wells (1999) and Taylor et al. (2011), empirically supported the idea that informativeness strengthens consumer attitudes toward social media advertisements and facilitates brand choice. More recent findings by Lee and Hong (2016) further confirmed that informativeness is positively associated with purchase intention. Karadeniz and Kocamaz (2019) highlighted that among various ad attributes, Instagram users especially value informativeness when forming purchase decisions. Sakinahmohdshukri et al. (2020) also emphasised that consumers' search for information significantly affects their perceptions of online advertisements. Supporting these findings, Wimalarathna and Ranwala (2021) note that informativeness in Instagram advertisements has a favourable effect on millennial purchase intentions. Based on this literature, the following hypothesis is posited:

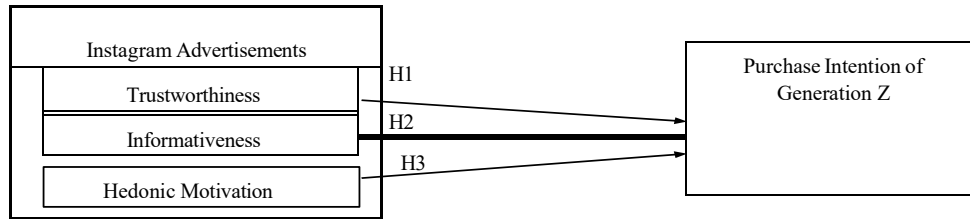
H2: There is a positive impact of informativeness on the purchasing intention of Generation Z.

Hedonic motivation, characterised by the pursuit of pleasure, enjoyment, and sensory gratification, has gained prominence in digital marketing as social media platforms increasingly feature visually appealing and interactive advertisements. Shafnaz (2021) observed that the creativity and attractiveness of social media ads enhance consumer desirability and engagement. Convenience and personalisation, as noted by Kumar and Sadarangani (2018), contribute to the hedonic appeal of such advertisements. Kim and Forsythe (2007) demonstrated that hedonic motivations can have a more substantial impact than functional motivations in online shopping behaviour, especially for apparel. Supporting this, Jung et al. (2016) and Shareef et al. (2017) reported that entertainment value embedded in ads significantly increases consumers' willingness to purchase. Davis et al. (2013) also identified a strong relationship between hedonic motivations and purchase intentions among female consumers. Likewise, Wimalarathna and Ranwala (2021) found a positive and significant effect of hedonic motivation on millennial purchasing behaviour in response to social media advertising. Drawing on this foundation, the study advances the following hypothesis:

H3: There is a positive impact of hedonic motivation on the purchasing intention of Generation Z.

Methodology

Figure 1
Conceptual framework



(Source: Authors' compilation)

Operationalisation and Measurements of Variables

In this study, both independent and dependent variables have been utilised with previously validated scales, and based on this, a structured questionnaire has been developed. To ensure the selected questions provide adequate coverage of the variable, the following table has been developed.

Table 1
Construction of operationalization

Variable	Item Number	Description	Measurement Scale	Source/s
Trustworthiness (TW)	TW1	Instagram advertisements on fashion products can be relied upon.	Five-Point Likert Scale	Karadeniz & Kocamaz, (2019), Gaber, Wright, Kooli, K., & Kostadinova, (2019)
	TW2	Instagram advertisements on fashion products can be trusted.		
	TW3	Instagram advertisements on Fashion products can be believed.		
	TW4	Instagram advertisements on fashion products are a reference for purchasing.		
Informativeness (IN)	IN1	Instagram advertisements on fashion products are a valuable source of information.	Five-Point Likert Scale	Karadeniz & Kocamaz, (2019), Gaber, Wright, Kooli, K., & Kostadinova, (2019)
	IN2	Instagram advertisements on fashion products inform about which brands have the qualities that is aspire.		
	IN3	Instagram advertisements on fashion products inform about current products and services in the market.		
	IN4	Instagram advertisements on fashion products are a good source for timely information.		
	IN5	Instagram advertisements on fashion products provide the information needed.		
Hedonic Motivation (HM)	HM1	Instagram advertisements on fashion products can sometimes provide more entertaining content than content in other media.	Five-Point Likert Scale	Karadeniz & Kocamaz, (2019)
	HM2	Sometimes enjoy thinking about things I hear or see on advertisements.		
	HM3	Instagram advertisements on fashion products involve too much excitement and surprise.		
	HM4	Funny characters appear in Instagram advertisements on fashion products many times and those advertisements are entertaining.		
Purchase Intention (PI)	PI1	After viewing the Instagram Advertisements on fashion products, became interested in making a purchase.	Five-Point Likert Scale	Shaouf, Kevin, & Xiaoying, (2016), Alalwan, (2018)
	PI2	After viewing the Instagram advertisements on fashion products, have willing to purchase the product being advertised.		
	PI3	After viewing the Instagram advertisements on fashion products, will probably purchase the product being advertised.		
	PI4	After viewing the Instagram advertisements on fashion products, is planning to purchase products that are promoted on Instagram.		
	PI5	After viewing the Instagram advertisements on fashion products, likely to buy products that are promoted on Instagram.		

(Source: Authors' compilation)

Sample and Data Collection

According to this study, the target population consists of Instagram users from Generation Z in Sri Lanka. As Instagram is the most preferred social media platform among businesses in Sri Lanka to conduct business affairs (Hewage & Weerasekera, 2020), and as Ramakrishnan (2019) stated the fashion industry has the most followers on Instagram than other industries, the researcher selected Generation Z Instagram users who have the intent to purchase fashion products. To conduct this study, an online questionnaire survey was created using Google Forms, and the questionnaire was distributed to Sri Lankan Generation Z Instagram users who had seen advertisements for fashion products on social media platforms such as Instagram, Facebook, and WhatsApp, as many Generation Z users utilise these platforms. The responses were collected over a 2-month period, and data was obtained from 222 Gen Z Instagram users. A non-probability convenience sampling technique was adopted because the target population, Gen Z Instagram users, is large, diverse, and geographically scattered. The final sample of 222 respondents meets the general guideline of at least 10–15 cases per predictor variable for regression analysis (Hair et al., 2019), ensuring sufficient statistical validity. To minimise common method bias, anonymity was ensured, and question order was randomised to reduce response bias.

Questionnaire Development

The questionnaire primarily consists of three sections, labelled A, B, and C. The demographic characteristics of the responses are discussed in Section A, which includes 6 questions regarding the demographic profile. Section B addresses awareness of Instagram advertisements for fashion products, comprising two questions. Section C is based on questions that relate to independent and dependent variables. It comprises 18 questions, which are obtained from previously validated scales. A five-point Likert Scale has been used for those 18 questions.

Results and Analysis

The variables TW, IN, HM, and PI, with 4 items and 5 items, respectively, resulted in Cronbach's alpha being above 0.8; hence, they fell under the level 'Good'. The results of the reliability test are shown in Table 2.

Table 2
Characteristics of the sample

Variable	Cronbach's Alpha (≥ 0.7)
Trustworthiness (TW)	0.848
Informativeness (IN)	0.887
Hedonic Motivation (HM)	0.870
Purchase Intention (PI)	0.895

(Source: SPSS output)

This current study meets the cutoff criteria as all values are above the 0.7 edge. To achieve convergent validity, Average Variance Extracted (AVE) values should be greater than 0.5 (Fornell & Larcker, 1981), along with Composite Reliability (CR) values that are greater than 0.7 (Hair, 1997). Table 3 presents the factor loading results, along with the convergent validity results, which include composite reliability and AVE.

Table 3
Convergent validity

Variable	Item	Factor Loading (≥ 0.5)	AVE (≥ 0.5)	CR (≥ 0.7)
TW	TW1	0.769	0.688	0.898
	TW2	0.866		
	TW3	0.877		
	TW4	0.800		
IN	IN1	0.823	0.690	0.917
	IN2	0.842		
	IN3	0.804		
	IN4	0.846		
	IN5	0.837		
HM	HM1	0.869	0.720	0.911
	HM2	0.832		
	HM3	0.876		
	HM4	0.816		

PI	PI1	0.810	0.706	0.923
	PI2	0.881		
	PI3	0.846		
	PI4	0.847		
	PI5	0.815		

(Source: SPSS output)

The study determines the correlation between variables by using Pearson's correlation analysis with SPSS. The general rule of thumb is that the square root of each AVE element should be larger than its correlation (r) with other elements (Fornell & Larcker, 1981). As all the correlations (r) are below the square root of AVE, this study confirms the discriminant validity. Table 4 below indicates the results of the discriminant validity.

Table 4
Discriminant validity

	TW	IN	HM	PI
TW	0.829			
IN	0.704	0.831		
HM	0.675	0.671	0.848	
PI	0.704	0.777	0.652	0.840

(Source: SPSS output)

Demographic Characteristics of the Sample

The study targeted Sri Lankan Generation Z Instagram users aged 13 to 28, analysing eight key demographic variables. The sample was predominantly female (68%), aligning with the fashion-focused nature of the study. The majority (53%) were aged 24–28, followed by 19–23 (36%), indicating higher engagement among older Gen Z users. Respondents represented all nine provinces, with the highest participation from Uva (42%) and Western (36%) provinces, ensuring geographic diversity. Educationally, 34% held a bachelor's degree, while others had Advanced Level (A/L) qualifications (21%), diplomas (20%), or professional qualifications (10%), suggesting a well-educated sample. Employment data revealed that most participants were private sector employees (41%) or students (32%), with a significant portion economically active. Income levels varied, with 32% earning between 25,000 and 49,999 lkr monthly and 27% reporting no income. All respondents had prior exposure to Instagram fashion advertisements, aligning with the purposive sampling strategy. In terms of platform usage, 35% of respondents spent 1–2 hours daily on Instagram, followed by 32% who spent 2–3 hours, confirming the platform's relevance for digital marketing among Gen Z. Overall, the demographic profile supports the validity and relevance of the sample to the research objectives.

Descriptive Data Analysis

The results in Table 5 indicate a correlation of 0.704 between TW and PI, suggesting a positive relationship between the two variables. The correlation between IN and PI is 0.777, indicating a positive relationship between the two variables. The correlation between HM and PI is also 0.652, indicating a positive relationship between the two variables. Therefore, according to Cohen (1988), there is a strong relationship between the IVs and DV. The significance of all IVs with DV is 0.000, which is less than 0.05, indicating that the variables are significant.

Table 5
Pearson correlation

		Correlations			
		TWMean	INMean	HMMean	PI_Mean
TWMean	Pearson Correlation	1	.704**	.675**	.704**
	Sig. (2-tailed)		.000	.000	.000
	N	222	222	222	222
INMean	Pearson Correlation	.704**	1	.671**	.777**
	Sig. (2-tailed)	.000		.000	.000
	N	222	222	222	222
HMMean	Pearson Correlation	.675**	.671**	1	.652**
	Sig. (2-tailed)	.000	.000		.000
	N	222	222	222	222
PI_Mean	Pearson Correlation	.704**	.777**	.652**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	222	222	222	222

** . Correlation is significant at the 0.01 level (2-tailed).

(Source: SPSS output)

Inferential Data Analysis and Hypothesis Testing

Regression Analysis

Table 6
Model summary

Model Summary ^a					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.814 ^a	.663	.658	.320	1.777

a. Predictors: (Constant), HMMean, INMean, TWMean

b. Dependent Variable: PI_Mean

(Source: SPSS output)

This study yields an R-squared value of 0.663, indicating that 66% of the variance in purchase intention (DV) is explained by the collective effect of trustworthiness, informativeness, and hedonic motivation (IVs), while 34% of the variance in purchase intention is attributed to other factors. This model appears to be robust. Also, the R-value of 0.814 shows a strongly positive relationship between IVs and DV. Hence, this model can be accepted.

Table 7
ANOVA

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	43.996	3	14.665	142.869	.000 ^b
	Residual	22.377	218	.103		
	Total	66.373	221			

a. Dependent Variable: PI_Mean

b. Predictors: (Constant), HMMean, INMean, TWMean

(Source: SPSS output)

The significance of the study's overall model, which includes three independent variables (TW, IN, and HM) and one dependent variable (PI), is illustrated in Table 7. If the significance value is less than 0.05, then it indicates that the model is good at predicting the DV. The current study also confirms the rule of thumb by showing a significance of 0.000. Therefore, this model is significant and qualified to predict the DV.

Testing of Hypotheses

To determine whether the results are statistically significant and to assess the strength of the relationship between the variables, hypothesis tests are conducted.

Table 8
Coefficients

Coefficients ^a								
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.262	.196		1.340	.182		
	TWMean	.263	.062	.254	4.229	.000	.430	2.327
	INMean	.529	.063	.501	8.397	.000	.434	2.306
	HMMean	.145	.058	.145	2.519	.012	.469	2.133

a. Dependent Variable: PI_Mean

(Source: SPSS output)

According to the results, the independent variables, TW, IN, and HM, have significant values of 0.000, 0.000, and 0.012, respectively. Also, all the B values of independent variables (TW = 0.263, IN = 0.529, HM = 0.145) have positive values, which means that there is a significant positive relationship between all three IVs and DV. These findings indicate statistically significant positive impacts of trustworthiness, informativeness, and hedonic motivation on the purchase intention of Generation Z Instagram users in Sri Lanka. Therefore, all three hypotheses have been accepted. Table 9 shows the summary of the hypothesis test conducted.

Table 9
Results of the hypotheses

H1: There is a positive relationship between Trustworthiness on Purchase Intention of Generation Z	Accept
H2: There is a positive relationship between Informativeness on Purchase Intention of Generation Z	Accept
H3: There is a positive relationship between Hedonic Motivation on Purchase Intention of Generation Z	Accept

(Source: Authors' compilation)

Discussion and Conclusion

This study aims to investigate the influence of three key advertising attributes - trustworthiness, informativeness, and hedonic motivation - on the purchase intentions of Generation Z Instagram users in Sri Lanka, particularly within the fashion industry. The results confirm that all three variables have a significant and positive relationship with purchase intention. Among them, informativeness emerged as the strongest predictor ($\beta = 0.529$), suggesting that Generation Z consumers value advertisements that provide clear, relevant, and sufficient information about products. These findings align with previous studies that emphasised the importance of perceived informativeness in online advertising (Sharma & Lijuan, 2015; Wimalaratna & Ranwala, 2021). When compared with findings from global literature (Jung et al., 2016; Lee & Hong, 2016), the stronger role of informativeness in this Sri Lankan context suggests that local Gen Z consumers place greater emphasis on clarity, product value, and credibility. Conversely, hedonic motivation showed a comparatively weaker influence, likely due to cultural tendencies prioritising practicality over entertainment in purchasing fashion items. The study also reinforces the notion that trustworthiness and hedonic motivation play critical roles in shaping consumer behaviour in digital environments, particularly on visually driven platforms like Instagram. As Generation Z is more likely to engage with content that is both trustworthy and entertaining, marketers must consider emotional and aesthetic elements in their ad design. The study applied the TAM, a well-established framework in digital technology adoption research (Wirtz & Göttel, 2016), to conceptualise these relationships. By integrating trustworthiness, informativeness, and hedonic motivation into the TAM framework, the research presents a validated model for forecasting consumer behaviour in similar digital marketing contexts. This study contributes theoretically by extending the TAM to include advertisement credibility and affective factors as external variables, providing an integrated framework for predicting purchase behaviour on visual platforms. Practically, marketers should balance functional (informative, trustworthy) and emotional (hedonic) elements to enhance Gen Z engagement.

Moreover, insights may inform policymakers and platform designers to promote ethical and transparent digital advertising practices. While offering practical guidance for marketers targeting Sri Lankan Gen Z consumers, the study is limited by its focus on a single platform, industry, and demographic. Future research should explore other generational cohorts and extend the investigation to platforms such as TikTok, Facebook, or Threads, as well as additional industries, including food, travel, and personal care. Including further variables such as interactivity, personalisation, or ad intrusiveness and using larger, more diverse samples may also enrich the understanding of social media advertising.

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UNVEILING CONSUMER PURCHASE INTENTION OF HERBAL DRINKS IN SRI LANKA: INSIGHTS FROM THE THEORY OF PLANNED BEHAVIOR

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Abstract

Raising health consciousness has opened up significant opportunities in different market segments. Herbal drinks are one such segment among them. But the herbal drinks market is a less focused area. In this vein, this study examines the impact of consumer purchase intention on the herbal drinks market in Sri Lanka through the insights of 'Theory of Planned Behaviour.' The study advocates the positivist philosophy accompanied by the deductive and quantitative approach. The study distributes a self-administered questionnaire to a sample of 385 individuals through the convenience sampling technique. 'Attitude, subjective norm, and perceived behavioural control' served as the independent variables, whereas the 'consumer purchase intention of herbal drinks' was the dependent variable. 'Pearson's Product-Moment Correlation and Multiple Linear Regression were employed as the data analysis techniques. The findings indicate that there is a strong correlation between attitude and perceived behavioural control on consumer intention of herbal drinks, whereas there is a moderate correlation between subjective norm and intention. The regression results conclude that there is a significant positive impact of attitude, subjective norm, and perceived behavioural control on the purchase intention of herbal drinks. The manufacturers can develop new marketing strategies to uplift the consumer attitude, subjective norm, and perceived behavioural control in order to obtain the benefits in their sales. Since these three independent variables are the players that give rise to the actual behaviours.

Keywords: Attitude, herbal drinks, perceived behavioural control, purchase intention, subjective norm

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DOI:

Introduction

The consumption of herbal drinks has tremendously increased worldwide due to the significant hype in rising consumer health consciousness. Herbal drinks are a pivotal part of health and nutrition since globally improved health and wellness have been successfully attracted towards the herbal drinks sector (Aeknarajindawat et al., 2024). As compared with the past, consumers in this modernised era are more aware of their health and wellness. Herbal drinks are beverages that are concocted in natural substances sourced from different morphological types of plant parts such as leaves, roots, even the buds, flowers, fruits, and stems (Shaik et al., 2023). Sri Lankan herbal drinks have their own heritage, even from the past, since they were used by Sri Lankan ancestors. ‘Infusions, decoctions, herbal tea, and fruit drinks’ are some categories under the herbal drinks, and the healing power embedded in the herbal drinks is idiosyncratic (Rashid et al., 2018). A study conducted by Layoo et al in 2024 elaborated that there are still limited studies focusing on variances in herbal consumption-related decisions and the demographic factors that led to herbal drinks (gender, age, work types, education, and marital status). While the broader category of ‘herbal products’ covers a wide array of items ranging from oral supplements, cosmetics and other topical applications, this study specifically narrows its attention to herbal drinks. This is due to less attention on the area (Shaik et al., 2023). Notwithstanding, Sri Lanka’s traditional herbal drinks (known as ‘kola kenda’; one of the porridge varieties in Sri Lanka prepared using various green leaves) have been largely admired as a unique beverage in boosting the immune system and those beliefs are even rooted in Sri Lankan culture. The other types of herbal drinks (such as infusions and decoctions known as ‘kasaya’ in Sri Lanka) were used by the ancestors during their daily routines, and they valued them as unique healers for all diseases. Though these advances are associated with herbal drinks, the attention on herbal drinks related studies is quite less as per the literature. But herbal drinks are also positioned in the market by holding a unique momentum in beverage consumption. Therefore, consumer intention for herbal drinks should be successfully built by the manufacturers to lead them to form the actual purchasing behaviour. They must gain sufficient knowledge from the consumers of herbal drinks. Since the intention is the influential player in forming the actual buying behaviour (Morwitz, 2012). Therefore, this study aims to contribute to the important practical gaps that exist in the literature on herbal drinks while leveraging the robust theoretical framework that was put forward by Ajzen in 1991. This particular research advocates ‘Theory of Planned Behaviour (TPB) to determine the intention to consume herbal drinks in Sri Lanka through the lens of attitude, subjective norm, and perceived behavioural control. Since these three variables are the most vital players of determining the consumer purchase intention. In the same token, the demographic profile that is undertaken under this study will further serve to fill the stressed gaps in the literature. Furthermore, the literature stressed that though the favourable background persists towards herbal drinks, less attention on herbal drinks has hindered the awareness and attraction of the consumers towards herbal drinks (Shaik et al., 2023). Therefore, the research problem emerges as determining the impact of herbal drinks on consumer purchase intention through the lens of the Theory of Planned Behaviour, since this theory suggests that an immediate causal factor of behaviour is the intention (Sakulwattana et al., 2025).

Research questions

RQ1: What is the impact of Attitude on consumer purchase intention of herbal drinks?

RQ2: What is the impact of subjective norm on consumer purchase intention of herbal drinks?

RQ3: What is the impact of perceived behavioural control on consumer purchase intention of herbal drinks?

Research objectives

RO1: To discover the impact of Attitude on consumer purchase intention of herbal drinks.

RO2: To discover the impact of subjective norms on consumer purchase intention of herbal drinks.

RO3: To discover the impact of perceived behavioural control on consumer purchase intention of herbal drinks.

Study contribution

Shaik et al. (2023) concluded that attention towards herbal drinks is poor, though herbal drinks offer many benefits. This suggests that important attention should be paid to the area as a way of fulfilling the existing gap. Hanmontree et al. (2022) concluded that the awareness of the medical community towards herbal drinks should be improved by sharing the health benefits associated with herbal drinks. This will fulfil the knowledge gap. Further, through this research, the affiliated parties such as herbal manufacturers and herbal advertisers will have the opportunity to structure their operations as per the findings of the research, and herbal drinks are an essential player in this because health consideration has emerged as the trend in this era.

Literature Review

Purchase intention

Purchase intention is an important catalyst in determining the actual purchasing behaviour of an individual. Attitude toward behaviour, subjective norm, and perceived behavioural control are the key pillars in this regard, as articulated under the 'Theory of Planned Behaviour'. Intention stems from the subjective probability of a particular individual towards his or her behaviour (Ajzen, 1991). Consumer intentions and behaviour have a positive relationship with each other (Wiwoho & Riptiono, 2022). Balau (2018) stressed that 'Attitude, subjective norm, and perceived behavioural control stand as the predictors of intention and the stronger the intention, the stronger the drive to perform that behaviour (Balau, 2018). Studies on purchase intentions of health drinks could provide utmost relief for companies, allowing them to pinpoint the optimal combination of ingredients that consumers require in the product (Bhagat & Ravi, 2018). Since intention is a powerful predictor of an individual's actual behaviour, the successful strategies followed by manufacturers in capturing positive consumer intentions will also influence the actual purchasing behaviour towards the products. Therefore, this particular study examined the purchase intention of herbal drinks through the lens of three predictors of intention: Attitude towards herbal drinks, subjective norm, and perceived behavioural control.'

Attitudes

Ajzen (1991) emphasised that attitudes are the favourable or unfavourable evaluation of a specific behaviour. Attitudes stand as the learned predisposition in behaving favourably or unfavourably towards a given object. Since attitudes are focal to behaviours shown during the buying process (Aeknarajindawat, 2024). A study based on herbal beverages that was performed by Vaddhano et al. (2023) found that 'attitudes towards healthy beverages and the purchase intention had a positive relationship.' If the consumer forms a favourable attitude towards a product or a service, this will eventually pinpoint the intention, and thus, attitudes and intention influence each other. Therefore, to further elucidate this, the first study hypothesis is as follows.

H1: There is an impact of Attitude on consumer purchase intention of herbal drinks

Subjective norm

Ajzen (1991) elaborated, subjective norms are the sensed social pressure in performing a behaviour. Those social pressures may be from, as per Wiwoho and Riptiono (2022), the closest people, such as the parents, family, relatives, spouse or friends. People's decisions are being altered by those social influencers. People are more conscious of what others perceive when they undertake a certain decision. Therefore, whatever the positive or negative thoughts, feelings and ideas of the surrounding environment are cause for a decision. Vaddhano et al. (2023) found that 'subjective norms had a positive relationship on purchase intention towards healthy beverages.' In this particular research has been introduced the below hypothesis based on the impact of social pressures on herbal drinks and their purchase intention.

H2: There is an impact of subjective norm on consumer purchase intention of herbal drinks

Perceived behavioural control

Ajzen (1991) expressed that an individual's perceived ease or difficulty in performing a particular behaviour. Perceived behavioural control stands as the people's perception of whether they have control or not with regard to a behaviour (Hussin, 2021). As per this study. if individuals perceive that they have the controlling ability to purchase herbal drinks, this can affect their intention to purchase and consume herbal drinks. Therefore, in order to elucidate deeper insights in this arena, the following hypothesis will stand as the third hypothesis.

H3: There is an impact of perceived behavioural control on consumer purchase intention of herbal drinks

Methodology

The study was undertaken during years of April 2024 to April 2025. The sample (aged between 15 - 60 years and above) was taken by 385 consumers living in Sri Lanka, advocating the convenience sampling technique (Sakulwattana et al., 2025). This research has used convenience sampling since the related study researchers have advocated the same. The study was undertaken in the Western Province of Sri Lanka since this province represents the most populous province of Sri Lanka, as per the latest data of the Department of Census and Statistics of Sri Lanka. The researcher was able to collect 385 responses using the direct online distribution of the questionnaire via the printed mode and social media, especially through WhatsApp. The respondents were informed that their responses would remain anonymous, confidential and would be used for educational purposes only. It did not collect any sensitive information.

Dependent variable

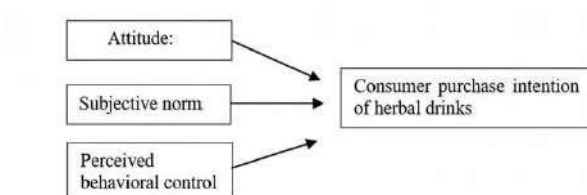
Consumer purchase intention on herbal drinks will serve as the dependent variable.

Independent variables

This study considers three major independent variables, namely 'Attitude, subjective norm, and perceived behavioural control.

Figure 1

Conceptual framework



(Source: Author's Compilation)

This study employs a deductive approach that is guided by the Theory of Planned Behaviour. This quantitative and cross-sectional study has collected data at a single point of time. The self-administered questionnaire was prepared using mainly two sections, whereas the first section of the questionnaire consisted of the demographic profile of the respondents. The second part consisted of the main research questions measured on a five-point Likert scale. Under the inferential statistics, the correlation (Pearson's Product-Moment Correlation - PPMC) and regression (Multiple Linear Regression - MLR) were employed as data analysis techniques. Before testing the regression, certain parametric assumptions were tested, such as 'normality, linearity, homoscedasticity, independence of observations, multicollinearity, and normal distribution of values of residuals.' All assumptions satisfied the acceptability criteria.

Findings and Discussion

Validity and reliability analysis

Convergent Validity is represented by the 'factor loading and Average Variance Extracted (AVE).' Internal Consistency is represented by the 'Cronbach's Alpha and Composite Reliability.' Composite reliability of 0.70 is regarded as the recommended value (Hair et al., 2010), whereas Fornell and Larcker (1981) recommended a Composite Reliability (CR) value of 0.60 or more as the accepted limits. Fornell and Larcker (1981) further recommended an Average Variance Extracted (AVE) greater than 0.5 as the recommended limits in research.

Table 1

Internal consistency and convergent validity

Variable	Item	Factor Loading (≥ 0.5)	Cronbach's Alpha (≥ 0.7)	CR (≥ 0.7)	AVE (≥ 0.5)
ATT (Attitude)	ATT 1	0.693	0.812	0.869	0.571
	ATT 2	0.794			
	ATT 3	0.780			
	ATT 4	0.753			
	ATT 5	0.756			
SN (Subjective Norm)	SN 1	0.783	0.756	0.845	0.578
	SN 2	0.698			
	SN 3	0.758			
	SN 4	0.798			
PBC (Perceived Behavioral Control)	PBC 1	0.757	0.749	0.841	0.571
	PBC 2	0.738			
	PBC 3	0.739			
	PBC 4	0.786			
INT (Consumer purchase intention of herbal drinks)	INT 1	0.750	0.751	0.843	0.573
	INT 2	0.744			
	INT 3	0.787			
	INT 4	0.746			

(Source: Author's Compilation)

There was adequate discriminant validity as per Table 2, according to Fornell & Larcker, which is that the square root of the AVE of each construct should be more than its other constructs' correlation values (Fornell & Larcker, 1981).

Table 2

Discriminant validity

	ATT	SN	PBC	INT
ATT	0.756			
SN	0.445	0.760		
PBC	0.617	0.374	0.756	
INT	0.562	0.417	0.571	0.757

(Source: Author's Compilation)

As per the above Table 3, the highest responses were represented by the male parties (56%), whereas the married category was outstanding in responding (52%). The 30-44 age category represented the highest portion of the overall responses. Most of the respondents were under the Secondary Education. 200 respondents served as the employed category was in the highest rank in responding. 45% of the respondents were under Rs. 25,000.

Table 3

Demographic profile of the respondents

Demographic		Frequency	Percent
Gender	Male	215	55.8
	Female	170	44.2
Marital Status	Unmarried	170	44.2
	Married	200	51.9
	Divorced	10	2.6
	Separated	05	1.3
Age	15 - 29	100	25.9
	30 - 44	110	28.6
	45 - 59	105	27.3
	Above 60	70	18.2
Education Level	Primary (Up to O/L)	20	5.2

	Secondary (Up to A/L)	215	55.8
	Undergraduate	100	25.9
	Graduate	40	10.4
	Post-Graduate	10	2.6
Employment	Employed	200	51.9
	Selfemployed	160	41.6
	Unemployed	15	3.9
	Pensioner	10	2.6
Monthly Income	Below Rs. 25,000	175	45.4
	Rs. 25,000 - Rs. 44,000	100	25.9
	Rs. 45,000 - Rs. 64,000	65	16.9
	Above Rs. 65,000	30	7.8
	Dependent	15	3.9

(Source: Author's Compilation)

As per Cohen (1988), if the correlation coefficient value is higher than 0.5, that indicates a strong correlation whereas if the value relies between 0.3 to 0.5; that pinpoints a moderate correlation. If the value is between 0.1 to 0.3, there is a small correlation. Table 4 shows that the correlation between “ATT and PBC on INT” was strong since the value was 0.5. The correlation between “SN on INT” was moderate.

Table 3

Correlation analysis

	Consumer purchase intention of herbal drinks (INT)
Attitude (ATT)	0.562
Subjective Norm (SN)	0.417
Perceived Behavioural Control (PBC)	0.571

(Source: Author's Compilation)

Since the unstandardized coefficients and the standardised coefficients were positive, this elucidated a statistically significant positive impact between the variables. In the same token, the significant values of the three variables (Attitude, subjective norm, and perceived behavioural control) were less than the P-value of 0.005. This indicated that the below-stated hypotheses were accepted.

H1: *There is an impact of Attitude on consumer purchase intention of herbal drinks*

H2: *There is an impact of subjective norm on consumer purchase intention of herbal drinks*

H3: *There is an impact of perceived behavioural control on consumer purchase intention of herbal drinks*

Table 4

Multiple linear regression (MLR)

Model	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
1	(Constant)	.483	.162	.003
	ATT	.289	.053	.000
	SN	.159	.042	.000
	PBC	.328	.049	.000

(Source: Author's Compilation)

Conclusion

This research has meticulously disclosed the insights of consumer purchase intention on herbal drinks, facilitating a definitive roadmap for the herbal drinks market. The findings transcend strong and moderate correlations, establishing a statistically significant impact between the three pillars of the Theory of Planned Behaviour and a consumer's purchase intention. The findings highlight the multifaceted aspect of consumer decision-making, stressing the pivotal roles of attitudes, social norms, and perceived control in shaping the purchasing behaviour of consumers. Consumer attitudes are a vital driver of purchase intention. In this study, the way consumers feel about herbal drinks, the beliefs on taste, health benefits, and overall value, significantly affected their willingness to purchase herbal drinks. These findings emphasise the paramount significance of reinforcing positive attitudes in the consumers' minds by the herbal drinks manufacturers. Since attitudes and intentions have a positive impact, as per the findings. Therefore, marketing efforts should be directed towards consumers by spreading awareness of the unique benefits of herbal ingredients. This will pinpoint positive outcomes for the business by way of building a robust brand image linked with purity, wellness, and efficacy. Furthermore, the manufacturers and the marketers should fine-tune testimonials and clear communication of health benefits to uplift the positive attitudes of the customers toward herbal drinks. Beyond the attitudes, subjective norm or social influences play an outstanding role in building the consumer intention for herbal drinks. When consumers believe in any recommendation made by their closest precious people in their lives (family, health professionals, friends, other influencers), there is a tendency to consume the approved herbal drinks, or they are more vigilant in purchasing that brand. Therefore, the manufacturers should strategically recognise and impress the reference groups. The manufacturers could link with influencer marketing campaigns, community engagement sessions, partner with industry experts, and build platforms for consumers to spread their experiences, thereby fostering a collaborative environment for herbal drink consumption. The perceived behavioural control involves factors such as 'accessibility, ease of obtaining information, affordability, and perceived complexity of the product. Therefore, if a consumer feels those factors are not performed well, that itself acts to lower the consumer's intention towards a product or a service. The manufacturers must focus on availing herbal drinks through different distribution channels, offering competitive pricing offers, providing concise product information such as on labels, marketing materials, and websites and smoothing the purchasing process of herbal drinks. Through active involvement in addressing concerns about taste or any other preparation process of herbal drinks can also develop this sense of controlling power. In order to uplift the consumer purchase intention, herbal drink manufacturers should adhere to a holistic marketing approach and a continuous product development process that simultaneously focuses on these three pillars of the Theory of Planned Behaviour. Since, based on those three, the other factors can be formed. Due to the significant hype in raising the wellness and herbal-related beverages, manufacturers will have the unique opportunity to introduce new herbal drinks and thereby contribute to the national economy. As the previous researchers revealed, the awareness of herbal beverages through proper communication channels and education is pivotal. The manufacturers should launch targeted sessions or campaigns in order to stress the benefits inherent in the herbal drink. Ensuring readily accessibility and affordability through sound distribution networks, attractive pricing, and accurate product information will help reduce the perceived barriers to purchasing herbal drinks. Therefore, herbal drink manufacturers can effectively build consumer intention into an actual purchase in this evolved health and wellness market by strategically addressing the consumer attitude, subjective norm, and perceived behavioural control since these three are the main players in building the actual purchasing behaviour. Future studies can be focused on adding more variables to the conceptual framework by increasing the sample size.

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STRUCTURAL BREAKS AND MARKET DYNAMICS IN THE SRI LANKAN TEA INDUSTRY: A CHANGEPOINT-BASED ANALYTICAL APPROACH

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Abstract

This study reveals the structural and forecastable dynamics of tea prices in Sri Lanka following significant macroeconomic shifts. Focusing on Gross Sales Averages (GSA) for Low Grown (LG) Elevation, High Grown (HG) Elevation, and Western High Grown (WHG) Elevation teas, the paper applies changepoint analysis to identify structural breaks in price patterns and uses average-based forecasting models to predict. Forecasted accuracy is around 10%, mostly less than 5%. The study further explores the effect of the global tea market on the Sri Lankan Tea market with sold quantities at Colombo auctions, supported by production data and cost of production (COP) benchmarks. The changepoint was found in April 2022 for LG and HG, while the changepoint was found in June 2022 for WHG, which explained the Ruppee depreciation. The paper provides actionable insights for stakeholders navigating post-shock price behaviour and informs auction planning, export strategies, and production policies. Global tea consumption is projected to reach 6,300 million kilograms in 2025, with a Compound Annual Growth rate (CAGR) of 1.14% from 2019 to 2022. Additionally, based on a CAGR of 1.01% from 2018 to 2021, global tea exports are anticipated to reach 2,000 million kilograms by 2025.

Keywords: Change Point, cost of production, forecasting, gross sales average, production, tea market

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DOI:

Introduction

Tea is one of Sri Lanka's most vital exports and a major source of employment. Recently, Sri Lanka's tea market experienced significant volatility, following the 2022 currency depreciation and macroeconomic crisis. In general, in this study, we choose Gross Sales Averages (GSA) to examine variability and trends in prices. The objective of this study is to conduct a comprehensive analysis of the Sri Lankan tea market by leveraging changepoint detection and data-driven forecasting techniques, with a particular focus on Gross Sales Average (GSA) prices across Low Grown (LG), High Grown (HG), and Western High Grown (WHG) tea grades. By identifying significant change points, the analysis enables the detection of historical price shocks and potential regime shifts. Additionally, forecasting techniques are applied to project future price trends, supporting strategic decision-making for stakeholders in the tea industry. This research aims to uncover key market shifts, both local and global, since recent economic disruptions by integrating historical price data, cost of production metrics, and global production/value trends (using CAGR). The study aims to provide actionable insights and strategic recommendations that strengthen Sri Lanka's competitiveness in the global tea market, informing policy and investment decisions. Previous research in commodity price modelling has shown the effectiveness of time series models in capturing market dynamics. However, few studies combine changepoint detection with forecasting in the context of auction-based tea markets. Existing Sri Lankan tea price studies often lack integration of cost structures and production trends, leaving a gap that this research aims to fill.

A change point (also called a breakpoint) is a time of discontinuity in a time series data structure. These changepoints occur in mean, variance, frequency, trend and autocorrelation or combined. Changepoint detection methods have been developed in many different application areas such as Climatology (Beaulieu, Chen, and Sarmiento 2012; Reeves et al. 2007), Finance (Górecki, Horváth, and Kokoszka 2018), Environmental Science (Cucina, Rizzo, and Ursu 2018), Oceanography (Killick et al. 2010), and Econometrics (Bai and Perron 2003). Moreover, these abrupt variations occur due to changes in recording equipment and observers, station location changes, measurement techniques, environmental changes, food production shocks, fluctuations in commodity prices and exchange rates. (Reeves et al. 2007). Changepoint detection improves the modelling and prediction of time series. A model could perform poorly or even fail when the change points occur in the data (Shi et al. 2022).

The first section of this study provides a Literature review and an overview of the Sri Lankan tea industry, highlighting its historical importance, current market dynamics, and the key challenges faced both locally and globally. The second section outlines the methodology, detailing the data sources, change-point detection techniques, and forecasting models used to analyse price volatility and trends. The third section presents the results and discussion. Finally, the conclusion summarises the key findings, offers strategic recommendations, and discusses the implications for market players and policymakers.

Literature Review

The Sri Lankan tea industry is highly esteemed in the international tea market for its premium quality and rich heritage. The tea industry is vital to the nation's economy since it is contributing significantly to Gross Domestic Product (GDP), employment, and foreign exchange earnings. The tea productions are categorised under 3 main geographical regions as High grown (Above 1200 meters - Nuwara Eliya, Udupusellawa, Uva, Dimbula), Medium Grown (MG) (From 600 meters to 1200 meters - Kandy) and Low Grown (From Sea level to 600 meters - Ratnapura, Ruhuna). Because of these different climatic regions, a tea product gives different flavours and aromas.

According to the Annual National Accounts of Sri Lanka, 2023 (DCS, 2024) of the Department of Census and Statistics, growing tea contributed 0.7% to Gross Domestic Product (GDP) at current market prices in 2023. The report also noted that the Agricultural sector contributed 8.3% to the GDP, and the tea cultivation accounted for 7.9% of the agricultural sector. This leading agricultural export provides direct and indirect employment to nearly one million people and covers about 4% of the country's land area (Pure Ceylon Tea, 2022). Another reason of the Sri Lankan tea industry is crucial to the nation's economy, as employment in the industry has grown, with more people engaged in tea-related activities in both small holders and plantation sectors.

In 2022, Sri Lanka was the fifth in producing tea but was fourth in 2021 and the third largest exporter in the World. Sri Lanka has long been a leading exporter of tea to the global market, consistently holding this prominent position over the years. Sri Lanka has established itself as a major force in the global tea market, renowned for its high-quality teas. The primary method for selling tea produced in factories is through public auction. The Colombo Tea Auction, the world's second-largest tea auction next to Mombasa in Kenya, handles approximately 5 Mn kgs to 7 Mn kgs of tea weekly. 95% of Sri Lanka's annual tea production is sold through public auctions (e-auction, 2024). A considerable amount of foreign exchange is gained annually by the Sri Lankan tea Industry. However, since many countries took safety measures to contain the spread of COVID-19, which resulted in lower global demand for tea in 2021 (International tea market: Market situation, prospects and emerging issues, 2022). The market

crashed due to a combination of reduced global demand and oversupply in East Africa that yielded more tea than expected (Bermúdez, Voora, & Larrea, 2024). More recently, the economic and agricultural supply chain disruptions caused by Russia's invasion of Ukraine and war activities in Iran and Israel have impacted international tea prices. The conflict has reduced tea demand from several countries (Andae, 2022), and the cost of exporting tea has nearly tripled due to major shipping lines stopping operations and a shortage of merchant ships (Kitimo, 2022).

In India and Sri Lanka, tea cultivators and pickers are struggling as prices have fallen while production costs have risen due to inflation (Preetha, 2023). Sri Lankan tea cultivators face additional challenges due to a financial crisis, causing inflation and excessive food prices. This situation lowers tea yields and quality following the government's 2021 ban on chemicals, which tea farmers resulted in a half drop in yields, causing significant financial losses across entire plantations and pushing many farmers deeper into poverty (Bellalou, 2022; SAAPE, 2022). A few multinational companies control several processes from field input supply to tea-bag retail and strongly influence price-setting dynamics throughout the value chain (SAAPE, 2022). These companies also have considerable power at auctions, where they can impact both price movements and demand for certain tea qualities through their buying policies (Farmers and workers: About tea, 2023).

According to the China Tea Marketing Association (CTMA), green tea is the most representative staple tea in China, and CTMA optimises the industrial layout, strengthens technological innovation, promotes the integration of production and marketing, and creates new high-quality productivity of the green tea sector. At the launch of the China-Kenya Tea Trade Centre, it was announced that Kenya and China are exploring bilateral cooperation to achieve an annual trade volume of five million kilos of tea between the two countries. Additionally, they will focus on promoting the value addition and branding of Kenyan tea. It appears that China is increasingly importing black teas as its younger consumers trend towards milk tea and other less traditional offerings. (Snail, 2023). This is a huge challenge for other tea-producing countries. Since there are new countries emerging as markets for Kenyan tea, during 2023, it was notably recorded a significant increase in exports was noted, and these markets usually import tea in value-added form. Moreover, the Indian tea market faces rigid competition from alternative beverages such as coffee, fruit juices, and energy drinks. Consequently, India may increase its tea exports to the global market. Given that India is a main competitor of Sri Lanka, it can be conclusively stated that this will impact the Sri Lankan tea market. In other traditional markets, including Pakistan, the Middle East, and Russia, tea consumption continues to grow. On the other hand, Europe and North American markets are increasingly favouring apparently more "healthful" botanicals, rather than using *Camellia sinensis* products, which is changing the insights of tea among populations with significant spending power and established tea-drinking habits (Snail, 2023).

The gradual decrease in tea production in Sri Lanka from 2018 to 2022 poses a risk to its share in the global tea market. This trend may lead to other countries with more stable or increasing tea production capabilities acquiring Sri Lanka's market share. Major tea-producing countries have increased their production over this period, and the Sri Lankan tea industry faced significant challenges in 2022 that impacted its sustainability and growth due to the fertiliser ban and the economic crisis, which led to reduced production (SLTB, 2022). Additionally, the industry has struggled with increasing production costs, limited land availability, a lack of suitable land for new tea plantations, labour shortages, climate change, and intense global market competition. Climate change threatens tea production by affecting crop yields and quality (Perera, 2020). One of the main challenges facing the tea industry in Sri Lanka is to be globally competitive and to increase productivity. Secondly, since the higher production costs will negatively impact the ability to compete in the global tea market with countries like India, Vietnam, China and Kenya, their COP is comparatively low. H1: Ownership concentration does not affect firm-level stock return.

Methodology

For this study, data were taken from several sources which are Sri Lanka Tea Board (SLTB), Department of Census and Statistics of Sri Lanka (DCS), Export and Development Board of Sri Lanka (EDB), Forbes & Walkers Tea Brokers (Pvt) Ltd (F&W), Tea Exporters Association of Sri Lanka (TEA), Tea Board of India, Tea Board of Kenya, World Trade Commodities (WTC) and web sources referred to were mentioned in the report where necessary. Monthly GSA data from 2017 to 2014 were used to forecast. Annual data from 2017 to 2024 for production, exports, and GSA were used to discuss market dynamics.

Among the most popular algorithms proposed for change-point detection are the binary segmentation algorithm (Scott and Knott, 1974; Sen and Srivastava, 1975) and the Pruned Exact Linear Time (PELT) (Killick et al., 2012). In order to detect change points in the time series of the average price indices, we apply the PELT algorithm for all three elevation-wise prices. Post-change-point, average-based models were used to forecast prices. These models were selected due to their interpretability and were validated with the Mean Absolute Percentage Error

(MAPE) from actual prices. Tea production and cost data were mapped alongside price trends to assess profitability. Seasonal alignment and cost-pressure periods were highlighted. CAGR is a useful measure to understand the mean annual growth rate of an investment, production, or any other business metric over a specified period longer than one year. It provides a smooth annual rate that captures the effect of compounding over the period in question. The formula for calculating CAGR is:

$$CAGR = \left(\frac{V_f}{V_i} \right)^{1/n} - 1 \quad \text{where: } V_f = \text{final value, } V_i = \text{initial value \& } n = \text{number of years}$$

CAGR can be used for various metrics, including production levels, revenue, export quantity, price, investment returns, or market growth, providing a consistent growth rate over the specified period. We used CAGR is to calculate the prediction of global production, exports and consumption.

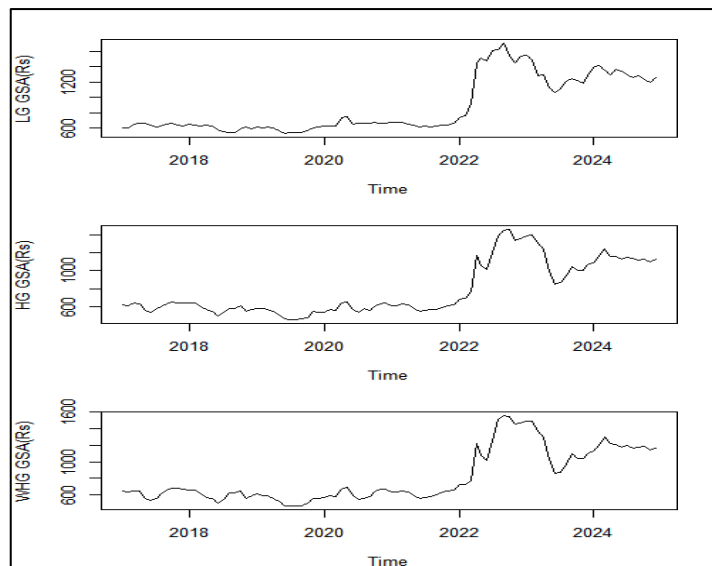
Findings and Discussion

Figure I illustrate the GSA of LG, HG, and WHG from January 2017 to December 2024. There was a significant sudden increment starting from the year 2022 in all elevations. Therefore, we searched for changepoints using the PELT method and found a changepoint in April 2022 in the variance. A clear shift in price levels and volatility was identified post-2022. All three grade categories exhibited this structural change, though with varying intensity. These were plotted and shown in Figure II. Then we used the post-changepoint structure of the time series to forecast GSA for all three elevations. These forecasts achieved around a 10% difference from actual prices over the 2024–2025 validation period, supporting the reliability of simple average models are better. The forecasted prices and percentage errors are given in Table I and shown in Figure III.

Then we used the ARIMA model to forecast the same. For the simple Average method is given Mean Absolute Percentage Error (MAPE) for LG, HG, and WHG are 17%, 34% and 10%. But ARIMA models give 48% for HG and LG elevations, while WHG gives 51%.

Figure 1

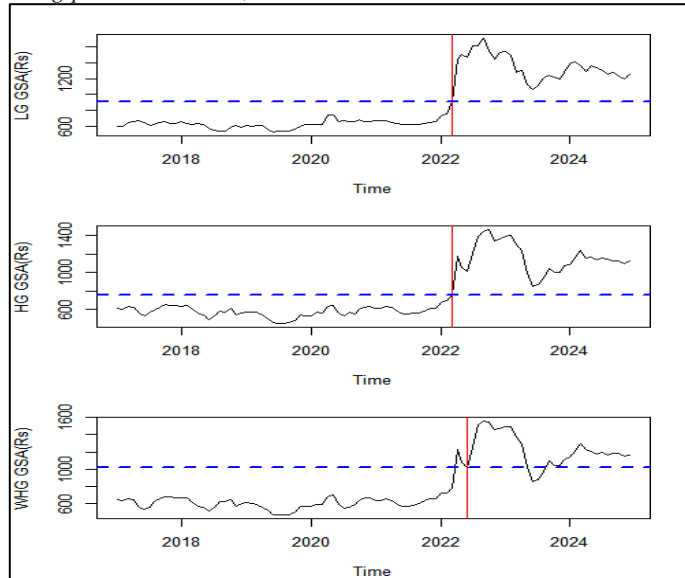
GSA (Rs) of LG, HG 2017 to 2024



(Source: Authors' Compilation)

Figure 2

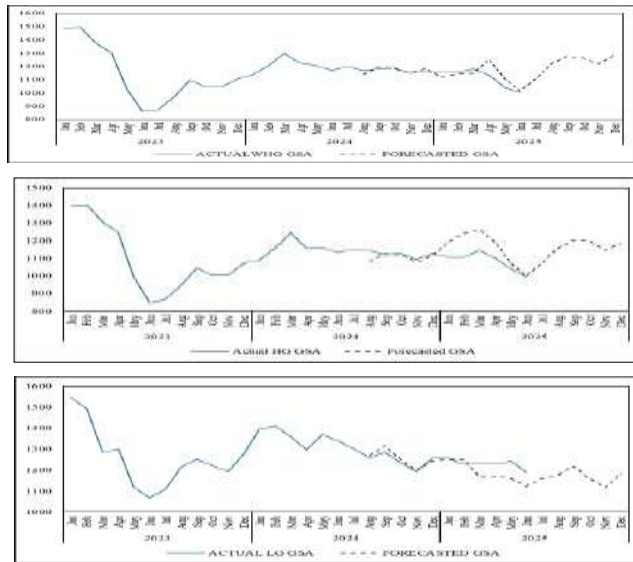
Change point detected in LG, HG and WHG GSA in 2022



(Source: Authors' Compilation)

Figure 3

Forecasted GSA (Rs) Vs Actual and WHG from for all three elevations



(Source: Authors' Compilation)

Table 1

Forecasted GSA Value for HG, LG and WHG for 2025

Year	Month	LG			HG			WHG		
		Actual	Forecasts	% Error	Actual	Forecasts	% Error	Actual	Forecasts	% Error
2024	Aug	1256.62	1268.82	-1%	1142.30	1084.04	5%	1167.84	1139.31	2%
	Sep	1282.63	1313.97	-2%	1121.04	1125.39	0%	1179.61	1193.51	-1%
	Oct	1233.29	1248.15	-1%	1127.71	1121.11	1%	1185.8	1182.04	0%
	Nov	1191.89	1197.76	0%	1092.89	1079.32	1%	1147.84	1147.12	0%
	Dec	1253.76	1240.86	1%	1128.16	1115.76	1%	1165.57	1182.83	-1%
	Jan	1255.60	1250.35	0%	1105.66	1191.83	-8%	1156.86	1115.89	4%
2025	Feb	1225.50	1245.92	-2%	1105.71	1238.68	-12%	1155.01	1142.03	1%
	Mar	1236.32	1168.43	5%	1144.99	1262.57	-10%	1179.69	1147.27	3%
	Apr	1228.65	1171.36	5%	1101.21	1191.62	-8%	1132.58	1249.07	-10%
	May	1240.70	1158.84	7%	1038.64	1070.72	-3%	1037.91	1104.53	-6%
	Jun	1187.39	1123.82	5%	996.85	997.88	0%	1002.06	1014.84	-1%

(Source: Central Bank Annual Report, 2022 & Tea Board of Sri Lanka, CTTA Annual Report 2024/2025)

Table 2

Annual tea production and total tea cultivated area in Sri Lanka from 2019 to 2023

Year	Annual Production (Mn Kgs)	Total Cultivated Area (Hectares (ha))
2019	300.1	235,001
2020	278.9	265,750
2021	299.5	266,606
2022	251.8	267,187
2023	256.1	269,000
2024	262.7	271,000

(Source: Central Bank Annual Report, 2022 & Tea Board of Sri Lanka, CTTA Annual Report 2024/2025)

During the year 2022, the national tea production of the country was recorded as 251.8 Mn kg. This decrease of 48 Mn kgs, which was 16% when compared to the year 2021. Then, during the year 2024, the tea production was recorded as 262.7 Mn kgs. Though this represents an increase of 6.6 Mn kgs, which was not a significant increase. According to Tea Board statistics, when compared to the first quarters of the years 2024 and 2025, the production of tea increased about 4.86 Mn kgs in the first quarter of 2024, which was a 2.4% increase (Table III).

Reducing the Cost of production is vital in the plantation sector. There is a significant relationship between labour productivity and the cost of production (COP) in the tea industry, as the tea production system requires a large workforce. Sri Lanka has the highest COP among major tea-producing countries (SLTB, 2022). For the period 2018 to 2024, the COP per kilogram of made tea has escalated steeply. Increased labour costs and higher prices of fuel and other needed inputs have significantly increased production expenses. According to the Department of Census and Statistics (Provisional), the annual cost of tea production in 2023/24 is Rs. 963.83 per Kg, which is an increase of 8.9 % against 2022/23, while 50.8% against 2021/22. Sri Lanka exports tea as bulk tea, Tea in packets, Tea bags, Instant Tea and Green Tea. Sri Lankan Tea Exports in metric tons for the period 2017 to the first quarter of 2024 are given in Table III.

Table 3

Sri Lanka tea exports from 2017 to 2023

Tea Exports (MT)	2017	2018	2019	2020	2021	2022	2023	2024
Bulk	125,629	122,428	122,844	118,251	125,388	110,453	103,328	111,074
Tea in packets	134,509	131,256	139,080	118,176	128,344	110,765	108,036	101,818
Tea bags	21,701	21,578	22,913	22,173	24,665	21,673	23,230	25,584
Instant Tea	2,122	2,481	3,071	2,843	3,032	3,076	2,801	2,623
Green Tea	5,023	4,620	4,749	4,126	4,587	4,222	4,516	4,687
Total	288,984	282,363	292,657	265,569	286,016	250,191	241,912	245,788

(Source: Tea Exporters Association Sri Lanka (<https://teasrilanka.org/statistics>) and F & W)

However, in the case of tea exports, there was an increase of 8.9 % for bulk tea in 2024; however, there was a decrease of 5.7% for packeted tea in 2024 compared to 2023. Total tea exports in 2021 were 286.02 Mn kgs, and in 2024, they decreased to 245.78 Mn kgs by 14.1%. However, the demand for packeted tea was higher than the bulk tea over the years from 2017 to 2023. Moreover, over the period 2021 to 2023, tea bag exports of 24.67 Mn kgs in 2021 decreased to 23.23 Mn kgs in 2023, but slight increase of 2.3 Mn Kgs in 2024. In comparison with 2022, an increase 18 % export of tea bags in 2024. Sri Lanka's green tea and instant tea exports are not so high despite global demand for green tea. However, the demand for green tea is higher than that of instant tea over the period.

Table 4

National elevation averages (Rs/kg) from 2020 to 2023 with the variance of 2022/2023

Elevation	2020	2021	2022	2023	2024	Variance 2023/2024	% Variance
High	580.90	587.13	1093.10	1072.48	1141.63	69.15	6.4%
Medium	553.94	550.80	1030.82	1012.35	1064.48	52.13	5.1%
Low	666.32	644.23	1339.86	1252.15	1304.38	52.23	4.2%
Overall	628.21	615.44	1234.24	1171.29	1225.17	53.88	4.6%

(Source: Sri Lanka Tea Board and F & W Tea Brokers (Pvt) Ltd)

Comparing 2023 and 2022, a decline of GSA has been noticed in all HG, MG and LG elevations (Table IV). However, in 2024, the average price recorded an increase of all elevations but less than 7%. Averages of all elevations in the second quarter of 2025 are lower than the second quarter of 2024 (Table V).

Table 5

Elevation-wise averages in the first quarters of 2023 and 2024

Elevation	2024 – 2 nd Quarter	2025 – 2 nd Quarter
High	1153.23	1078.13
Medium	1098.61	1029.89
Low	1359.05	1228.85
National	1265.67	1158.54

(Source: F & Ws Brokers (Pvt) Ltd)

Sri Lanka's tea export volumes are given in Table VI. While tea exports declined in 2023 compared to 2022, a slight recovery was seen in 2024 which is 3.9 Mn Kgs. A slight increase in the export tea quantity was notable in the 2nd quarter of 2025, when compared to 2nd quarter of 2024. The revenue earned increased by 5% is not a significant amount, it can be seen a positive increase in 2025. According to Forbes and Walker Statistics in March, Tea Export Revenue of US \$ 1365.42 Mn was recorded in 2024 which is a 4.06% increase compared to 2023. Export earnings from tea, which made up 12% of merchandise exports, increased by 18.43 % to US\$ 131.6 Mn in December 2024 compared to December 2023.

Table 6

Tea exports quantity and value from 2020 to 2023 of Sri Lanka

Year	Quantity (Mn Kg)	Value (Rs Bn)
2020	265.57	230.17
2021	286.02	263.35
2022	250.19	411.09
2023	241.91	428.29
2024	245.79	NA

(Source: F & W Tea Brokers (Pvt) Ltd / *NA-Not Available)

Labour costs in Sri Lankan tea plantations are substantially higher compared to other countries for producing the same amount of tea. Sri Lanka enforces an attendance-based minimum wage for tea estate workers, giving it the highest labour wage rate among all black tea-producing nations. However, higher wages directly contribute to increased production costs for tea, potentially making Sri Lankan tea less competitive in global markets, unless productivity improves or higher prices are fetched for premium tea varieties. Refer to Table VII. In contrast, in India and Kenya, labour costs are relatively lower, enabling them to produce tea at a more competitive rate on the global market (Balachandran, 2022). This cost discrepancy has put a burden on Sri Lanka's tea exports, as buyers might opt for more cost-effective sources from India or Kenya.

Table 7

Comparison of the daily labour wage rate of Sri Lanka, Kenya and India

Country	Wage/kg in USD		Daily Labour Wage Rate
	2022	2024	
Sri Lanka	3.11	0.23	20 kg a day/LKR 1350 Daily Wage
Kenya	1.00	0.08	45 kg a day/KSH 516.45 Daily Wage
Assam, India	1.25	0.07	34 kg a day/INR 204 Daily Wage

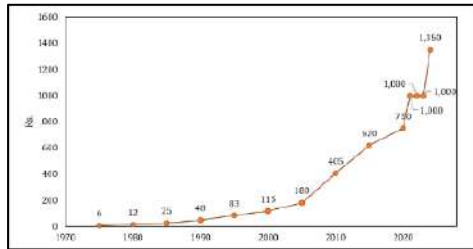
(Source: Authors' Compilation)

Refer to Figure IV to see the daily labour wage rates changes from 1970 to 2024. Sri Lanka's tea industry, particularly the Regional Plantation Companies (RPCs), is burdened by the highest production costs globally, which makes it challenging to remain competitive in the international tea market. A significant factor driving these high costs is labour, which accounts for 65% to 75% of the total production costs at the green-leaf stage (Ariyaratne, 2023). In Kenya, labour costs make up about 50% of the cost of production during the green leaf stage and roughly 20% during the processing stage. This more balanced labour cost distribution is due to higher efficiency and mechanisation in tea production. In India, the labour share of the total production cost at the green

leaf stage is between 40% 50%, while the labour cost during the processing stage is minimal, at less than 5%. These differences highlight why India and Kenya have lower production costs compared to Sri Lanka, where labour makes up a much larger proportion of total costs. This structure allows Kenya and India to be more competitive in the global tea market (Balachandran, 2022)

Figure 4

Daily labour wage rates from 1970 to 2024



(Source: Authors' Compilation)

Global tea production experienced a compound annual growth rate (CAGR) of 1.86% from 2018 to 2022 and is expected to reach 6,790 million kilograms by 2025. Global tea consumption is projected to reach 6,300 million kilograms in 2025, with a CAGR of 1.14% from 2019 to 2022. Additionally, based on a CAGR of 1.01% from 2018 to 2021, global tea exports are anticipated to reach 2,000 million kilograms by 2025. According to the Sector Overview – Tea and Value-added Tea Sector report by the Ministry of Sri Lanka, the global tea market was valued at USD 66.74 billion in 2020, with a CAGR of 6.54% (Sector Overview – Tea, Value-added Tea, Beverages and Related Industries Sector, 2022). Based on this growth rate, the global tea market value is projected to reach USD 81.02 billion by 2025.

Conclusion

Forecasting GSA prices using changepoint analysis and time series models is not just a statistical exercise, which also provides strategic insights that improve market transparency, operational stability, and global competitiveness of Sri Lanka's tea sector. Since MAPE for LG, HG, and WHG are 17%, 34% and 10% less than MAPE for ARIMA models, given 480% for HG and LG, and WHG 510% which implies the simple average method is more suitable to predict GSA in all elevations. Further, the Changepoint analysis gives better forecasting. Predicted GSA helps exporters and brokers align marketing, pricing strategies with forecasted prices, allows better resource planning (labour, plucking cycles, processing capacity) by anticipating high and low-price periods, and government and plantation companies can design subsidy programs, justify fertiliser and fuel support and promote value-added initiatives.

Tea production in Sri Lanka declined from 2018 to 2022, causing a loss of market share to more stable producers. The 2021 ban on chemical fertilisers severely disrupted yields and farmer incomes. Though it reversed quickly, the damage was already done. Tea is a major export for Sri Lanka, but wage fluctuations affect profitability, and the industry's heavy dependence on manual labour, unlike more mechanised producers like Kenya and India, increases production costs and lowers global competitiveness. Countries like Kenya benefit from lower labour costs and larger, more efficient estates, further disadvantaging Sri Lankan tea in global markets. Moreover, Global tea consumption is projected to reach 6,300 million kilograms in 2025, with a CAGR of 1.14% from 2019 to 2022. Additionally, based on a CAGR of 1.01% from 2018 to 2021, global tea exports are anticipated to reach 2,000 million kilograms by 2025.

While agricultural recovery began in late 2022, the tea industry still faced high production costs due to increased prices for inputs and utilities. Despite this, auction prices at the Colombo Tea Auction reached record highs, showing price resilience; therefore, Sri Lanka's tea industry remains vital and resilient. To sustain global presence, the sector must adopt sustainable practices, diversify products and markets, and promote value-added exports. Strategic improvements are needed for better production planning, expanded product lines, improved harvesting schedules, and stronger sales networks. Research and innovation are key to long-term competitiveness in the global tea industry. Post-COVID, global demand has increased for teas with health benefits. Green, fruit, and herbal teas have gained popularity due to their immune-boosting and calming properties, presenting new growth opportunities for Sri Lankan tea producers. As a world-renowned tea-producing country, it is imperative for Sri Lanka to rethink its strategies and find innovative ways to meet global demand.

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PHYGITAL PATHWAY IN RETAIL INDUSTRY: A SYSTEMATIC LITERATURE REVIEW AND BIBLIOMETRIC ANALYSIS ON KEY DRIVERS OF CONSUMER PURCHASING BEHAVIOUR

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Abstract

This research presents a systematic literature review and bibliometric analysis of the flow of physical marketing (physical+digital) from 2018 to 2025. This article presents the results of an analysis of 38 peer-reviewed articles using the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) to investigate what are the key drivers that affect consumer purchasing behaviour through phygital services and what are the main topics and trends in this research area. The analysis indicates rapid research production, especially after an upsurge in COVID-19, and the most prominent areas of focus are the study of customer experience, digital transformation, omnichannel approaches, and the use of technology. The research results show that developed markets are the most physically deployed, and emerging economies are struggling with infrastructure-related deployment and adoption. Examples of new trends include the use of AI to incorporate personalisation, sustainability, and the metaverse. The review provides insight into the concept of retail transformation and hybrid consumer experiences and has theoretical implications as well as practical implications for researchers, marketers, and practitioners in developed and emerging markets.

Keywords: Phygital marketing, digital channels, retail transformation, emerging markets, hybrid consumer experience

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DOI:

Introduction

Phygital is an emerging concept in the marketing world that highlights the innovation of digital touch point technologies. Phygital marketing encompasses both the physical and digital experiences of a consumer. The field is still in its infancy, and it creates space for customers to experience innovative customer experiences without interruption. Although phygital marketing applies to several different sectors, it is particularly prominent in the retail industry (Jacob et al., 2021). Under phygital systems, consumers can easily connect with physical and virtual environments without any complexity, taking advantage of the simplicity and personalisation of digital technology and providing a better customer experience. Effective marketing, innovation, consumer engagement and consumer behaviour depend on awareness and intention to purchase phygital products. Augmented reality (AR), virtual reality (VR), and the Internet of Things (IoT) assist in making the transition to physical goods possible, as they allow businesses to create more interactive and engaging experiences (Anwar et al., 2025).

According to Jacob et al. (2021) that the correctly managed phygital experience requires the appearance of new marketing potential, such as journey design, touchpoint prioritisation, and strategic resource allocation. They present a six-step approach, which was based on Design Science Research Methodology (DSRM), and provided a structured approach to managing customer interactions in hybrid environments, which can address an important gap in the modern approaches to marketing. Furthermore, managing customer experiences across physical and digital channels has become a challenge facing marketers and businesses today. To address this challenge, many companies, including Allianz and Walmart, have allocated significant resources to strategically manage customer experiences across the three dimensions of channel stage, channel type, and channel agent (Jacob et al., 2021).

Although the literature on the topic of physical marketing and digital transformation is growing, the majority of research is focused on single tools, luxury brands, or developed markets, and their understanding of consumer experience and technology use is fragmented. However, there is little evidence to synthesise the key drivers that guide consumer purchasing behaviour across physical settings, and especially in emerging economies. Moreover, existing research has failed to integrate behavioural constructs, including perceived usefulness, ease of use, trust, engagement, and satisfaction. This is a research gap that limits theoretical progress in retail transformation as well as managerial decision-making. Thus, the proposed study will help address these gaps by using a systematic literature review (SLR) and bibliometric analysis of 38 peer-reviewed articles published in 2018-2025 to determine the most important consumer drivers, emerging technologies, and research trends in physical marketing. Accordingly, it intends to answer the following research questions by verifying them step by step through the literature.

RQ1: What are the key factors that impact consumer purchasing behavior in phygital service?

RQ2: What are the emerging technologies in consumers' purchasing behavior?

RQ3: What are the key trends in publications periodically?

Literature Review

The consumer experiences are changing as phygital services fuse physical and digital interactions to provide people with smooth, exciting, and curated journeys. Taking advantage of tools like augmented reality, virtual reality, and automatic pay technologies improves convenience, trust, and perceived value, thus affecting purchasing behaviour (Anwar et al., 2025; Johnson & Barlow, 2021). In this paper, we will consider five components, including Perceived Usefulness, Perceived Ease of Use, Consumer Trust and Security Concerns, Consumer Engagement, and Consumer Satisfaction, regarding how these elements will influence Consumer Purchasing Behaviour. Other possible factors of social influence and cultural context notwithstanding, the chosen variables take precedence due to the immediate connection with technology adoption and the value of experience in phygital terms (Anwar et al., 2025; Johnson & Barlow, 2021).

The study design is based on the developed technology and consumer behavioural theories that characterise how consumers embrace and react towards phygital services. The variables that indicate the important drivers of technology adoption in hybrid retailing settings, based on the Technology Acceptance Model (TAM) (Davis, 1989), and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003), include perceived usefulness, ease of use, trust, satisfaction, and engagement. Moreover, there is a behavioural basis of phygital stimuli (AR, VR, AI experiences) to emotional and cognitive responses of consumers, which eventually influence satisfaction and purchase behaviour, explained in the Stimulus Organism Response (SOR) model (Mehrabian & Russell, 1974).

Consumer purchasing behaviour

Consumer purchasing behaviour, as such an important dependent variable, also depends on the integration of physical and digital components in phygital services (Massi et al., 2025). This behaviour is built on better customer engagement and personalisation, which are quite essential in creating intent toward patronisation by a consumer. Ultimately, the cohesion of technology and real-life experiences might eventually be able to enhance customer satisfaction and affect buying decisions positively (Massi et al., 2025).

Perceived usefulness of phygital services

Perceived usefulness of phygital services is determined by their ability to flawlessly combine real-world interactions with high-tech digital tools, which in turn improves the product experience of the consumer and products. Phygital services enhance the attachment to products employed through the combination of the physical experiences of the products or skilled simulations thereof and, through simplifying the use of digital means of payment, lessen the pain of payment, raising the intentions to purchase and satisfaction with the purchase (Johnson & Barlow, 2021).

Perceived ease of use of phygital services

Perceived Ease of Use of Phygital Services implies the achievement of a problem-free integration of the digital and physical channels, with a unified customer experience (Hyun et al., 2024). It is a technology-based strategy that merges with the digital and real worlds and offers a more engaging and enjoyable experience (Mikheev et al., 2021). An emphasis on this variable will make the convenience of online services a part of the physical interaction advantages. An effective phygital environment enhances customer experience by enabling access to information with reduced perceived risk for a consumer (Hyun et al., 2024).

Customer trust

Consumer trust is paramount in the development of phygital services. Such negative practices as the lack of qualifications of a product manager and false advertising can cause a trust crisis, and customers will be much more suspicious and unwilling to purchase something (Chen, 2024). The lack of inspection and control of the new shopping mode can also foster an unfavourable environment among the consumers and reduce the level of trust to the corresponding extent, and subsequently influence the purchasing behaviours (Chen, 2024).

Consumer engagement

Consumer engagement is the conscious attention, emotional involvement, and active participation of consumers in a brand's services or products, which is the fundamental basis for their behavioural intentions and their loyalty (Anwar et al., 2025). It strengthens consumer interactions in phygital retail environments by strengthening emotional and cognitive connections between consumers and brands (Anwar et al., 2025).

Consumer satisfaction

In the retail industry, customer satisfaction is the overall evaluation of a customer's shopping experience, achieved through the integration of digital and physical. It acts as an antecedent variable that determines customer loyalty and repurchase intentions. Customer satisfaction strongly influences customers' repurchase decisions (R et al., 2025).

Methodology

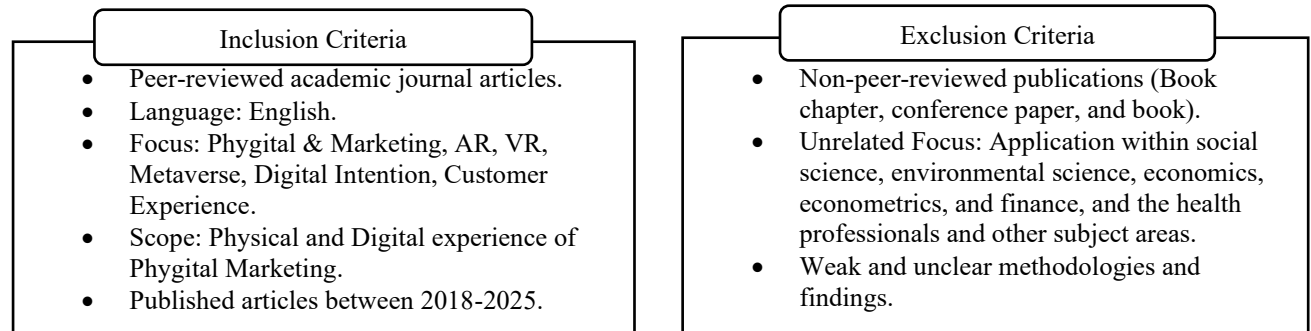
The research under this study was structured using a stepwise approach to literature review (SLR) according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) (Page et al., 2021). The SLR methodology provides transparent, replicable, and complete coverage of the literature on digital marketing with minimal selection bias and high-quality results (Tranfield et al., 2003). The authors analysed the literature from Scopus (2018-2025) on various aspects of phygital marketing, such as phygital marketing strategies, business improvement, new trends, customer experience, AR, VR, Metaverse, and digital intention of consumers. (38 peer-reviewed articles) The search terms focused on the keywords "Phygital and Marketing", "Digital Transformation", and "Phygital Trends" using Boolean operators (AND/OR) to help businesses and marketers identify marketing strategies and make decisions about new trends.

Bibliometric analysis was performed to complement the systematic review using tools such as VOSviewer to create keyword correlations, network analysis, and thematic cluster maps that directly show the drivers behind the action a consumer takes to purchase a product. Bibliometric clusters constructed with the VOSviewer were examined considering parameters like minimum co-occurrence balances and transparently correlated to the five

constructs, usefulness, ease of use, trust, engagement and satisfaction, to provide rigorous conformity to the research aims. A combination of PRISMA and bibliometrics was chosen to ensure that the study selection was rigorous, repeatable, and quantifiable in terms of identifying research trends and relationships. The narrow dataset of 38 articles was determined by strict inclusion/exclusion criteria, and recent, high-quality studies (2018-2025) were emphasized to remain reliable and relevant. The frequency parameter has been considered in all bibliometric parameters, such as the frequency limits of the keyword analysis, and the network mapping parameters have been appropriately taken for this study to highlight the most influential concepts without overemphasizing the less useful studies. This study is based entirely on secondary published data; no human participants were involved, and ethical approval was not required.

Figure 1

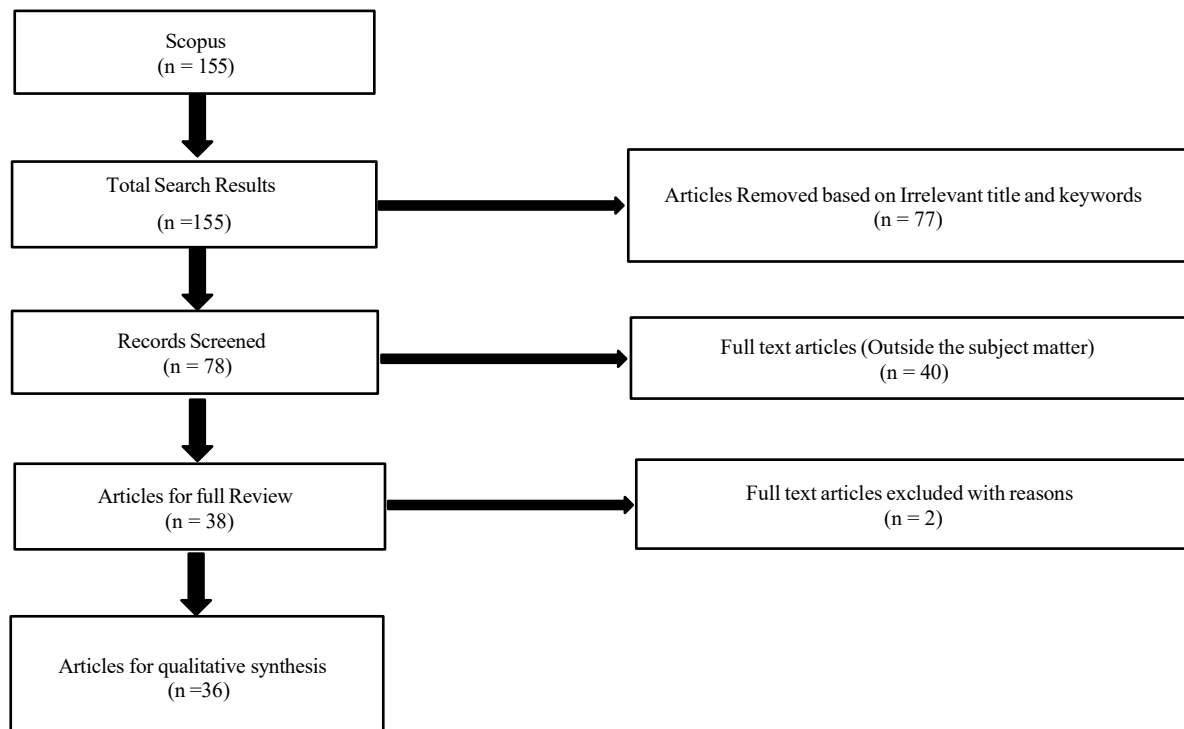
Inclusion and exclusion criteria for study selection



(Source: Authors' Compilation)

Using the PRISMA guidelines, we first abstracted 78 articles (36 journal articles and 2 reviews) relevant to our study in a transparent and easily searchable manner, and then further studied them, selecting 38 articles relevant to our topic and excluding the rest. The flow chart is shown in Figure 2.

Figure 2



(Source: Authors' Compilation)

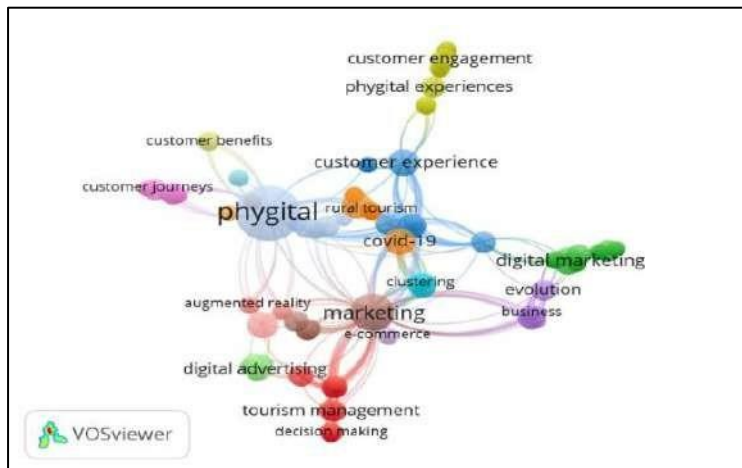
Findings and Discussion

A systematic review of 38 peer-reviewed articles on Phygital Marketing reveals key strategies, customer experience, and new dimensions that play a role in marketers' decision-making and the direction of phygital marketing. Other sections include author analysis, publication year analysis, and co-occurrence analysis. Figures 3 to 5 are presented for clarity.

Figure 3 shows a co-occurrence analysis of all 232 keywords, highlighting the various sub-factors associated with phygital and marketing. In addition, the top 5 citations related to this analysis are listed in Table 1. The largest and most interconnected keyword is phygital, and it serves as the conceptual centre uniting several streams of research. There is a range of interrelated themes that surround this core and cover operating, strategic, and experiential aspects of the phygital paradigm. Indicatively, based on clusters involving customer experience (Batat, 2022; Massi et al., 2025), customer engagement, and customer journeys (Jacob et al., 2021), the research field associated with a human-centred approach to the customer is demonstrated, with an emphasis on how hybrid physical-digital experiences supersede consumer behaviours and service provision. The other clusters of connections grasp the technological and strategic bases of phygital marketing, such as digital marketing, e-commerce, digital advertising, and augmented reality (Faruk et al., 2025), which helps prove the incorporation of the new technologies into the marketing approaches.

Figure 3

Co-occurrence analysis



(Source: Authors' Compilation)

Table 1

Core documents identified through bibliometric analysis

	Documents	Citation	Total Link Strength
1	S., Monaco, Salvatore; G., Sacchi, Giovanna (2023) Travelling the Metaverse: Potential Benefits and Main Challenges for Tourism Sectors and Research Applications Vol. 15	89	15
2	A., Pangarkar, Aniruddha; V., Arora, Vibha; Y.S., Shukla, Yupal Sanatkumar (2022) Exploring phygital omnichannel luxury retailing for immersive customer experience: The role of rapport and social engagement Vol.68	59	68
3	P., Del Vecchio, Pasquale; G., Secundo, Giustina; A., Garzoni, Antonello (2023) Phygital technologies and environments for breakthrough innovation in customers' and citizens' journey. A critical literature review and future agenda Vol.189	46	189
4	X., Liu, Xuerui; D., Wang, Dan; U., Gretzel, Ulrike (2022) On-site decision-making in smartphone-mediated contexts, Vol.88	42	88
5	W., Batat, Wided (2024) What does phygital really mean? A conceptual introduction to the phygital customer experience (PH-CX) framework, Vol 32, pp.1220 - 1243	40	32

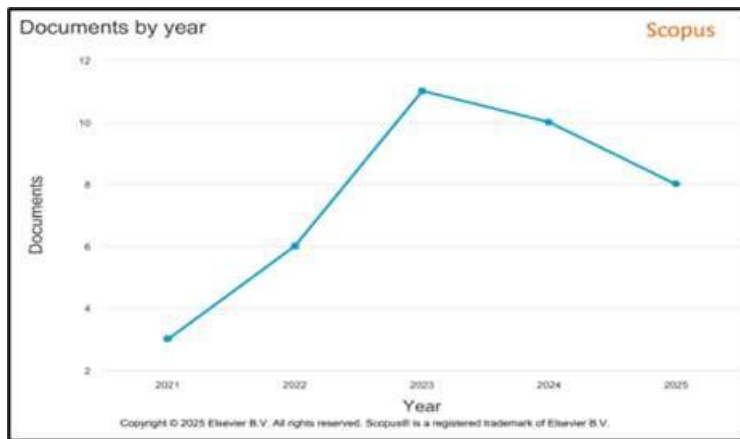
(Source: Authors' Compilation)

As shown in Figure 4, we use the 38 articles to illustrate how they have been published per year. According to this diagram, we can conclude that the phygital marketing concept has gained wider adoption globally following the COVID-19 pandemic. According to our study, researchers have started to investigate the phygital marketing concept since 2018. According to this analysis, approximately 10 articles are published annually on this topic. Of our 38 articles, 3 were published in 2021, 6 in 2022, 11 in 2023, 10 in 2024, and 8 in 2025. This reveals that the

study of this phygital marketing concept is likely to become an emerging trend in the coming years. This trend of growth corresponds to the results of Massi et al., (2025), who also noted that the adoption of phygital has increased faster after the pandemic, as the population of the target audience is more attached to combining retail experiences. Our discussion supports the fact that COVID-19 served as a game-changer in terms of digital transformation, which is also emphasized by (Batat, 2024).

Figure 4

Year analysis

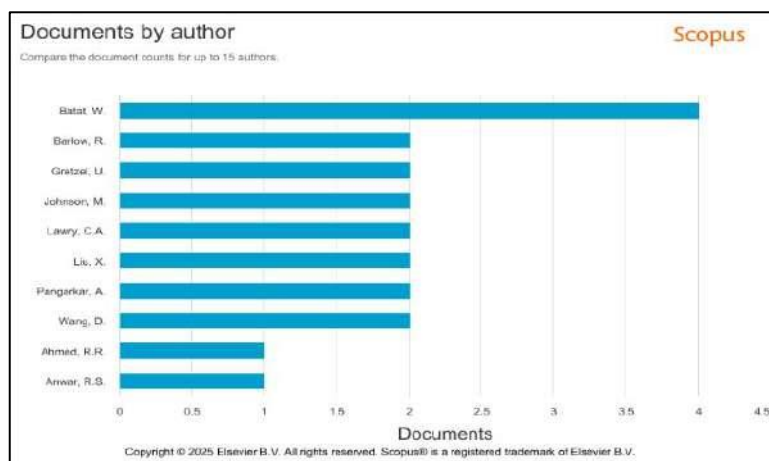


(Source: Authors' Compilation)

This includes an analysis of the authors to determine the most influential contributors to the field of physical marketing. Considering Figure 5, the most prolific faculty was Batat, W., who selected four papers, and therefore, a strong academic focus on phygital-related topics, including customer experience and hybrid branding approaches. The above authors, Ahmed, R.R., and Anwar, R.S., also show that each article has increased the research work done by third-world countries and other marketing-related researchers. The fact that the contributions are relatively evenly distributed and that only Batat's output is dominant suggests that the field remains open and needs to be further developed, with more opportunities for scholars to explore and create further theory. The focus of publications by Batat (2024) is consistent with the first steps, the Phygital Customer Experience (PH-CX) framework, but researchers' findings indicate the spread of contributions by developing regions, which indicates the diversification and upcoming research outside of Europe.

Figure 5

Authors' analysis



(Source: Authors' Compilation)

Conclusion

This study reviewed 38 articles (2018-2025) on the key factors affecting phygital services, new technologies, and new trends affecting phygital marketing, and the research periods conducted on phygital marketing. Our analysis shows that each of these key variables affects consumer purchasing behaviour, as well as the development of phygital marketing, such as AI, VR, kiosks, Metaverse. Our analysis can emphasise that there has been a wide growth in phygital marketing, especially after the COVID-19 pandemic. These results provide theoretical insight into how phygital technologies shape hybrid consumer experiences and extend the Phygital Customer Experience framework. Practically, marketers can leverage AI, AR, VR, and Metaverse tools to enhance engagement, satisfaction, and brand loyalty. Limitations include the small sample of 38 articles, reliance on the Scopus database, and a focus on research from developed regions. Researchers recommend that future research expand the practical use of emerging technologies such as AR, VR, Metaverse in the retail industry using mixed methods and conduct studies on the reuse intention of phygital service.

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THE INFLUENCE OF VIRTUAL INFLUENCER ATTRIBUTES ON CUSTOMER ENGAGEMENT IN THE SRI LANKAN FASHION INDUSTRY

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Abstract

The research examines how the three most significant features of virtual influencers (VIs) in the guise of anthropomorphism, aesthetic value, and entertainment value initiate consumer engagement within the context of Sri Lankan fashion. A quantitative research design was used, with a methodical online survey to collect data from 300 digitally active Sri Lankan fashion consumers. The data was analysed using multiple regression analysis to understand the predictive significance of each independent variable in relation to consumer involvement. The findings validate that VIs are most likely to interact with individuals who are human-like and handsome. The implications of the findings are profound for online fashion brands and digital marketers, as virtual influencers' personalities and appearances need to lean towards realism and aesthetics to garner maximum consumer engagement and interaction. This is particularly important in emerging economies where the uptake of digital technology is becoming increasingly rapid. This study contributes to the digital marketing literature by extending the Stimulus-Organism-Response (S-O-R) framework to virtual influencers in an emerging market context, providing practical guidance for fashion brands in Sri Lanka. Future studies would benefit from using larger population samples, such as those from rural and elderly populations, and employing longitudinal or mixed methods designs to track changes over time. Further studies could also examine the ethical implications, such as trust and authenticity, in the use of virtual influencers.

Keywords: Aesthetic value, anthropomorphism, consumer engagement, fashion industry, virtual influencers

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Proceedings of the 16th International Conference on Business and Information - ICBI 2025 © 2025 by The Faculty of Commerce and Management Studies, University of Kelaniya, Sri Lanka is licensed under CC BY-SA 4.0.

DOI:

Introduction

The current global business landscape is deeply rooted in uncharted digital transformation, profoundly redefining industries, communication models, and customer habits worldwide (Brodie et al., 2011). Such widespread digitalisation has transformed the shift from traditional advertising to embracing new paradigms within the ever-evolving digital landscape. Among these emergent tactics, the most notable is the leveraging of influencer marketing, which capitalises on the power of people to create genuine connections between consumers and brands (Lou & Yuan, 2019). In a digital environment, activating high-strength customer engagement (CE) has been on the priority lists of organisations looking to establish brand loyalty, influence purchases, and achieve sustainable commercial profitability (Hollebeek et al., 2014). CE is a multifaceted construct encompassing various exposures of consumers to brand communications beyond mere exposure. It comprises cognitive engagement, as supported by active attention and information processing, and by the interaction among brands and consumers' mental engagement with brand content; affective engagement, as indicated by attachment feelings and positive affect towards emotional attachment to brands; and behavioural engagement, as indicated by overt behaviours such as liking, commenting, posting, actively searching for brand information, and following on social media (Brodie et al., 2011; Hollebeek et al., 2014; Lou & Yuan, 2019).

The nation is experiencing a fierce digital adoption wave, reflected in ever-rising internet penetration levels and widespread utilisation of mobile phones, which has anchored social media in position as a hub for communication, information acquisition, and increasingly, a business platform (Wijerathna & Wijesundara, 2022). Empirical research confirms that social media marketing certainly improves Sri Lankan consumers' buying behaviour in the apparel sector (Francis et al., 2024). Although influencer marketing is a relatively underdeveloped yet fast-growing sector in the country, it is increasingly being seen as a crucial strategic requirement for local and international brands seeking to create effective consumer experiences (Samaradiwakara, 2023; Wijerathna & Wijesundara, 2022). Sri Lankan consumers, particularly urban Generation Z youth who are well-versed in technology, heavily rely on individuals who possess apparent fashion awareness when making informed purchasing decisions and are inclined to adopt their examples (Samaradiwakara, 2023; Wijerathna & Wijesundara, 2022).

Existing research on influencer marketing in Sri Lanka has focused on celebrity endorsement through humans and micro-influencers, experimentally testing their traditional attributes of influencing consumer behaviour (Samaradiwakara, 2023; Wijerathna & Wijesundara, 2022). Still, the function, efficacy, and nuance of consumer reactions to virtual influencers (VIs) - a facet of a qualitatively distinct form of endorser with no physical presence and lived experience - are over explored in this context (Francis et al., 2024). There is technology available for high-end digital aid in a culture that is highly devoted to authenticity, verifiable expertise, and impartial judgments by opinion leaders (Samaradiwakara, 2023; Wijerathna & Wijesundara, 2022). While global studies have extensively examined the impact of human influencers on consumer engagement, there is a noticeable lack of research on virtual influencers, particularly within the Sri Lankan fashion industry. Prior research on influencer marketing has largely centered on human influencers, emphasising factors such as attractiveness, credibility, and authenticity in shaping consumer behaviour (Brodie et al., 2011; Kim & Sundar, 2012). Although recent studies have begun to explore virtual influencers, they have primarily focused on global or Western markets, offering limited insights into emerging contexts (Goyal & Bhardwaj, 2025). However, little is known about how attributes like anthropomorphism, aesthetic appeal, and entertainment value of VIs influence consumer perceptions and behavioural intentions in emerging economies. This gap is particularly relevant to Sri Lanka, where digital adoption in the fashion industry is growing rapidly, yet consumers remain cautious about authenticity and trust in virtual environments. Addressing this gap extends the S-O-R framework to a new cultural and technological setting, contributing both to academic literature and providing practical guidance for Sri Lankan fashion brands aiming to leverage VIs effectively. This gap is significant as the growing presence of virtual influencers presents new opportunities and challenges for brands in shaping consumer perceptions and engagement in the local context. The entire virtual platform of VIs necessarily limits how much they can offer tangible product experiences or share 'real-world' information, which may be contrary to local consumers' desires for genuine endorsements (Seo & Jin, 2023). To address this specific gap, the following research objectives are considered,

RO1: To examine the influence of virtual influencer anthropomorphism on customer engagement with fashion brands in the Sri Lankan fashion industry.

RO2: To investigate the influence of virtual influencer aesthetic value on customer engagement with virtual influencer content in the Sri Lankan fashion industry.

RO3: To identify the influence of virtual influencer entertainment value on customer engagement toward fashion-related content in the Sri Lankan fashion industry.

Literature Review

Virtual influencers in digital marketing

Virtual influencers are digital characters designed to mimic human behaviour, managed by brands, designers, or content creators (Donda Pati, 2025; Mouritzen et al., 2024). These VIs frequently promote fashion products on platforms like Instagram, YouTube, and TikTok through carefully curated visuals and narratives (Varghese, 2025; Yang, 2025). Prominent examples, such as Lil Miquela and Shudu Gram, demonstrate that audiences can form connections with these virtual personas, like those formed with human influencers (Goyal & Bhardwaj, 2025; Nasr et al., 2025; Seyedzadeh, 2024).

Customer engagement in digital fashion marketing

Customer engagement is a multifaceted concept encompassing the emotional, cognitive, and behavioural interactions consumers have with brands (Brodie et al., 2011). Within the realm of social media, this translates into tangible actions such as likes, comments, and shares, as well as sustained following, brand loyalty, and active advocacy. According to Hollebeek et al. (2014), engagement extends beyond a simple reaction to content; it represents an evolving and ongoing relationship between the consumer and the brand. Social media influencers, including their virtual counterparts, play a pivotal role in nurturing this relationship.

Anthropomorphism and customer engagement

Anthropomorphism is the attribution of human characteristics, emotions, and intentions to non-human entities (Epley et al., 2007). In marketing, this often leads to increased emotional attachment and trustworthiness with brands or characters (Aggarwal & McGill, 2007). When virtual influencers are designed with human-like features such as expressive facial gestures, a distinct fashion sense, or personal life narratives, they can foster a sense of social presence and perceived realism (Kim & Sundar, 2012; Li & Sung, 2021). Accordingly, the first hypothesis is developed as follows:

H1: The anthropomorphism positively affects the consumer engagement in the Sri Lankan fashion industry.

Aesthetic value of virtual influencers

Aesthetic value refers to the perceived visual attractiveness or artistic appeal of an object, which, in the context of this discussion, applies directly to the virtual influencer and their content (Bloch, 1995). In the realm of digital marketing, particularly within the fashion industry, visuals are paramount in shaping consumer perceptions, defining brand identity, and influencing consumer responses (Pham & Avnet, 2009). In accordance with that, the second hypothesis is developed as follows:

H2: The aesthetic value positively affects consumer engagement in the Sri Lankan fashion industry.

Entertainment value in virtual influencer content

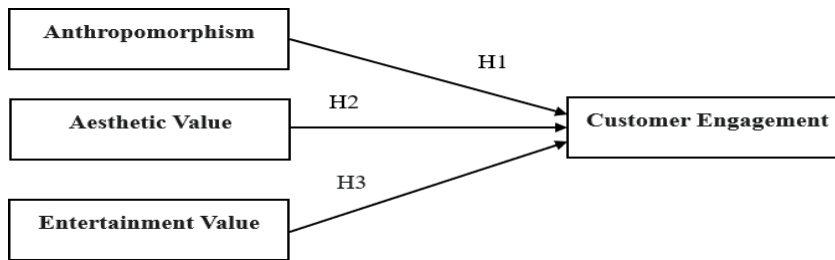
Entertainment value refers to the degree of amusement, enjoyment, and emotional stimulation that the content provides (Ducoffe, 1996). In the world of influencer marketing, entertainment is a major force driving engagement. It elicits positive emotional responses and encourages users to spend more time engaging with the content. Ashley and Tuten (2015) highlighted that entertaining content, especially when it includes humour, compelling narratives, or novelty, helps create emotional connections with followers. For virtual influencers, their ability to craft creative storylines, join popular trends, or offer unique, personality-driven humour significantly boosts their appeal. Accordingly, the third hypothesis is developed as follows:

H3: The entertainment value positively affects the consumer engagement in the Sri Lankan fashion industry.

Theoretical underpinning

This study is theoretically grounded in the Stimulus-Organism-Response (S-O-R) framework, originally proposed by Mehrabian and Russell (1974). This framework posits that environmental stimuli (S) influence an individual's internal states or 'organism' (O), which subsequently leads to a behavioural response (R). In the context of this research, the characteristics of virtual influencers serve as the stimuli (S). Specifically, anthropomorphism, aesthetic value, and entertainment value are considered the key stimuli emanating from the virtual influencer. These stimuli are hypothesised to affect the internal states of consumers, forming the organism (O). This 'organism' encompasses consumers' cognitive and emotional responses, including their perceptions and attitudes towards the virtual influencer and the fashion content they consume. Finally, these internal states are expected to influence consumers' observable responses (R), which, in this study, are measured through various dimensions of customer engagement (e.g., likes, comments, shares, brand loyalty).

Figure 1
Conceptual framework



(Source: Authors' compilation)

Methodology

This study adopts a positivist research philosophy (Saunders et al., 2020). A deductive quantitative approach was employed, and a cross-sectional time horizon survey was conducted. The study focuses on urban adolescents aged 18-35 years old, as they are the most technologically engaged and fashion-conscious generation in Sri Lanka; nevertheless, the lack of inclusion of rural and elderly demographics is acknowledged as a methodological limitation.

The study was conducted primarily in urban and semi-urban areas, focusing on digitally active consumers in Colombo and other urban cities where influencer culture is more popular. Primary data was collected via a self-completed, standardised web questionnaire, distributed through WhatsApp, Facebook, and Instagram platforms. Items were adapted from existing, validated instruments and scored on a 5-point Likert scale. Due to the absence of a comprehensive sampling framework, purposive sampling was deemed the most suitable sampling method for this study. The sample consisted of 400 participants selected through purposive sampling based on their salience, and only those who had previously been exposed to virtual fashion influencers were included. Screening questions were used to check compliance. SPSS was used to analyse data, beginning with descriptive statistics to detail demographic and behavioural profiles and to test hypotheses. Multiple linear regression was performed. The operationalisation table clearly presents each variable along with its respective dimensions, indicators, and measurement scales adapted from established sources. Specifically, anthropomorphism includes 5 indicators, aesthetic value has 5 indicators, entertainment value comprises 5 indicators, and customer engagement consists of 15 indicators across three dimensions: cognitive engagement (5), affective engagement (5), and behavioural engagement (5), all measured using a five-point Likert scale to ensure reliability and consistency.

Validity and Reliability

All criteria for validity and reliability were satisfactorily met. Factor loading values for each of the four indicators consistently surpassed the threshold of 0.7. Cronbach's alpha values for all significant variables exceeded the standard threshold of 0.7, thereby confirming the reliability of all variables in the questionnaire. Furthermore, each of the Kaiser-Meyer-Olkin (KMO) values and Average Variance Extracted (AVE) values exceeded 0.5, and all significance values for Bartlett's Test were below 0.05. The square root of the AVE for each variable also surpassed the corresponding inter-construct correlations, providing additional confirmation of construct validity.

Results and Analysis

Demographic information, including gender, age, occupation status, and monthly income of the respondent, was collected to enhance the value of the final research outcomes. Frequency analysis was conducted for each demographic variable in the current research, namely gender, age, occupational status, and monthly income. There are 148 male respondents out of the total number of respondents (300), whereas there are 152 female respondents. A larger group of respondents (268) falls in the 18-29 years age group, which accounts for 89.33%. A total of 185 respondents, or 61.67%, are working respondents. Most of the respondents have a monthly income of Rs. 41,000 to Rs. 60,001, and it is 95 in number.

Table 1
Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.964 ^a	.930	.929	.57765

a. Predictors: (Constant), A, AV, EV, CE

(Source: Survey data)

The model summary indicates a very strong correlation between the independent variables anthropomorphism (A), aesthetic value (AV), entertainment value (EV), and customer engagement (CE) and the dependent variable as seen from a high multiple correlation coefficient ($R = 0.964$). The R Square value of 0.930 indicates that 93% of the variation in the dependent variable is explained by the combined effect of these predictors, which reflects an excellent model fit. The Adjusted R square of 0.929 confirms that the model is still stable after being adjusted for the number of predictors, and there is minimal overfitting. Furthermore, the standard error of the estimate is relatively low (0.57765), indicating that the model's predictions are highly like the actual observed values.

Table 2
ANOVA table

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	863.715	4	215.929	647.117	.000 ^b
	Residual	65.067	195	.334		
	Total	928.782	199			

a. Dependent Variable: CE

b. Predictors: (Constant), A, AV, EV

(Source: Survey data)

Table 2 indicates that the regression model is significant. The F-statistic value of 647.117 with a p-value (Sig.) of .000 indicates that the combined effect of the predictors anthropomorphism (A), aesthetic value (AV), and entertainment value (EV) significantly predicts the variation in the dependent variable, cognitive engagement (CE). The large sum of squares for the regression (863.715) compared to the residual (65.067) also clearly demonstrates that the model accounts for a significant portion of the variation in CE. The model, therefore, provides a valid and relevant explanation for the effect of the virtual influencer attributes examined on cognitive engagement.

Table 3
Coefficients table

Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.397	.327		-1.217	.225
	A	1.027	.120	1.261	8.559	.000
	AV	1.076	.055	1.107	19.481	.000
	EV	.038	.064	.028	.592	.024

a. Dependent Variable: CE

(Source: Survey data)

The regression coefficients indicate that aesthetic value (AV) and anthropomorphism (A) exert a statistically significant and strong positive effect on cognitive engagement (CE), with beta values of 1.261 and 1.107, respectively, and p-values of 0.000. This suggests that increases in these variables are positively related to high cognitive engagement. Although entertainment value (EV) has a very low standardised beta (0.028), its p-value of 0.024 indicates that EV is statistically significant at the 5% level, though not practically significant. The constant is not statistically significant ($p = 0.225$) and doesn't contribute much to the model. Although standardised coefficients theoretically range between -1 and +1, the beta values for anthropomorphism and aesthetic value exceed 1, likely due to multicollinearity or strong intercorrelations among predictors. This indicates that these variables share overlapping explanatory power regarding cognitive engagement, and their effects should be interpreted in conjunction rather than in isolation. Overall, all three independent variables significantly impact cognitive engagement, but anthropomorphism and aesthetic value are the most effective.

Table 4

Hypotheses after testing

H1: The anthropomorphism positively affects the consumer engagement in the Sri Lankan fashion industry.	Accepted
H2: The aesthetic value positively affects the consumer engagement in the Sri Lankan fashion industry.	Accepted
H3: The entertainment value positively affects the consumer engagement in the Sri Lankan fashion industry.	Accepted

(Source: Authors' compilation)

Discussion

The findings revealed that anthropomorphism had a significant and positive influence on consumer engagement from all three perspectives. Consumers responded more cognitively, emotionally, and behaviourally to virtual influencers that were more human-like in their facial expressions, gestures, and emotionally intelligent utterances. This result aligns with the theoretical position that anthropomorphic cues make people perceive non-human agents as social beings (Kim & Sundar, 2012). In the Sri Lankan context, where social cues and interpersonal warmth are culturally valued, the realistic characteristics of virtual influencers create familiarity and trust, and therefore, users are more likely to actively interact, follow, and engage with these virtual characters. Aesthetic value also emerged as a prominent driver of affective and behavioural engagement (Pham & Avnet, 2009). Visually appealing virtual influencers generated more engagement and resulted in more intense behavioural activities such as liking, sharing, or following. These findings suggest that aesthetic consistency, fashion sense, and visual branding are accountable for the degree of emotional attachment users have towards virtual influencers. Entertainment value proved to be an important predictor of cognitive and behavioural engagement. Entertaining content, whether humorous, dramatic, or creatively presented, engages users and encourages them to reflect on the content as well as react through actions such as commenting or sharing (Ashley & Tuten, 2015). In an environment where stimuli are abundant, the virtual influencer's ability to surprise or entertain becomes a key point of differentiation, particularly for younger consumers accustomed to emotionally engaging, fast-paced media content.

Conclusion

The empirical contribution of this study is the proof that the attributes of virtual influencers, including anthropomorphism, aesthetic value, and entertainment value, influence consumers' engagement in the context of Sri Lanka's fashion industry. Aesthetic value is found to facilitate emotional connection and behavioural participation, especially in the visually responsive fashion industry, while entertainment value, although less pragmatically efficient, remains statistically significant in enabling cognitive participation and web activities. The results not only prove the efficacy of VIs in enabling consumer behaviour but also highlight the strategic importance of integrating human-like, visually engaging, and creatively evocative components in virtual persona design. Second, the study employed a cross-sectional survey design, which takes a snapshot at a single point in time. Third, while focusing on cognitive engagement as the dependent variable allows for close examination, a larger model incorporating effective and behavioural engagement as separate dependent constructs may yield greater understanding.

Future Research Directions

Future studies can expand the sample to include different age groups and rural areas to ensure generalisability. A longitudinal study is also possible to track trends in consumer engagement in the long run. Qualitative methods, such as interviews, can also provide more nuanced insights into how users perceive them. Future research may employ structural equation modelling (SEM) to provide a more comprehensive and rigorous examination of the interactions between factors, extending beyond the direct impacts assessed by regression analysis in the current study. Examining ethical concerns, trust, and transparency regarding virtual influencer promotion, particularly in culturally sensitive environments such as Sri Lanka, would also be beneficial. Finally, comparative studies between virtual and human influences can suggest differences in performance and popularity.

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EXPLORING THE INFLUENCE OF E-STORE IMAGE ON CONSUMER SEARCH INTENTIONS: A SUSTAINABLE MARKETING PERSPECTIVE

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Abstract

This study investigates the dimensions of e-store image information quality, atmosphere, and convenience impact on Generation Z consumers' search intentions in online clothing retail, with search attitude examined as a mediating variable. Drawing on the Theory of Reasoned Action (TRA), a conceptual framework was developed and tested using data from 342 Gen Z consumers in Sri Lanka's Central Province. Quantitative methods, including correlation, regression, and structural equation modelling (SEM), were employed to assess both direct and indirect effects. The findings show that search intention is considerably and favourably influenced by all three aspects of an e-store's image. Of these, atmosphere has the most impact, followed by convenience and the quality of the information. Furthermore, it was discovered that search attitude somewhat mediates the impacts of information and atmosphere and totally mediates the association between convenience and search intention. These results highlight how crucial it is to provide an engaging and easy-to-use online environment to influence favourable customer perceptions and boost search engagement. The study has useful ramifications for online retailers: Gen Z-specific tactics like immersive content and expert design can increase engagement, while improving the online environment with uniform aesthetics and interactive design can improve the user experience. The study offers a comprehensive understanding of e-store influence in digital retail by integrating search and attitudinal aspects of online decision-making. Geographical and product-specific scope, as well as unmet consumer categories that do not develop strong e-store perceptions, are some of the limitations. Future studies should look at cross-cultural validity, the variations between desktop and mobile experiences, and the effects of visual design on behaviour using experimental tools like eye-tracking. The study's overall findings emphasise how important e-store image is in shaping sustainable customer search behaviour in a cutthroat online market.

Keywords: Atmosphere, convenience, information, search attitude, search intention

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DOI:

Introduction

The advancement of information technology has significantly accelerated the development of online shopping in Sri Lanka (Kuruwitaarachchi et al., 2018). This digital transformation has led to a rapid increase in the number of e-commerce platforms and virtual retail outlets. According to traditional brick-and-mortar retailers have increasingly expanded their operations into the online domain, while dedicated online brand stores have also evolved, gaining maturity and market share. As a result, online platforms have become critical commercial spaces for many enterprises. Among various product categories, apparel, footwear, and bags have emerged as presiding segments in online retail, displaying higher sales volumes compared to other consumer goods. With continued economic growth, the frequency of clothing purchases has increased, positioning fashion-related products as a key component of the fast-moving consumer goods (FMCG) market in the digital retail landscape (Wang et al., 2025).

In this context, the e-store image incorporates elements such as layout, navigation, pricing, product display, and visual aesthetics play a critical role in shaping consumer attitudes and decisions (Patricija Gedmontaitė, 2024). At the information search stage, consumers rely on high-quality, visually appealing and tempting, well-structured websites to reduce perceived risk and increase confidence. The Theory of Reasoned Action (TRA) supports the notion that e-store image is an antecedent to consumer attitude. Because young consumers are highly fashion-conscious and environmentally aware, the trend toward sustainable clothing is gaining predominance. E-store image, therefore, also reflects sustainable values, which can strengthen consumer loyalty. Given the intense competition in online retail, understanding how e-store image influences consumer search attitude and intention over both decision-making stages is essential for developing effective, sustainable marketing strategies.

Thus, we propose the research questions,

RQ1: How do the information quality, atmosphere, and convenience of an e-store influence consumer search intentions in the context of online shopping?

RQ2: To what extent does search attitude mediate the relationship between the e-store image dimensions (information, atmosphere, and convenience) and consumer search intentions?

RQ3: How does the sustainable marketing perspective of an e-store's image impact consumer search intentions, and how does search attitude influence this process?

Literature Review

Theory of Reasoned Action (TRA)

According to the Theory of Reasoned Action (TRA), an individual's behavioural objective is determined by their attitude toward the behaviour and subjective norms, which are influenced by the availability of resources and social expectations. Attitude reflects a person's evaluation of or interest in performing a particular behaviour, and the stronger the positive attitude, the more likely the behaviour will occur. In the context of online shopping, TRA has been widely applied to explain how various beliefs influence consumer attitudes and intentions (Tran & Nguyen, 2022). Building on this substructure, the present study conceptualises information quality, atmosphere, and convenience as three key dimensions of e-store image as independent variables that shape consumer search attitude, which acts as a moderating variable between these beliefs and search intention, the study's dependent variable. In this model, the e-store image serves as a belief-forming mechanism that indirectly affects consumer search intentions through their search attitude, in line with TRA's assertion that internal psychological factors, rather than external variables alone, play a critical role in shaping behavioural outcomes. Therefore, the study extends the TRA framework by focusing on how specific aspects of e-store image influence the cognitive and affective processes behind sustainable online search behaviour.

E-store image

The concept of e-store image, derived from customary store image theory, refers to consumers' overall insight of an online retail environment based on its functional and psychological attributes (Jiang et al., 2023). These perceptions form a multidimensional structure, containing factors such as information quality, convenience, atmosphere, enjoyment, service, and uncertainty (Almaiah et al., 2022). For this study, the dimensions of information, atmosphere, and convenience are emphasised as the key independent variables influencing consumer behaviour during the online search process. Information quality encircles the accuracy, reliability, timeliness, and depth of product or service data presented by the e-store (Manuzon, 2023). Atmosphere, frequently referred to as online aesthetics, which reflects consumers' awareness of the website's visual appeal and design style, contributes

to their emotional engagement with the site. According to Cristina (2024), convenience refers to the ease and efficiency of steering the site, completing transactions, and accessing relevant information, key aspects that reduce intellectual effort and enhance user experience. Together, these components shape a consumer's search attitude, which serves as a mediating variable that reflects their evaluative disposition toward engaging in online product searches. According to Bogdiun (2022), this attitude, in turn, most importantly influences their search intention, defined as the likelihood or willingness to continue searching for products or information within the e-store environment. By focusing on these specific e-store image attributes, this study aims to explain how design and functional elements of online stores impact consumer cognition and behaviour, thereby providing insights into effective, sustainable marketing strategies.

Search attitudes

Consumer attitudes are defined as an individual's overall evaluative disposition, either favourable or unfavourable, toward objects, behaviours, or ideas, and they significantly influence consumer decision-making. In the context of online shopping, attitudes are not directly observable behaviours but internal predispositions that guide behavioural intentions and subsequent actions (Eshpulatov et al., 2025). This study focuses specifically on search attitude, which reflects consumers' positive or negative estimate of engaging in online information search activities within an e-store environment. As supported by existing literature, consumer attitudes serve as a mediating variable, translating the effect of external stimuli into behavioural intentions. In this model, information quality, store atmosphere, and convenience, three dimensions of the e-store image, serve as independent variables that shape the user's cognitive and emotional evaluation of the online search process. A well-organised, visually attractive, and user-friendly e-store experience can positively influence a consumer's search attitude by reducing effort, increasing engagement, and enhancing trust (Mehmet Ozan Karahan & Fatih Şahin, 2025). This, in turn, significantly contributes to the consumer's search intention, which is the dependent variable and refers to the likelihood that the consumer will continue seeking product or brand-related information online. Identifying the critical role of search attitude in driving online consumer behaviour offers valuable insights for e-retailers aiming to optimise website design and functionality as part of a sustainable marketing strategy.

Search intention

According to Pham et al. (2024), search intention represents the possibility that consumers will actively seek out product-related information through online platforms, and it is considered a key predictor of actual online search behaviour. Embedded in the Theory of Reasoned Action (TRA), intention reflects an individual's conscious readiness to engage in specific behaviour, which in this context involves the use of e-stores for information recovery. Search intention is influenced by the consumer's evaluation of the online shopping environment, including the perceived quality of information, visual atmosphere, and ease of navigation, which function as the independent variables in this study (Dua & Uddin, 2022). These dimensions of the e-store image shape a consumer's search attitude, defined as the positive or negative evaluation of engaging in online search activities. A well-structured website offering relevant, authentic information, an aesthetically pleasing and emotionally engaging environment (atmosphere), and a unlined, user-friendly interface (convenience) collectively enhances the consumer's attitude toward the search experience (Patel et al., 2023). In turn, this search attitude serves as a mediating variable, moderating the impact of the e-store image on the consumer's search intention, which is the dependent variable in the model. Empirical evidence suggests that a positive search attitude increases the probability of engaging in pre-purchase information seeking and, eventually, purchasing behaviour. Thus, fostering favourable attitudes through e-store design and user experience is essential for enhancing consumers' intention to search for products in a sustainable and competitive e-commerce environment.

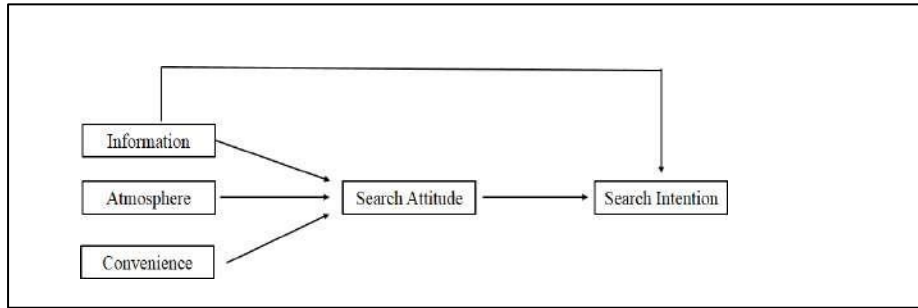
Methodology

Conceptual framework

Based on the theoretical basis of this research, this research combines e-store image (including information, atmosphere, and convenience), consumer search attitude and intention to establish the research model based on the TRA paradigm, as shown in Figure 1.

Figure 1

Conceptual framework



(Source: Authors' Compilation)

Research hypotheses

Customers' search intentions are greatly influenced by the e-store's image, especially when it comes to the website's convenience and informational atmosphere. A website that is informative and well-structured makes it easier for users to locate and assess products. Customers are more satisfied and trust high-quality and pertinent content, which encourages them to search further. Furthermore, search-friendly features like simple navigation and a well-organised structure encourage users to explore and interact with the site more. When combined, these factors increase the likelihood that customers would go into product details in the online store.

H1a: Information has a significant positive impact on consumers' e-store search intention

H1b: Atmosphere has a significant positive impact on consumers' e-store search intention

H1c: Convenience has a significant positive impact on consumers' e-store search intention

Mediating Effect of Search Attitude: Consumers' attitudes toward searching in e-stores refer to their favourable or unfavorable perceptions of online browsing behaviour. For instance, when consumers find online searches appealing or enjoy casually browsing e-stores, it reflects a positive perception of the search experience. Visual elements, such as image quality and the presence of models, significantly influence consumers' attitudes toward the e-store. In turn, these attitudes serve as powerful predictors of future purchase intentions.

Online stores that offer accurate, easy-to-access information alongside visually pleasing and trend-driven content can enhance the overall search experience. As a result, consumers develop a more positive attitude toward searching within e-stores, which in turn influences their intent to engage in future searches. Based on this reasoning, the current study puts forward the following hypotheses:

H2a: Search attitude plays an intermediary role between information and search intention.

H2b: Search attitude plays an intermediary role between atmosphere and search intention.

H2c: Search attitude plays an intermediary role between convenience and search intention.

Research Methods

Research philosophy forms the foundational beliefs and assumptions guiding the development of knowledge within a study. For this study, positivism serves as the primary research philosophy. Positivism aligns with the use of quantitative data, allowing for accurate predictions and empirical testing of hypotheses. This philosophical position is appropriate, given the availability of tangible quantitative data related to e-store image and the mediating effect of search attitude on search intention (Saunders et al., 2007). The descriptive research design reflects the experiences of respondents and provides an appropriate framework for the study. For example, it enables the reporting of demographic characteristics of a population subgroup. This research employs a descriptive design, and the sample size and sampling technique are based on the true experiences of the respondents. The purpose of the present study can be identified as descriptive hypothesis testing. Accordingly, the researcher aims to identify the influence of dependent variables and the mediating effect on search intention. The researcher seeks to conduct a descriptive study to further explore and understand the issues, as limited research has been conducted on the e-store image and the mediating effect of search attitude on search intention among Generation Z. Since the main purpose of the study is to examine the relationship between the variables, it can also be considered a correlational study.

The study will be conducted in a non-contrived setting, with a Gen Z consumer who shops on clothing websites as the unit of analysis. A structured questionnaire will be distributed to collect data from respondents. According to Sekaran et al. (2003), the unit of analysis in this research is at the individual level, specifically, a Gen Z customer who purchases from clothing websites.

Data for this study were collected for the first time, and it will be a single cross-sectional study, as data will be gathered at one point in time. The population for the present study consists of Gen Z customers in the Central Province who shop on clothing websites. The sample represents a segment of this larger population (Bryman & Cramer, 2011). The sample size for this research is 342 Gen Z customers in Central Province who shop online for clothing (Krejcie & Morgan, 1970). Primary data were collected using a self-administered, structured questionnaire with a 5-point Likert scale. The data were analysed using IBM SPSS Statistics 20.0 and AMOS 24.0. The study used correlation analysis to identify the relationship between independent and dependent variables, and regression analysis was used to test the hypotheses. Surveys, which are typical in quantitative research, were employed to sample a representative portion of the population.

Results and Analysis

Demographics

A total of 342 valid samples were composed of Gen Z, 20.5% men and 79.5% women. The proportion of women is significantly higher than that of men. On the other hand, women consumers are more impressed with the store than men consumers when buying clothing. All samples are between 19 and 28 years old. From the perspective of the education level, 54% of them are university students, 41% of them are working professionals and 5% of them are entrepreneurs. Among them, 47.6% said they would browse online stores whenever they were free, while 20% said they would browse three to five times a week and one to two times a week. A total of 32.4% of people only browse when they need to buy. In terms of online shopping frequency, 36.4% of young people buy online once a month, 29.7% buy online half a month, and 33.9% buy online more than once a week.

Measurement of validity and reliability: Validity of the questionnaire

Validity analysis indicates how accurately a method measures data. If a method measures what it claims to measure, and the results closely correspond to real-world values, then it can be considered valid. Kaiser-Meyer-Olkin (KMO) sampling adequacy is mainly used to measure the validity of the resulting instrument. In addition, all the factor loadings (KMO) values are above 0.7, and the cumulative figure is more than 50% can be concluded multi-item measurement scale is validated enough. Normally, Cronbach's Alpha ranges between 0 to 1, and it indicates that there's no lower limit to the coefficient. Cronbach's Alpha coefficient is near to 1 it conveys the message of internal consistency of the items of the variables. According to George and Mallery (2019), there are rules to interpret Cronbach's Alpha as follows: $\alpha \geq 0.9$ - Excellent, $0.9 > \alpha \geq 0.8$ - Good, $0.8 > \alpha \geq 0.7$ - Acceptable, $0.7 > \alpha \geq 0.6$ - Questionable, $0.6 > \alpha \geq 0.5$ - Poor, $0.5 > \alpha$ - Unacceptable.

Table 1

KMO and cumulative factor analysis of variable items

Variable	Items	Standard Loading	Cronbach's Alpha	Average Variance Extracted
Information	I 1	0.752	0.847	0.645
	I 2	0.841		
	I 3	0.785		
Atmosphere	A 1	0.738	0.819	0.582
	A 2	0.837		
	A 3	0.721		
Convenience	C 1	0.756	0.748	0.571
	C 2	0.821		
	C 3	0.797		
Search Attitude	SA 1	0.789	0.877	0.668
	SA 2	0.828		
	SA 3	0.841		
Search Intention	SI 1	0.787	0.810	0.528
	SI 2	0.681		
	SI 3	0.748		

(Source: Authors' Compilation)

Table 1 shows the reliability output of the survey data. According to George and Mallery (2019), the statistical figure of Cronbach's Alpha of information, atmosphere, search attitude and search intention was more than 0.8, and there was a good internal consistency among the five items. Furthermore, the statistical figure for Cronbach's Alpha of convenience was more than 0.7, and there were acceptable internal consistencies among all items of the above variables. SPSS 20.0 software was used to analyse the reliability of the overall sample data. As shown in Table 1, Cronbach's alpha coefficient overall scale was greater than 0.7, and the scale had good and acceptable reliability and high internal consistency.

The KMO and Bartlett's test results for the effective samples (N = 342) show that the sig = 0.000, which indicates that the sample data is suitable for exploratory factor analysis.

The validity test of the scale mainly consists of aggregation validity and discrimination validity. The aggregate validity of the scale was evaluated using the standardised factor load, composite reliability (CR) and average variance extracted (AVE). All the standardised factor loads of other items were greater than 0.5 and significant at 0.001. The highest composite reliability is 0.877, the lowest is 0.748, both greater than 0.6, and the AVE values for all constructions are greater than 0.5; the highest is 0.668. Therefore, aggregation validity is supported. By comparing the AVE and latent variable correlation coefficient matrix to judge the discriminant validity, the whole model has good discriminant validity.

Normality

Multivariate assumptions test normality. This study has used one of the most significant assumptions for statistical test procedures in the data to ensure the data set is normally distributed. The test of normality can be tested using either a graphical or numerical method. For the graphical method, there are two types of illustrations, including box plot analysis and histogram and in numerical methods, researchers of the present study have been using Skewness and Kurtosis analysis.

Table 2

Skewness and kurtosis statistics

Variable	Skewness Statistic	Kurtosis Statistic
Information	-0.884	0.468
Atmosphere	-1.158	1.089
Convenience	-1.692	2.456
Search Attitude	-1.652	2.985
Search Intention	-1.772	2.798

(Source: Authors' Compilation)

There is a statistical norm that if Skewness and Kurtosis slice between -3 and +3, the data set is normally distributed. Table 2 shows all the statistics of Skewness and Kurtosis are sliced between under acceptable range. Hence, the data set of the present research study has been normally distributed.

Test of multicollinearity

Multicollinearity indicates the interrelationship among independent variables in multiple regression analysis. Tolerance level and VIP values can be used to measure multicollinearity, and the tolerance level should be above 0.1, and the VIP value should not be more than 10 to run the regression analysis. According to the Present study, Table 3 shows that research output is at a considerable level.

Table 3

Test of multicollinearity

Variable	Tolerance Level	VIP
Information	0.286	3.414
Atmosphere	0.181	3.495
Convenience	0.136	5.325
Search Attitude	0.152	7.452
Search Intention	0.147	6.231

(Source: Authors' Compilation)

Table 3 indicates tolerance level and VIP values of present study. Tolerance level of information, atmosphere, convenience, and search attitude and search intention are 0.286, 0.181, 0.136, 0.152 and 0.147 respectively. All tolerance values were more than 0.01. Hence, multicollinearity is assured according to tolerance level. VIP values of information, atmosphere, convenience, search attitude and search intention are 3.414, 3.495, 5.325, 7.452, and 6.231 respectively and all VIP values were less than 10. Therefore, through the regression analysis of multicollinearity, present study has been assured of multicollinearity.

Model fit

We tested the measures of the model fit using AMOS in Table 4. The model was tested to fit well with $\chi^2/df = 3.124$ (standardized to less than 5), the root mean squared error of approximation (RMSEA) = 0.056 (standardized to less than 0.08), root mean square residual (RMR) = 0.042 (less than 0.05, which we consider a good model fit), incremental fit index (IFI) = 0.928, normative fit index (NFI) = 0.927, comparative fit index (CFI) = 0.961, and goodness-of-fit index (GFI) = 0.928 (criterion is greater than 0.90). Its demon- started a good fit between the model and the data.

Table 4

Measures of model fit

Fit Index	MIN/DF	RMSEA	RMR	GFI	CFI	NFI	IFI
Model value	3.124	0.056	0.042	0.928	0.961	0.927	0.961

(Source: Authors' Compilation)

Hypotheses testing

After examining validity and reliability, SPSS 20.0 was used to test the proposed hypotheses. The results of the main effect test between the three dimensions of online store image (information, atmosphere and convenience) and consumers' search intention are shown in Table 5. Information, atmosphere and convenience all have a significant positive impact on search intention. It is assumed that H1a, H1b and H1c pass the verification ($p < 0.001$).

Table 5

Coefficients

Variable	t	Standard coefficient	Sig.	R Square	Adjusted R Square	F
Information	7.158	0.217	0.000	0.356	0.353	156.096***
Atmosphere	8.254	0.265	0.000			
Convenience	6.875	0.199	0.000			

(Source: Authors' Compilation)

Table 6

Results of hypotheses testing

Hypotheses	Support
Ha	Yes
Hb	Yes
Hc	yes

(Source: Authors' Compilation)

Mediating effect testing

Based on the above two main effects, to test the mediating effect of consumer attitudes, this study constructed two models. The bootstrap method of AMOS 24.0 was used for parameter estimation (sampling times $N = 5000$). Table 7 shows the mediating effect.

Table 7

Results of the mediating effect test

Effect Type	Effect	p	Lowest 95% CI	Upper 95% CI
Information – search intention (direct)	0.074	0.087	-0.013	0.162
Atmosphere - search intention (direct)	0.123	0.007	0.036	0.206
Convenience - search intention (direct)	0.114	0.015	0.024	0.197
Information – search intention – search attitude (indirect)	0.184	0.000	0.128	0.265
Atmosphere – search attitude – search intention (indirect)	0.239	0.000	0.175	0.311
Convenience – search intention – search attitude (indirect)	0.139	0.000	0.067	0.206
Information – search intention (total)	0.258	0.000	0.169	0.364
Atmosphere - search intention (total)	0.362	0.000	0.284	0.456
Convenience - search intention (total)	0.253	0.000	0.151	0.331

(Source: Authors' Compilation)

The indirect path, information → search attitude → search intention, is significant with an effect value = 0.184, $p = 0.000 < 0.01$, and a 95% bootstrap confidence interval excluding zero. This shows that search attitude plays a significant mediating role between information and search intention. Meanwhile, the direct path, information → search intention, is not significant. This shows that search attitude plays a full mediating role between information and search intention. Hypothesis H2a was verified. The indirect path, atmosphere → search attitude → search intention, is significant with an effect value = 0.239, $p = 0.000 < 0.001$, and a 95% bootstrap confidence interval excluding zero. This shows that search attitude plays a significant mediating role between atmosphere and search intention. Meanwhile, the direct path, atmosphere → search intention, is also significant. The effect value = 0.123, $p = 0.007 < 0.05$, with a 95% bootstrap confidence interval excluding zero. This shows that search attitude plays a partial mediating role between atmosphere and search intention. Hypothesis H2b was verified. The indirect path, convenience → search attitude → search intention, is significant with an effect value = 0.139, $p = 0.000 < 0.001$, and a 95% bootstrap confidence interval excluding zero. This shows that search attitude plays a significant mediating role between convenience and search intention. Meanwhile, the direct path, convenience → search intention, is also significant. The effect value = 0.114, $p = 0.015 < 0.05$, with a 95% bootstrap confidence interval excluding zero. This shows that search attitude plays a partial mediating role between convenience and search intention. Hypothesis H2c was verified.

Table 8

Types of mediation roles

Dependent variables	Mediating effect	Hypothesis	Support
Information	Full	H2a	Yes
Atmosphere	Partial	H2b	Yes
Convenience	Partial	H3c	Yes

(Source: Authors' Compilation)

Discussion

The findings of this study confirm that all six proposed hypotheses are supported. Specifically, in the information search stage, the three components of e-store image information quality, store atmosphere, and convenience collectively have a positive and outstanding influence on consumers' intention to search for information. Among these measurements, atmosphere has the strongest effect, followed by information, and then convenience.

Furthermore, the study calls attention to the mediating role of consumers' search attitude in the relationship between e-store image and search intention. Drawing from the Theory of Reasoned Action (TRA), the concept of consumer attitude toward the e-store is refined and categorised as a search attitude in this context.

The data analysis discloses that search attitude partially mediates the relationship between information and atmosphere with search intention, while it fully mediates the effect of convenience on search intention. This indicates that while information and atmosphere can influence search intention directly and indirectly through search attitude, convenience can impact search intention only through its effect on search attitude.

Overall, these results exhibit that e-store image influences both search intention and purchase intention through the intermediary of search attitude, strengthening the importance of cultivating a strong and favourable e-store environment in shaping consumer behaviour.

Conclusion

This study has strongly verified the simultaneous influence of all dimensions of e-store image on consumer behaviour during the information search stage. While previous research has typically examined individual dimensions of e-store image in isolation, often focusing primarily on purchase intention, this study takes a more joint approach, offering a more realistic representation of the actual online shopping experience. It demonstrates that when multiple dimensions (information, atmosphere, and convenience) act together, they significantly affect the consumers' search intention. Furthermore, consumer attitude toward searching mediates the connection between e-store image and search behaviour, providing a more comprehensive and scientifically robust model.

This research also provides a methodological approach by integrating the two key phases of online consumer decision-making, search and purchase, into an integrated framework, focusing particularly on the search stage. While many studies explore search and purchase behaviours separately and differentiate them across different retail channels (online vs. offline), this study mainly emphasises the difference among different e-stores within the same channel. It highlights that consumers eventually choose specific retail terminals (individual e-stores) rather than broad channels. The findings clear up how various e-store image dimensions are operated differently across the decision-making stages. Specifically, information, atmosphere, and convenience are shown to significantly impact the search phase of decision-making.

This study provides valuable practical applications for e-store operators aiming to enhance consumer engagement during the information search stage. First, upgrading the search experience is crucial, particularly through advanced improvements in the online store atmosphere, which was identified as the most dominant factor affecting search intention among young consumers. A visually appealing atmosphere classified by consistent design, harmonious colour schemes, and seasonal updates can most significantly enhance the browsing experience, increasing the probability of consumers returning to and engaging with the store. Second, e-store operators should develop targeted strategies that serve specifically young consumers, who are especially responsive to engaging and immersive online environments. Investing in professionally qualified design teams, rich interactive content, and compelling visual storytelling can elevate the users' experience, encourage deeper exploration of the store, and foster long-term consumer interaction.

Despite its contributions, the study has several drawbacks. It was conducted within the Chinese market and focused entirely on online clothing stores, which may control the generalizability of the findings to other cultural contexts or product categories. Additionally, the study presumes that consumers have a pre-existing perception of e-store images. However, approximately 27.34% of respondents, especially males, did not exhibit a clear memory or awareness of specific e-stores, even though they had prior online shopping experience. These consumers generally engage in product-focused searches without forming long-lasting impressions of the stores themselves. Furthermore, the study did not investigate the reasons why some consumers fail to develop store images or how such perceptions could be cultivated, leaving a significant area for future exploration.

Future research could extend this study by verifying the model in different cultural settings, across various product types, and within service-based e-stores to determine the universality of the conclusions. Comparative studies between consumers who form strong impressions of e-stores ("imaged") and those who do not ("non-imaged") could deepen understanding of the underlying mechanisms of store image formation. Moreover, future work could distinguish between desktop and mobile shopping experiences to uncover how different platforms influence consumer perception. Experimental methods, such as eye-tracking technology, may also be employed to assess how visual elements like layout, colour, and design impact search behaviour from a cognitive and perceptual standpoint.

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THE ROLE OF MULTI-SENSORY MARKETING ACROSS LUXURY BRANDS: ENHANCING CONSUMER EXPERIENCE AND BRAND RELATIONSHIP

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Abstract

This research investigates multi-sensory marketing's ability to transform of consumer experience and strengthen the brand-consumer relationship in the luxury industry. These brands purposefully merge sensory stimuli across sight, sound, smell, touch, and taste to create immersive experiences that foster emotional attachment, sensory brand engagement, and ultimately loyalty to a brand. This study aims to synthesise findings regarding the influence of multi-sensory marketing on consumer perception, behaviours, and self-expression through a systematic review of 34 peer-reviewed articles published between 2012 and 2025. Key variables related to how sensory brand engagements and brand loyalty influence brand equity as mediators were examined. The research further highlights contextual influences, such as cultural differences and product categories, which can modify the effectiveness of sensory marketing strategies. The implications provide usable insights for luxury brands to create sustainable, genuine, culturally relevant sensory marketing strategies that can enhance consumer-brand connections and facilitate longer-term brand loyalty. This research contributes to improving theoretical understanding and gives actionable recommendations for marketers looking to exploit multi-sensory marketing in competitive luxury markets.

Keywords: Brand Loyalty, Brand Equity, Consumer Experience, Emotional Attachment, Multi-Sensory Marketing, Luxury Brands, Sensory Brand Engagement, Sustainability, Virtual Reality

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DOI:

Introduction

In the competitive luxury branding landscape, multi-sensory marketing has emerged as a key strategy to optimise consumer experience and cultivate our brand relationship. Luxury brands are creating experiences that target our multiple senses (sight, sound, scent, touch, and taste) to create immersive moments that generate a significantly more personal and evocative experience to foster stronger emotional attachment, brand loyalty, and self-expression (Petit, 2019; Sanyaphirak, 2020). Studies suggest that sensory cues have a direct effect on purchasing behaviour in the short term, while also enhancing long-term brand equity through the factors of trust, engagement, and consumer identity (Krishna, 2017; Hepola, 2017). New advancements in digital and virtual technologies have further enhanced multi-sensory engagement, offering luxury brands greater distance to deliver immersive, novel experiences through virtual realities and digital platforms (Jung, 2021; Petit, 2019). Nevertheless, substantial gaps remain regarding sensory marketing's contextual effectiveness between sociocultural contexts and product categories, as well as sensory congruence for effective overload or perceived inauthenticity (Jhamb, 2020). Identifying these barriers holds opportunities for developing tailored, sustainable, and culturally resonant sensory marketing frameworks for a wide range of luxury consumer segments across the world. In response to these gaps, we propose an innovative integrative framework which brings together Sensory Marketing Theory and Self-Expansion Theory in one single model, which has not been attempted before in the luxury brand literature. The framework explains how multi-sensory brand stimuli shape emotional attachment, leading to self-expansion, and examines how gender and store image moderate these relationships. Previous studies have only examined single senses or limited cultural contexts. Our study constructs a model to examine the understanding of multi-sensory integration, adapting it cross-culturally, and includes identity-based consumer psychology in the Sri Lankan Gen-Z luxury perfume context.

Literature Review

Multi-sensory marketing

Multi-sensory marketing engages consumers through sight, sound, smell, touch, and taste to create immersive brand experiences that affect perceptions, behaviours, and memories. (Krishna, 2012) discusses sensory elements as improvements to sensory memory and helps to deepen emotional connections to the brand. Wiedmann (2017) also extends this argument, asserting that sensory elements serve to promote consumer engagement and brand loyalty. Brands utilise visual stimuli, olfactory cues, and auditory signals such as music to convey meanings, including exclusivity and quality, and move consumers toward emotional connections and identity enactment (Spence, 2014; Petit, 2019; Verhoef, 2015). Sensory communication can inspire consumer engagement and develop a psychological connection with strong brand equity when done strategically (Krishna, 2012; Wiedmann, 2017).

Multi-sensory marketing in luxury brand contexts

Luxury goods are sold in an experience economy where the consumption process is equally, if not more, significant than the luxury product itself. In luxury retail, sensory marketing has been utilised to intentionally engage different senses to influence perceptions, assessments, and behaviours of consumers in order to create an emotional connection and differentiate the brand in the market (Shahid, 2022). This strategy elevates consumption from functioning strictly as a means to produce value toward existential emotional experiences reflecting symbolism, exclusivity, and attachment. Empirical research has demonstrated that sensory marketing can deliberately enhance branded experiences and create brand loyalty, which is consistent with inference theory that explains how cues in the environment influence perceptions of quality and patronage theory that explains how sensory cues increase the frequency of customers returning to visit or purchase again.

Luxury retailers use inherent characteristics like craftsmanship and aesthetic sensibilities to create sensory-rich retail stores. Visual components, textures to touch, ambient odours, and soundscapes are intentionally put in place to signify authenticity, exclusivity, and value. Tactile properties such as the weightiness of materials signify competence, and soft surfaces represent warmth; both factors impact social impression and the purchase decision and build a relationship with the consumer and the brand. According to Li (2025), the multisensory and structural brand experiences operate via mental imagery that increases the perceived authenticity of brands by creating either a cognitive or affective response. Sensory stimuli contribute to emotional encoding of memory, decreased cognitive dissonance, and increased emotional engagement, leading to increased perceived authenticity. Ambient scents have been noted to have an impact on proximity to products, purchase intentions, appetite, and desirability within retail contexts (Villar, 2020). The results underscore the importance of the strategic component of sensory orchestration in luxury brand management.

Impact of multi-sensory marketing on consumer experience

The consumer experience in luxury markets is inherently multidimensional, involving sensory, affective, cognitive, and behavioural dimensions. Sensory marketing harnesses numerous sensory cues to stimulate pleasure, arousal, and immersion that enhance consumers' cognitive evaluations of a brand, which ultimately affect the formation of purchase intention and brand loyalty (Krishna, 2012; Hultén, 2011). The effect of both sensory cue combinations, particularly olfactory cues known to evoke vivid autobiographical memories, with tactile cues produced from premium materials, enhances emotional connection, resulting in increased brand satisfaction, memorability, and attachment. This empirical research examines how sensory brand experience impacts brand loyalty by exploring emotional and cognitive mediators that facilitate strong relationships between brands and customers. Visual and auditory elements cumulatively modulate consumer emotional responses and behaviours in retail environments. Notably, retailers can curate soundscapes to influence in-store tempo, pace, and duration (Krishna, 2012). It is important to note that sensory congruence across sensory, cognitive, and behavioural dimensions minimises cognitive load, promotes perceived authenticity, and implicitly builds consumers' trust (Krishna, 2014). This research demonstrates a beneficial role of sensory marketing cues in improving brand experiences, emotional connection with the brand, and brand loyalty in the field of luxury retail (Shahid, 2022). Moreover, positive emotional contagion in immersive retail or brand environments improves brand value perceptions and consumer willingness to pay a higher price (Hagtvedt, 2016). Affective transfer deepens emotional attachment, with sensory congruence working collectively to reinforce cognitive assessments of brand dependability and forming the foundation for long-term brand loyalty and advocacy behaviours (Hultén, 2011; Wiedmann, 2017). Through repeated and reconciled stimulus exposure, the cumulative effects of positive affective experiences create emotional associations that are instrumental in enabling repeated and sustained brand loyalty to luxury items.

Sensory marketing and brand relationship outcomes

Sensory marketing utilises the intentional employment of sensory stimuli to shape perception and behaviour by tapping into factors that extend beyond the product's functional characteristics (Krishna, 2016). Specifically, brands seek to engage in multiple senses at once to develop more significant and immersive experiences. Such affective experiences develop emotional connections that shape consumer intentions to behave and, more importantly, to develop attachment, trust, and loyalty. Research shows that congruent sensory cues, visual, auditory, and olfactory, enhance consumer trust and reinforce persuasion by facilitating engagement with the consumer and the advertisement (Krishna, 2014; Hultén, 2011). In addition to congruency, tactile and haptic attributes of product design also enhance quality perception and consumer commitment (Breneman, 2022).

In the realm of luxury branding, these sensory experiences help to develop identity-based consumer relationships, with the interactions with the brand tied into self-concept (Zha, 2025; Safeer, 2021). Developments in immersive and digital technology, including virtual reality, have expanded sensory marketing to the online realm, allowing for multi-sensory experiences that provide simulated sensory experiences that reaffirm the credibility of a brand and provide outreach access to a wider audience (Petit, 2019). Touchpoints through the senses can be pivotal moments in which brands can foster a lasting emotional and psychological bond with consumers. When these sensory moments are designed systematically across various channels, they augment consumers' feelings of brand closeness and attachment, which facilitates loyalty and advocacy over time (Singh & Crisafulli, 2020).

Contextual factors and considerations

Many contextual factors, including the type of product, culture, and retail environment, affect multi-sensory marketing strategies for luxury brands. The author Villar (2020) explains that, in addition, brand usage and usage for a product can also affect the delivery of potential sensory cues. As Jhamb (2020) highlights, sensory cultures vary by market, which means marketers should develop culturally adaptive sensory marketing plans. Retail elements, along with the addition of sensory experiences, particularly in a digital context, can foster brand engagement but can also create challenges such as sensory overload and incongruence. According to Petit (2019), virtual and augmented reality applications with good design could increase the authenticity of a brand and improve brand engagement. However, tactile, olfactory, and auditory sensory elements are not universally effective (Krishna, 2017; Morrin, 2021; Petit, 2019). Marketers must consider the strategic deployment of sensory elements to enhance uniqueness while remaining culturally authentic, while also managing the risk to brand equity (Hepola, 2017; Safeer, 2021). At the core of sensory digital marketing is sustainability, with emerging technologies providing avenues for environmentally conscious sensory interactions throughout the consumer experience (Zha, 2025; Jung, 2021).

Research gaps

Existing research highlights a strong positive effect of multisensory marketing on consumer experience, sensory brand engagement, and brand loyalty in luxury markets (Hepola, 2017; Wiedmann, 2017). However, scholars emphasise that the field still requires further empirical and theoretical development, particularly in understanding how different sensory cues can be effectively combined and utilised across various luxury categories (Villar, 2020). The interaction of sensory intensity, congruence, and contextual fit in fostering long-lasting brand connections has been insufficiently explored, especially within the shifting dynamics of digital retail environments (Spence, 2014).

There is also a notable gap in research related to the influence of rapidly evolving digital technologies, such as virtual and augmented reality, on multisensory experiences and luxury brand perceptions (Jung, 2021; Petit, 2019). Despite widespread evidence that sensory perception and consumer behaviour vary significantly across markets, cross-cultural perspectives remain underrepresented in existing studies (Jhamb, 2020). This gap limits understanding of how sensory marketing should be adapted to balance global brand consistency with local cultural relevance (Zha, 2025).

Further gaps exist in research on the specific roles of individual sensory cues—including tactile packaging elements, olfactory branding, auditory atmospherics, and taste—in shaping holistic sensory brand experiences and enhancing brand equity (Krishna, 2017). In addition, the mediating influence of consumers' emotional and cognitive processes on multisensory effects remains insufficiently examined (Hepola, 2017). Sustainability as a strategic and ethical component of sensory marketing is also in its early stages of scholarly attention, with initial insights suggesting potential links between virtual sensory experiences and environmentally responsible consumer behaviour (Zha, 2025; Jung, 2021).

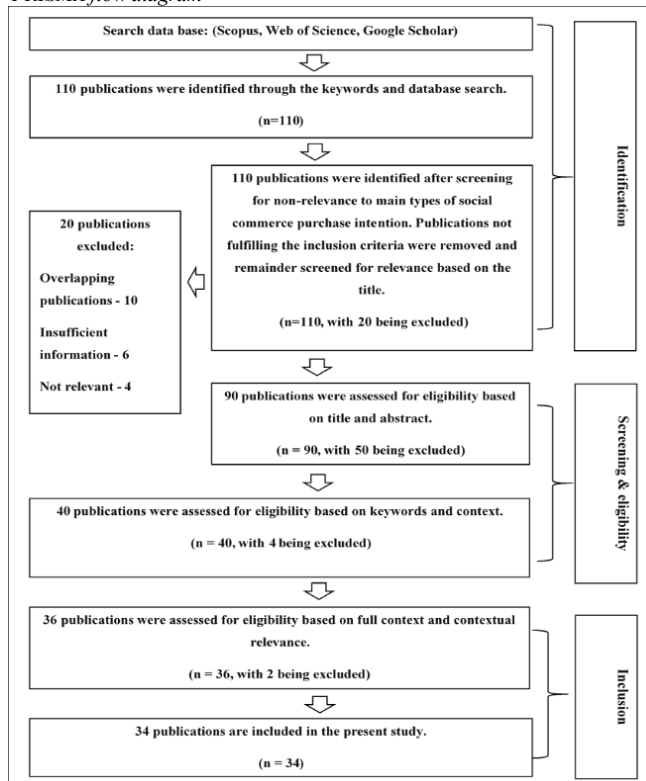
Finally, there is limited theoretical work addressing how multisensory marketing shapes consumer identity, self-expression, and authentic brand attachment, particularly within digital and hybrid online–offline consumption environments (Safeer, 2021). This research responds to these gaps through a systematic synthesis of recent empirical findings and the development of an integrative framework that incorporates cultural context, sensory congruence, sustainability considerations, and digital engagement. By doing so, it enhances understanding of how luxury brands may strategically utilise multisensory marketing to strengthen culturally grounded consumer–brand relationships.

Methodology

This paper systematically reviewed and revised 30 articles (2012–2025) on multi-sensory marketing in the context of luxury brands. All articles reviewed were peer-reviewed. The review team undertook searches through Scopus, Science Direct and Google Scholar with relevant keywords such as Articles that were duplicates and those that were not relevant were identified and removed by the review team before screening all other articles. “Multi-Sensory Marketing”, “Sensory Brand Engagement”, “Brand Loyalty”, “Consumer Experience” and related synonyms. Rather than following the more formal dual independent review protocols, screening was performed by the authors using established relevance criteria consistently. Data extraction was performed on the study aim, methods, sensory marketing techniques, and consumer outcomes, and the data were synthesised qualitatively. The steps involved in the review process are displayed in a PRISMA flow diagram for transparency in Figure 1. Accordingly, further analysis was carried out to provide a comprehensive overlook of the articles referred to in the review paper based on publication year and the country-wise.

Figure 1

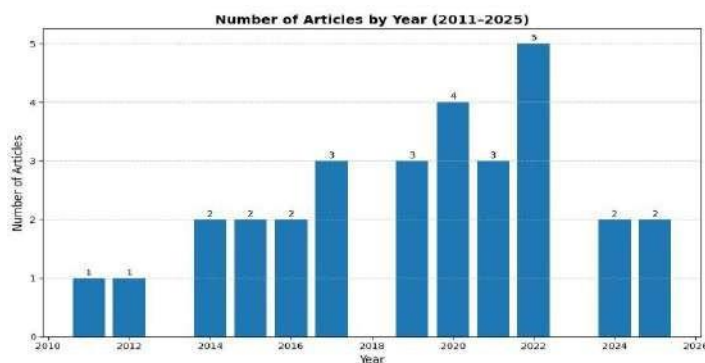
PRISMA flow diagram



(Source: Authors' Compilation)

Figure 2

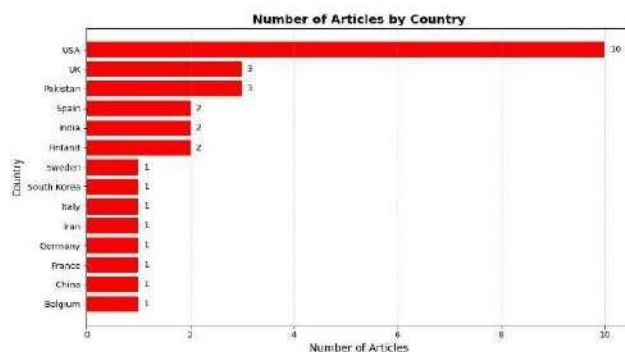
Publication Year of Articles Reviewed



(Source: Authors' Compilation)

Figure 3

Reviewed Articles by Country of Origin



(Source: Authors' Compilation)

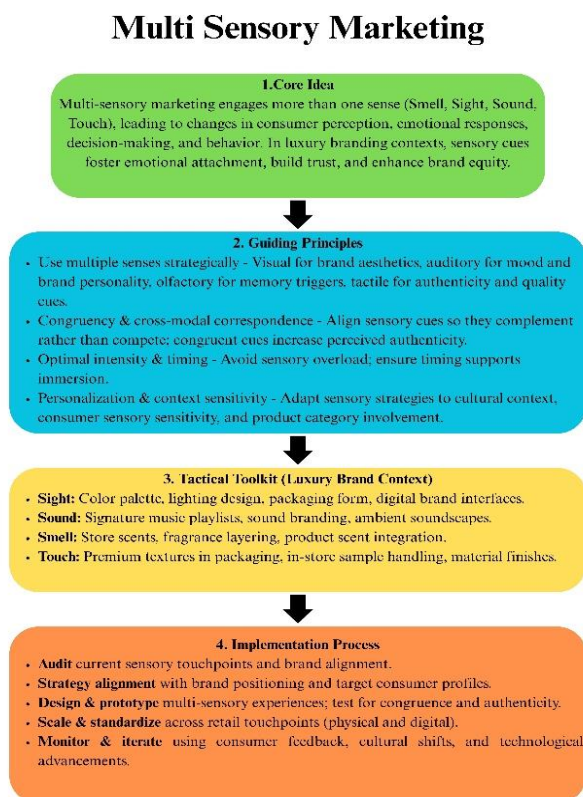
Discussion

This research provides valuable insights into effective multi-sensory marketing for luxury brands, particularly emphasising the importance of cultural sensitivity and digital innovation. The findings demonstrate that, unlike generalised approaches, sensory marketing must be culturally specific to generate authentic emotional connections, build stronger brand loyalty, and support consumer identity (Shahid, 2022; Park, 2024). Aligning sensory cues with luxury brand values enhances culturally meaningful engagement across global markets, as cultural value orientations significantly shape consumer perceptions of luxury value, prestige, and uniqueness (Anastasia Stathopoulou, 2019).

Furthermore, the incorporation of emerging digital technologies—such as augmented reality, virtual reality, and immersive digital tools—extends sensory marketing beyond physical environments. These technologies enable luxury brands to create immersive digital experiences, but they must be designed carefully to avoid sensory overload or incongruence that may compromise brand authenticity. Recent evidence shows that intelligent technologies (AI-driven tools, personalised features, virtual mirrors, etc.) and interactive digital environments enhance perceptions of brand personality and increase purchase intentions, particularly among status-seeking consumers (Sestino, 2024). Collectively, the findings support an adaptive sensory marketing framework that balances cultural relevance with technological innovation to strengthen long-term consumer–brand relationships.

Figure 4

Multisensory Marketing Framework



(Source: Authors' Compilation)

Conclusion and Future Directions

This study deepens theoretical understanding by integrating multi-sensory marketing effects across various senses within luxury consumption contexts, highlighting cultural and digital dimensions that are often overlooked in existing literature (Shahid, 2022; Park, 2024). Methodologically, the research contributes a robust systematic review that can serve as a foundation for future empirical studies examining the behavioural outcomes of sensory marketing in hybrid retail environments. Practically, the framework developed in this research guides luxury marketers to design sensory touchpoints that combine cultural insight with advanced digital tools to promote authenticity, sustainability, and emotional engagement. By adopting this balanced approach, luxury brands are better positioned to remain competitive and cultivate sustainable consumer loyalty in the face of rapidly evolving market dynamics.

Future studies should examine how sensory cues can be combined and utilised across different luxury categories, particularly focusing on sensory intensity, congruence, and contextual fit in digital retail environments. As virtual and augmented reality technologies advance, longitudinal research is needed to understand their impact on brand attitude and loyalty among digital-native luxury consumers. There is also a lack of cross-cultural perspectives in sensory marketing, despite evidence that sensory perception varies across markets. More research is required to build culturally adaptive sensory marketing frameworks that balance global brand consistency with local relevance. Further investigation is needed into the roles of individual sensory cues and the emotional and cognitive processes that mediate multisensory effects. Sustainability remains underexplored, though early findings suggest that virtual sensory experiences may encourage environmentally responsible consumption behaviours. Finally, new theoretical models are needed to explain how multisensory marketing influences consumer identity, self-expression, and authentic brand attachment, particularly within digital and hybrid online–offline contexts.

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DIRECT MARKETING STRATEGIES AND THEIR EFFECT ON INCREASING READERSHIP: AN INQUIRY INTO REVIVING THE DECLINING PRINT NEWSPAPER MARKET

Dhuveeshan Muthusamy¹, Sugeeth Patabendige², H.C. Harshana³

Abstract

The print newspaper market has faced a significant decline in readership and circulation due to the rapid advancement of digital technologies and changing consumer behaviour. This study investigates the effectiveness of direct marketing strategies in revitalising the traditional newspaper sector, with a particular focus on the Sri Lankan context. Four key dimensions of direct marketing, namely direct selling, direct mail, telemarketing, and SMS marketing, were assessed to determine their influence on reviving newspaper readership. Adopting a positivist research paradigm and a deductive quantitative approach, data were collected through a structured questionnaire administered to 366 respondents using a judgmental sampling technique. Participants were selected based on their engagement with locally published newspapers within the past three months. Findings from simple linear regression analysis reveal that all four strategies exhibit a positive relationship with increased readership. Notably, direct selling, direct mail, and SMS marketing demonstrated moderate significance, while telemarketing showed a weaker yet positive effect. This research offers actionable insights for media houses struggling to remain relevant in a digital-first environment, particularly in emerging markets like Sri Lanka, where print still holds cultural value. It bridges an empirical gap in understanding the long-term impact of direct marketing on reader engagement and addresses a practical void in the development of cost-effective, targeted strategies for traditional media revival.

Keywords: Direct marketing strategies, newspaper readership, media revival, print media

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DOI:

Introduction

The print newspaper market has long been a key part of democratic societies. It provides timely news, shapes public discussions, and holds power accountable through investigative journalism (Saxena, 2019). Traditionally seen as a reliable source, newspapers have played a vital role in media diversity and civic engagement. However, the fast growth of digital technology and the rise of online platforms have greatly disrupted the traditional print media landscape. As real-time news becomes easily available through websites, mobile apps, and social media, traditional newspapers are seeing a drop in readership and financial struggles (Nelson, 2019; Pew Research Centre, 2023; Sambrook, 2017).

This digital change has also affected developing countries. In Sri Lanka, over 100 newspapers are still published in Sinhala, Tamil, and English (Verite Research, 2019), but the print industry is facing a significant decline in readership, especially among young people. While older generations may appreciate the physical nature and cultural importance of newspapers, digital media has become the main news source for many people. Along with shifts in how people consume news, rising printing costs, decreasing advertising revenue, and competition from online-native media pose serious challenges to the industry's future. These trends not only threaten the economy but also hinder newspapers' ability to support independent journalism and engage the public in democracy.

In light of these challenges, direct marketing strategies may provide a way to revive newspaper readership. These strategies involve personalised communication channels that target consumers directly, such as direct selling, telemarketing, direct mail, and SMS marketing. They have worked well in areas like retail, healthcare, and telecommunications (Kotler & Keller, 2019; Gibbons, 2014). In those fields, personalised marketing has boosted customer retention, engagement, and loyalty. However, the newspaper market largely underuses these methods, despite their potential to rebuild personal connections with readers in an increasingly impersonal digital world.

Current research lacks thorough empirical studies on the long-term effects of direct marketing in the newspaper field, especially in emerging markets like Sri Lanka. While some efforts, like subscription discounts or email campaigns, have been tried, there is no agreement on which strategies work best for different demographic groups (Aziri & Mazllami, 2018). Furthermore, the cost of implementing these strategies poses a challenge for mid-sized and regional publishers with limited budgets (Direct Marketing Association, 2023). This study aims to fill this gap by examining the effectiveness of four key direct marketing strategies in increasing newspaper readership in Sri Lanka.

This research holds significance for both economic and societal reasons. Economically, a stronger newspaper sector can help keep jobs in journalism, printing, distribution, and local advertising. Societally, it helps maintain quality journalism, which is essential for an informed public and a resilient democracy. In this setting, the main research question arises: How do direct marketing strategies affect the growth of newspaper readership in the struggling newspaper market? This question highlights the urgent need to find cost-effective, scalable, and demographic-specific solutions to ensure the long-term survival of print media.

In Summary, this study seeks to evaluate how direct selling, direct mail, telemarketing, and SMS marketing can increase newspaper readership in Sri Lanka. Using a quantitative approach based on consumer feedback, the research will provide new insights and practical advice for media professionals facing the challenges of print media in a digital-first world.

Literature Review

Many research studies show a significant positive effect on direct marketing strategies. According to the past literature cited by Mlobothi (2022), the author shows a significant positive relationship between direct marketing and consumer buying decisions. Musyoka (2002) described that there is a significant positive relationship between direct marketing strategies and prescribing decisions in the pharmaceutical industry. Risselada et.al (2014) assume that there is a positive relationship between both direct marketing strategies and customers' smartphone adoption probability. Past literature, Mlobothi (2022), Musyoka (2002), Risselada et.al (2014), shows the significant impact on direct marketing strategies and its based on dependent variables shows the significant impact. So, we therefore hypothesise:

H1: There is a significant impact of direct marketing strategies and increasing readership

Many research studies show the positive effect of this model of direct selling strategies, which is characterised mostly by interactive communication, given that many messages are delivered to the clients through in-person communication with the sales agent (Alturas & Santos, 2021). According to the past literature connected by Alturas & Santos (2024), it is stated that Direct salespeople are most usually independent contractors and not employees of the company, and direct selling companies embrace compliance from individuals of all ages,

experiences, and personal characteristics. Brown and Peterson (1994) also report a significant effect on Direct Selling strategies, distributor sales performance. Sparks and Schenk (2001) assume that there is a positive relationship between both a distributor's sales and the distributor's average sales percentage per year, and consistent with those results, there is a significant effect of direct sales. So we therefore *hypothesise*:

H1a: *There is a significant impact of direct selling strategies and increasing readership*

Despite the growth of direct marketing, multichannel retailers rely on direct mail for its ability to reach consumers conveniently, generate brand awareness and excitement, and provide higher response rates than digital marketing communications (Valenti, Srinivasan, Yildirim, & Pauwels, 2021). Several studies have shown that direct mail has a significant impact on consumer behaviour (Hill, Provost, & Volinsky, 2006). According to studies conducted by Naik and Peters (2009) provide empirical evidence that direct mail directly drives online travel to enable car configurations. Therefore, it can be hypothesised that direct mail can have a significant impact on increasing readership. So, we therefore hypothesise:

H1b: *There is a significant impact of direct mail strategies and increasing readership*

According to Eric (1996) mentioned in Nkpurukwe (2024), Telemarketing is a strong and proven communication tool used to establish business relationships and retain customers. Despite the many benefits and advantages of telemarketing, there has not been much interest in using it correctly. Furthermore, the ability of marketers to maximise benefits, maturity, relevance to customers, and focus on customer attraction can be achieved through attention to the unfulfilled expectations of customers (Geetika, 2012). According to past literature, Nkpurukwe (2020), Lobothe (2022), the literature shows, there is a significant relationship between telemarketing and customer relationship enhancement. So, we therefore hypothesise:

H1c: *There is a significant impact of telemarketing strategies and increasing readership*

Generations of youth and adults today have mobile phones as a multi-purpose tool that facilitates efficient performance of tasks such as processing and receiving text messages, uploading and downloading music, videos, images, and other data. The advantages of these mobile devices have made communication more interactive and confirm that SMS messages have a significant positive impact, especially in past literature (Siraj, Rauf, & Sultan, 2021). According to past literature conducted by these (Khasawneh & Shuhaiber), (Sharma, Dwivedi, Vikas, & Siddiqui), SMS Marketing helps to increase consumer awareness and willingness to buy. According to the findings of the reports mentioned above, it appears that SMS Marketing has a significant impact on purchasing intention and consumer attitudes.

H1d: *There is a significant impact of SMS marketing strategies and increasing readership*

Methodology

This study adopts a positivist research philosophy, which emphasises the use of observable, empirical data and objective measurement to uncover relationships between variables. Positivism is particularly well-suited to hypothesis testing and statistical analysis in social sciences (Saunders, Lewis, & Thornhill, 2019). A deductive approach was employed, enabling the testing of pre-established hypotheses derived from the AIDA model and previous literature concerning direct marketing effectiveness (Creswell & Creswell, 2018).

A quantitative explanatory research design was chosen to examine causal relationships between the four direct marketing strategies, direct selling, direct mail, telemarketing, and SMS marketing (independent variables) and newspaper readership (dependent variable). Quantitative designs are especially effective for hypothesis-driven studies seeking generalizable insights.

The target population for this research included newspaper readers in Sri Lanka. A judgmental (purposive) sampling technique was used to select respondents who had read local newspapers within the past three months. This non-probability sampling method allows the researcher to focus on individuals most relevant to the study's objectives. A total of 366 responses were collected, meeting the minimum threshold for regression analysis and ensuring sufficient statistical power (Field, 2018).

Data were collected using a structured questionnaire, developed based on validated measurement items from prior studies in marketing and consumer behaviour. A 5-point Likert scale was employed to capture levels of agreement, with values ranging from "Strongly Disagree" (1) to "Strongly Agree" (5). Distribution occurred through both physical and digital channels to enhance reach and inclusivity.

The collected data were analysed using SPSS statistical software. Descriptive statistics were used to profile the sample population. The reliability of constructs was evaluated through Cronbach's Alpha, and validity was

assessed using exploratory factor analysis (EFA). To test the hypotheses, simple linear regression analysis was conducted, assessing the individual impact of each marketing strategy on newspaper readership. Statistical significance was determined at $p < 0.05$, ensuring rigorous evaluation of relationships.

Results and Analysis

This study aimed to assess the impact of direct marketing strategies on increasing newspaper readership within the Sri Lankan context. A total of 366 valid responses were analysed using SPSS to evaluate the relationships between the independent variables, direct selling, direct mail, telemarketing, and SMS marketing and the dependent variable, increasing readership.

Results of normality, reliability and validity

Concerning the scales' reliability, it used Cronbach's alpha (Cronbach, 1970) with a cutoff value of 0.7 (Nunnally, 1978). When considering the independent and dependent variables of the study, Direct Marketing has recorded 0.913 of reliability Cronbach's alpha value which is greater than 0.7. Increasing Readership, the dependent variable of the study, states that the reliability Cronbach alpha value is 0.769, which is greater than 0.7.

Table 1
Reliability analysis

Construct	No of Item	Cronbach's Alpha
Direct Selling	4	0.816
Direct Mail	3	0.773
SMS Marketing	4	0.772
Telemarketing	4	0.832
Increasing Readership	4	0.769

(Source: Authors' Compilation)

Table 2 shows that the overall KMO value is .918 and the Bartlett's Test (sig) value is 0.000, both of which are within the acceptable range. Hence, the study states that the validity of this study is capable enough to measure what it seeks to assess, as the statistical values of the research instrument demonstrated its overall validity in relation to the study.

Table 2
Validity analysis

Variable	Kaiser-Meyer-Olkin Measure	Sig.
Direct Selling	0.785	0.000
Direct Mail	0.692	0.000
SMS Marketing	0.780	0.000
Telemarketing	0.777	0.000
Increasing Readership	0.745	0.000

(Source: Authors' Compilation)

Correlation Analysis

Correlation analysis is a statistical method used to assess both the strength and direction of relationships between two or more variables. It determines the extent to which changes in one variable are linked to changes in another. The correlation coefficient, symbolised by "r," serves as the main numerical indicator in this process. A positive correlation (where $0 < r < 1$) suggests that as one variable increases, the other tends to increase as well, with the strength of this relationship growing as "r" approaches 1. On the other hand, a negative correlation (where $-1 < r$

< 0) means that as one variable increases, the other tends to decrease. The results of the correlation analysis are presented in the table below.

Table 3
Correlation analysis

Variables	Pearson Correlation Coefficient	P Value
Direct Selling vs Increasing Readership	0.363	0.000
Direct Mail vs Increasing Readership	0.363	0.000
SMS Marketing vs Increasing Readership	0.264	0.000
Telemarketing vs Increasing Readership	0.327	0.000

(Source: Authors' Compilation)

The given values indicate that the correlation between each independent variable and the dependent variable is statistically significant, with a p-value of less than 0.05. Additionally, the correlation coefficient for all independent variables with customer engagement exceeds 0.2, signifying a positive relationship. In every instance, the correlation coefficient is positive, highlighting a robust positive relationship between Direct Marketing and Increasing Readership in the print Newspaper market.

Multiple regression analysis

Regression analysis can be used to assess the relationship between independent factors and dependent variables. Simple regression analysis and multiple regression analysis are the two primary types of regression analysis that are frequently used. When there is only one dependent variable and one independent variable, simple regression makes sense; when there are multiple independent variables, multiple regression is used (Sekaran & Bougie, 2016). In this study, there are four independently identifiable variables which are considered for analysis. Consequently, to evaluate the level of correlation between the independent variables and the variable under investigation, the researcher employed multiple regression analysis.

Table 4
Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	Df1	Df2	Sig. F Change	
1	.381a	0.145	0.143	0.41134	0.145	61.833	1	364	<.001	1.966

a. Predictors: (Constant), Direct Marketing Strategies

b. Dependent Variable: Increasing Readership

(Source: Authors' Compilation)

The above table shows an Adjusted R-Square of 0.143. Hence, the Author identified that the Direct marketing strategies impact on increasing readership by 14.3%. This is very important for comparing the models with different numbers of predictors. In this case, the value is close to R Square (0.145), which signifies a well-fitted model.

Discussion and Conclusion

The findings of this study reaffirm a pressing issue: the print newspaper market in Sri Lanka is in a state of decline, mirroring global trends of diminishing print media consumption (Chyi & Tenenboim, 2019). This deterioration is evident not only in the reviewed literature but also through the study's empirical results, where direct marketing strategies, namely direct selling, direct mail, telemarketing, and SMS marketing, exhibited statistically significant yet modest correlations with increased readership. These results suggest that while direct marketing strategies are capable of making a measurable impact, the current implementation within the print newspaper market lacks the

depth or innovation necessary to catalyse meaningful change. This stands in contrast to other industries where direct marketing has been used successfully to drive customer loyalty and market retention (Kotler & Keller, 2019). In the case of newspapers, the observed correlation coefficients, although positive and significant, indicate that existing efforts are not yet optimised for maximum influence.

Despite the moderate nature of these relationships, the presence of statistical significance across all tested variables should not be overlooked. It suggests that direct marketing strategies still offer a credible foundation upon which the newspaper market can build. The path forward lies in amplifying these strategies through digital transformation and personalisation. Integrating data-driven approaches, such as AI-enabled targeting, dynamic SMS campaigns, and automated direct mail systems, has shown potential in enhancing customer responsiveness and engagement (Kannan & Li, 2017). These innovations allow for more precise audience segmentation and delivery of tailored content, which can improve message relevance and reader loyalty, two factors critical to sustaining the readership base. Given that consumers now expect highly personalised communication across platforms, adopting traditional direct marketing methods to meet this standard is both a necessity and an opportunity for revitalisation.

Encouragingly, emerging data support the feasibility of such a transformation. According to the Digital Outlook Report Sri Lanka 2025, Sri Lanka recorded a 3.2% increase in print newspaper circulation compared to the previous year, suggesting that the market, while challenged, is not beyond recovery (DataReportal, 2025). This rebound, albeit modest, underscores the potential of well-executed marketing strategies to reconnect with readers in a fragmented media environment. Therefore, the industry's stakeholders must rethink their marketing approach by merging traditional outreach with digital tools, leveraging mobile platforms, customer lifecycle mapping, and behavioural analytics to deliver compelling, timely, and relevant messaging. Such an integrated strategy could help not only to reinforce the connection between marketing initiatives and readership but also contribute meaningfully to the long-term sustainability of print journalism in Sri Lanka's rapidly evolving media landscape. Future studies could overcome these constraints by incorporating longitudinal designs or experimental methods to observe how marketing strategies influence readership behaviour over time.

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PRODUCT PLACEMENT AND BRAND VISIBILITY ACROSS FILM GENRES: EVIDENCE FROM SRI LANKAN CINEMA

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Abstract

Product placement is defined as the purposeful inclusion of branded products in film and television, making it a major tool in increasing brand visibility, brand recall, and recognition. This research aims to examine the influence of product placements on brand visibility in the Sri Lankan context and to explore the role of film genre as a moderator. The study used a quantitative research method, and a structured questionnaire with a large sample of respondents collected data. Findings reveal that product placement positively correlates with brand visibility. Among the three factors, the frequency of exposure shows the strongest positive effect on brand visibility. Additionally, types of placements and contextual fit also have a positive but less pronounced effect on brand visibility. The moderation analysis suggests that film genre has a significant direct effect on brand visibility, but not on the relationship between product placement and brand visibility. These findings imply that the Product Placement successfully increased the brand recall and recognition among Sri Lankan viewers within the film genre. Given the evolving nature of the Film Industry, these findings will offer valuable theoretical and practical insight to marketers, brands, and film directors to improve product placement strategy in terms of frequency, type of placement, and fit with the context.

Keywords: Brand visibility, contextual fit, film genre, frequency of exposure, product placement

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DOI:

Introduction

Product placement is a marketing method that aims to offer a more organic advertising format and emphasises its potential to shape the digital marketing landscape (Gündüzyeli & İpek, 2025). It has become a billion-dollar business around the world because it is proven to get attention, and it can help build brand recall and recognition (Kohut, 2024). Recent meta-analytic studies have found that product placements tend to generate higher recall and brand recognition compared to traditional advertising, with a significant positive impact on consumer attitudes and purchasing intention. However, the effects of product placement could be moderated by frequency, placement type, and contextual differences, such as the category of the film or program the product is placed. For example, comedies or action movies' effect on viewers' processing and recall of embedded brands is likely to be different from dramas or documentaries. (Cokki et al., 2025) Therefore, this study demonstrates how these variables work in the Product Placement concept and how they influence the effectiveness of Brand Visibility. The study mainly examines how film genres are associated with product placement and brand visibility and what specific factors contribute most to product placement success in a developing market context.

Despite the extensive research on product placement around the world, research evidence is rather limited in South Asia, and Sri Lanka lacks any considerable evidence on the moderation of brand visibility outcomes by film genre. Overall, while a limited number of studies have examined product placement in films in Sri Lanka, the researchers do not find any relationship between film genre and product placement. Prior studies (e.g., Srivastava, 2016; Mukherjee et al., 2021) mention the cultural effects but ignore differences that might stem from genre. Accordingly, this study adds to the research stream as it addresses the gaps in its effects on brand visibility outcomes, where product frequency, type of placement, and contextual fit can all be moderated by genre in the film.

Literature Review

According to Sunita Kumar's study "Influence of Product Placements in Films and Television on Consumers' Brand Awareness," Product placement is an advertising method and tool that includes products in entertainment programs such as movies, TV programs, and video games, with a specific objective (Kumar, 2017) The effectiveness of product placement is mainly based on the dynamic interaction between the frequency of exposure, types of placements, and the contextual fit. and it influences brand visibility outcomes. Recent meta-analytical evidence shows that the frequency of exposure works as the foundational variable when finding the effectiveness of product placement (López-Rodríguez et al., 2024). In types of placements, Hamdan's research on "The Effectiveness of Samsung Product Placement in Korean Drama" states that the type of placement could be viewed as the process of product placement. (Hamdan et al., 2025). Further to them, contextual fit plays the role of the decisive moderating variable in assessing how frequency and placement type interact.

Brand visibility represents how efficiently audience segments both have seen and remember a brand they have seen (Blankenship, 2024). Also, brand recall represents the remembrance of a brand in the presence of cues other than the brand name. It is a key indicator of advertising and marketing effectiveness as it is a part of brand equity. (Jin et al., 2019). The term brand recognition is used to determine whether consumers can recognise a product by its attributes, even if the consumer does not remember the product's name when other products are displayed (Kenton, 2024). The film genre is a specific form of classification within the motion picture industry. As it is a historical form of classification, it is a historical feature of the audience's experience with motion pictures (Pathak, 2024). This is where such labels serve to categorise narratives according to well-treaded norms and discern themes that inform about the emotional mood and the discourse styles (Lannom, 2025)

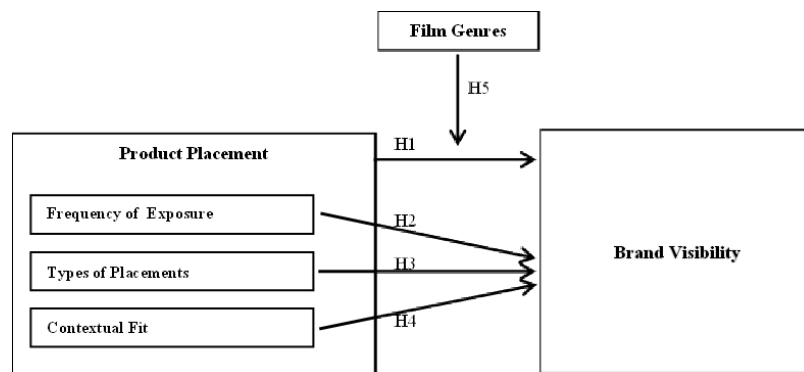
Previous studies show that product placement helps in increasing brand visibility due to various factors that include the placement salience, plot ties-in, and audience tie-in. Although Western literature implies genre-specific effects, with affective ones making brand recognition difficult and cognitive ones making it easy, there are no studies on this track in South Asia because there is a narrative of culture, and a hybrid genre, such as the case of so-called masala movies, generates a unique response from audiences (Mukherjee et al., 2021). The current literature of South Asian states focuses on such cultural elements as star power and the appeal of emotion but almost ignores genre as a mediating variable (Srivastava, 2016). In Sri Lanka, due to the lack of formal regulation of product placement in the country and the lack of any empirical research about the effects of genres, the current state of practice remains speculative, warranting context-specific, evidence-based approaches (Asia Video Industry Association, 2024).

The independent variable was established from a thorough examination of recent literature and conceptual frameworks, which was further refined during the operationalisation step. The constructions are primarily informed by Russell's Tripartite Model (2002), which is the central organising framework for understanding the influence of four dimensions of product placement on audience responses. (Russell C. A, 2002)

Frequency of Exposure, Balasubramanian, Karrh, and Patwardhan (2006) developed an all-encompassing model demonstrating that stimulus factors, such as frequency of placements, greatly influence placement effectiveness and brand recall. (Balasubramanian et al., 2006). Types of Placements, Russell's (2002) study found that audio-visual product placements prompted the highest recall, then visual-only placements, followed by audio-only placements. Contextual Fit, Gillespie et al. (2018) offered the Product Placement Fit Model, which argues that affective congruence and cognitive congruence for the brand and scene minimise negative viewer reactions and increase brand processing. (Gillespie et al., 2018)

Figure 1

Conceptual framework



(Source: Authors' Compilation)

Methodology

The research adopted a quantitative method. The variables in the study were operationalised and examined with a group of items and indicators measured using a Likert scale. For the questionnaire, twelve films were selected that included product placements. These movies represented six categories, with two films selected from each category. The study used a purposive sampling technique to select movies for the questionnaire. This purposive, non-probability sampling technique permitted the authors to purposely select films that were in line with the aims of the study. The primary data for this study were gathered through the distribution of a structured questionnaire. The population of this research consisted of Sri Lankan film viewers aged 18 and above who possess the cognitive ability to understand product placement as a marketing strategy. Individuals under the age of 18 were excluded to ensure the participants had the necessary media literacy and purchasing awareness to meaningfully contribute to the study. In the interest of procuring unbiased answers and increasing representativeness, a random sampling technique was used to collect data from individuals aged 18 and older.

According to the Sri Lanka Film Corporation Report (2025), the theatrical audience is approximately 1.5–2 million individuals, and digital consumers are approximately 3–5 million individuals. This provides an estimated total population of ~4.5 to 7 million adult film viewers in Sri Lanka (Somaratne, 2021). Therefore, the Morgan Table recommends a minimum sample size of 384 respondents for statistically valid findings at a 95% confidence level and at a margin of error of 5 %.

The responses were then evaluated using SPSS, and the data were determined to be normally distributed based on the skewness and kurtosis values falling between accepted values of (± 1.96). An adequate sample size added to the validity of these tests. Hayes' PROCESS Macro was employed to study moderation effects due to its ability to provide bootstrapped confidence intervals and ease of use regarding the analysis of interaction. This made it a more robust and efficient approach than utilising traditional regression approaches.

All ethical standards were closely adhered to during the study. Participants had a full understanding of the purpose of the study, and consent was obtained before data collection. Participation was voluntary, and participants had the option to withdraw from the study at any time. The anonymity of the participants and the confidentiality of their data were maintained, and all these measures were consistent with ethical standards for human subject research.

Findings

Data was collected through a questionnaire survey employing two quantitative methods. The researcher circulated 250 questionnaires through Google Forms and 150 through hard copy, and 392 questionnaires were returned. After the data screening process, a total of 346 valid and complete datasets were included in the final dataset.

As demographic information of the study, the gender distribution of the sample demonstrates a fair presence of both male and female subjects. Out of 346 participants, 177 were females (44.5%), and 169 were males (42.5%). Most of the participants were aged between 18 and 25 years ($n = 141$, 35.4%) and 26 to 33 years old ($n = 138$, 34.7%), representing over 70% of the overall sample. There were smaller proportions of respondents from the older age categories: 34–41 years ($n = 48$, 12.1%), 42–49 years ($n = 10$, 2.5%), and 50–57 years ($n = 9$, 2.3%). Most participants came from the Northwestern Province ($n = 113$, 28.4%). The rest of the provinces that contributed relatively high numbers were the Southern Province ($n = 67$, 16.8%), the Central Province ($n = 41$, 10.3%), and the Western Province ($n = 33$, 8.3%). In contrast, the numbers represented were very low in the Eastern Province ($n = 3$, 0.8%), Uva Province ($n = 20$, 5.0%), Sabaragamuwa Province ($n = 29$, 7.3%), and the North Central Province ($n = 39$, 9.8%), with just 1 participant (0.3%) coming from the Northern Province.

According to reliability analysis, most scales in parts of the survey will have acceptable to good internal consistency for this data. For instance, “Contextual Fit” ($\alpha = 0.765$) and “Film Genre” ($\alpha = 0.761$) show good reliability, whilst “Brand Recall” ($\alpha = 0.747$), “Brand Recognition” ($\alpha = 0.718$) and “Frequency of Exposure” ($\alpha = 0.622$) exhibit acceptable reliability. However, “Types of Placements” ($\alpha = 0.410$) is below the minimum acceptable level, suggesting that these items, when linked together, may not be an effective way of measuring the same set of underlying concepts. Validity analysis suggested that the value of KMO = 0.607 is mediocre, but still acceptable as an indication of sampling adequacy. The strong outcome of the Bartlett Test ($p < .001$) affirms that items correlate to each other to an extent that factor analysis or PCA can be performed. The normality of the study variables was assessed using skewness and kurtosis statistics. All variables recorded skewness values ranging from -0.338 to 0.163 and kurtosis values ranging from -0.172 to 0.324 , which fall well within the acceptable range of ± 1 , indicating that the data distributions are approximately symmetric with no significant departure from normality. Given the large sample size ($N = 346$), these values suggest that the assumption of normality is adequately met for all variables, including the dependent variable and its components, thereby supporting the suitability of parametric statistical analyses.

Despite the reliability coefficient for the “Types of Placements” construct ($\alpha = 0.410$) not meeting the acceptable limit, this limitation is recognised in the interpretation of the results for Hypothesis 3 (H3). However, the decision to keep the scale was supported by a strong overall model fit and the theoretical consistency of the construction. The items also conceptually matched other previously validated studies to support their inclusion to ensure consistency for comparison. We encourage future studies to re-evaluate and amend the measurement scale to improve internal consistency.

Table 1
Summary of hypothesis testing

Hypothesis	Statistical Result	Status	Key Findings
H1 There is a significant relationship between product placement and brand visibility	$r = 0.582, p < 0.001$	Supported	Product placement has a significant and positive effect on brand visibility
H2 There is a significant relationship between the Frequency of Exposure and brand visibility	$r = 0.613, p < 0.001$	Supported	Frequency of exposure is the strongest predictor of brand visibility, confirming that repeated exposure enhances brand recall and recognition
H3 There is a significant relationship between Product placement type and brand visibility	$r = 0.381, p < 0.001$	Supported	Different types of placements (visual, verbal, integrated) significantly impact brand visibility, though with a lower effect than overall presence or frequency
H4 There is a significant relationship between contextual fit and brand visibility.	$r = 0.390, p < 0.001$	Supported	The context fit with product placement has a positive impact correlation with brand visibility
H5 There is a Moderating impact of Film Genre on the Relationship Between Product Placement and Brand Visibility	Direct effect: $\beta = 0.259, p = 0.031$ Moderation effect: $\beta = 0.053, p = 0.149$ $\Delta R^2 = 0.0032$	Partially Supported	Film genre has a significant direct impact on brand visibility, but does not significantly moderate the product placement-brand visibility relationship

(Source: Authors' Compilation)

Discussion

In this study, the findings indicate that Product Placement has a significant and positive impact on Brand Visibility. These results align with several prior studies that have found a strong relationship between Product Placement and Brand Visibility. According to a comprehensive meta-analysis that examined 364 studies and found that brand placements have strong positive effects on brand placement memory (Babin et al., 2021). Moreover, the research suggests that Frequency of Exposure correlates positively, even strongly, with brand visibility. Prior Studies suggest that the frequency of exposure to product placements on multiple occasions increases the strength of the brand, which accords with principles of marketing that argue that frequency enhances brand recall and recognition. Bibliometric analysis identifies frequency-based brand recall as a main metric for measuring brand visibility. Recent studies show that moderate repetition levels (4-7 exposures) maximise brand recall and recognition without harming the brand. (López-Rodríguez et al., 2024). While Types of Placements also have a positive impact on Brand Visibility, the study implies that it has a lower effect than the overall presence (IV – Product Placement) or frequency of a placement. Recent research on Samsung product placement in Korean dramas shows that using several placements, such as script, screen, and plot placement, creates synergistic effects on brand recall among international audiences. (Hamdan et al., 2025). Additionally, the context fit with product placement has a positive impact correlation with brand visibility. Organic product placement within the backdrop improves brand awareness and consumer reception. Factors of economic congruence have dominated research studies in Sri Lanka, which have shown that economic volatility brings about preference changes towards value contextual fit. (Chan et al., 2016).

Conclusion

In this study, the results show that the impact of product placement on brand visibility is significant and positive. The effects of the product placement, the frequency of exposures, placement types, and the context fit are all positive on brand visibility. Frequency of Exposure has the strongest impact on brand visibility, while the other two variables have equal positive impact. As the quality of product placement (in terms of frequency of exposure, types of placements, or contextual fit) increases, so does visibility of the brand, ultimately leading to greater brand recognition and recall. Marketers and filmmakers are therefore encouraged to pay full attention to the design and position of the product to enhance audience immersion and brand value.

As shown by the process macro moderation analysis mode, film genre has a significant direct effect on brand visibility, implying that some genres might have more interest or engagement from the audience, thus generating more brand attention naturally. The moderating role of film genre in the relationship between product placement and brand visibility is not supported by the analysis. This study is important for businesses as it shows how a developing industry like the film industry offers marketers a valuable opportunity to enhance brand visibility through strategic product placement. It also provides insights into how filmmakers integrate brands in ways that support both the film's narrative and the brand's image without causing a negative impact. Most of the participants were aged 18-25, while the representation of older age groups was low. This can potentially bias the results. There was also an unequal geographic distribution where most of the respondents were sampled in Northwestern Province; hence, generalizability might not be possible across the various regions in Sri Lanka.

From a practical standpoint, our evidence indicates that marketers and filmmakers should focus primarily on frequency of placement and contextual fit rather than changing the genre format. However, it remains possible to choose genres that could align with the intended target audience's engagement patterns to help increase visibility.

There is limited research on how to optimise product placement strategies for different film genres, including factors such as prominence, modality, and plot integration. Further study is needed on how emotional involvement in various genres influences cognitive processing and brand recall. The effects of product placement in hybrid genres remain largely unexplored, despite their growing popularity. Longitudinal and cross-cultural studies could provide deeper insights into genre-specific placement effectiveness and long-term brand impact. Future researchers should explore how each genre affects Brand visibility and purchasing intention. In addition, researchers can create genre-specific placement models that help to inform strategic decisions based on the ability of each genre to support different kinds of viewing. As the effects of product placement in hybrid genres remain largely unexplored, despite their growing popularity, future researchers could examine that as well.

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Annexures

Table 2

Questionnaire

Variable	Dimensions	Indicators
Product Placement	Frequency of Exposure	- I think I have seen brands a few/many times in films - I noticed that the duration of the brand exposure in films made me easily recall the brand. - According to my understanding, the length of the product that appeared in the key scenes is good
	Types of Placements	- I feel that the product is not overly displayed - I think that the product is integrated into the plot of the movie nicely
	Contextual Fit	- I believe that the product fits the scene's content - I believe that the product fits the character's lifestyle. - I think the brand image and the film genre are consistently matching.
Brand Visibility	Brand Recall	- I believe I was able to recall the brand name without any prompts or cues after watching the film. - I think I was able to mention the brand name on my own without any reminders after watching the film.
	Brand Recognition	- I think I could recognise the brand when it was shown among several other brands. - I think I could mention the brand after watching the film.
Film Genre		- The genre of the film closely matched my interests. - I was more likely to recall brands featured in the films that matched my preferred genre. - The genre of the content influenced my attitude toward the brands that appeared in it. - I felt more emotionally engaged with the product placements because of the genre of the film.

(Source: Authors' Compilation)



OPERATION, LOGISTICS AND SUPPLY CHAIN MANAGEMENT

THE IMPACT OF GREEN SUPPLY CHAIN MANAGEMENT PRACTICES ON ECONOMIC PERFORMANCE WITHIN THE SRI LANKAN FOOD & BEVERAGE INDUSTRY

W.A.D.M.S. Wijesekara ¹

Abstract

This study investigates the multi-faceted impact of Green Supply Chain Management (GSCM) practices on Economic Performance (EP) of the unique Sri Lankan food and beverage (F&B) industry. The novelty of this research lies in the empirical examination of the high-resource-intensive industry of a developing nation, comparing five various dimensions of GSCM with a critical measure of financial performance, a relationship previously under-researched in Sri Lanka. EP was taken as the dependent variable, measured by five independent variables, including green purchasing, eco-design, internal environmental management, reverse logistics, and investment recovery. A convenience sample of 100 F&B businesses in the Galle district was surveyed. The research established that four of every five GSCM practices, green purchasing, eco-design, reverse logistics, and investment recovery, are positive and statistically significant with economic performance. This establishes that circular economy practices directly mirror organisational profits. However, internal environmental management was established to be statistically insignificant. This is a deviation from most literature in the world, suggesting that, independently, local top-management commitment may not lead to economic benefits in cash terms without extrinsic market pressures. The study offers strategic advice for managers to prioritise investment recovery and circular supply chains. Scholars can extend this study by considering other GSCM practices that exert a stronger influence on economic performance than the variables considered in this research.

Keywords: Economic performance, food and beverage industry, green supply chain management

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Proceedings of the 16th International Conference on Business and Information - ICBI 2025 © 2025 by [The Faculty of Commerce and Management Studies, University of Kelaniya, Sri Lanka](#) is licensed under CC BY-SA 4.0.

DOI:

Introduction

Economic performance is a critical indicator of a firm's ability to sustain growth, enhance competitiveness, and offer long-term viability for evolving market conditions. Economic performance defines how well a firm uses its resources to generate profits while preserving stakeholder value. Existing literature emphasises that external macroeconomic and environmental conditions strongly impact the profitability and long-term viability of companies. For instance, Yildiz and Kizildag (2024) revealed that macroeconomic uncertainty has a strong influence on profitability in manufacturing and service firms in Türkiye, noting the extent to which organisational performance is determined by external economic factors. Similarly, Rahim and Daud (2025) deduced that environmentally and socially responsible CSR practices positively impact the encouragement of economic development among Malaysian companies, verifying that socially and environmentally responsible practices lead to increased economic performance among firms. In the Sri Lankan context, Perera and Fernando (2023) found that sustainability practices like environmental responsibility and ethical business behaviour significantly increase the economic vitality and competitiveness of apparel firms. These results collectively indicate that economic performance is a multidimensional construct that is not only driven by financial factors but by environmental and social sustainability practices as well.

Previous research on Green Supply Chain Management (GSCM) has widely examined its influence on various dimensions of firm performance. Most of the researchers have explored how the activities of GSCM influence environmental performance (Sundarakani & Vel, 2016), operation efficiency (Feng et al., 2018), and overall sustainability outcomes (Herrmann et al., 2021; Shamsuddin et al., 2020). The previous research was inclined to understand GSCM as a single-dimensional construct, focusing primarily on environmental or financial dimensions. Nevertheless, recent literature offers the need to apply a multi-dimensional strategy that embraces GSCM as a bundle of inter-linked practices with impacts on multiple performance domains simultaneously (Feng et al., 2018; Priyashani & Gunarathne, 2021).

Financial performance centres on profitability, liquidity, and return on investment, whereas economic performance is a more holistic construct encompassing cost effectiveness, competitiveness in the marketplace, utilisation of resources, and creation of long-term value. Çankaya and Sezen (2019) and González-Torre and Adenso-Díaz (2021) emphasised that assessment of GSCM's impact on economic performance can contribute to showing how sustainable supply chain practices enhance the economic resilience and competitive advantage of organisations. Yet, most research has been concentrated in industrialised countries (Smith et al., 2022; Geng, Mansouri & Aktas, 2017), and limited empirical findings have been reported from developing economies such as Sri Lanka.

Sri Lankan industries are slowly implementing GSCM practices on a competitive scale relative to the prime exporting nations such as Japan and China, according to Jayarathna (2016). However, there has been limited analysis of how these practices influence economic performance, especially in the main manufacturing industries like food and beverages. This industry represents the highest Index of Industrial Production in 2021 and is one of the key sectors that contribute significantly to SL GDP (Chanchala & Joseph, 2023). Therefore, this study bridges this gap by exploring empirically the influence of multidimensional GSCM practices: green purchasing, eco-design, internal environmental management, reverse logistics, and investment recovery on the economic performance of Sri Lankan food and beverage firms.

Literature review

GSCM practices and economic performance

Green supply chain management can be defined as the "management process in supply chains whose prime objective is to remove all kinds of waste and reduce the environmental impact in various stages of a supply chain" (Burki, 2018). Supply chain companies can transform their supply chains into green supply chains using supply chain management systems and environmental management systems. Economically, the central focus of an organisation is to provide products and services to clients to meet their needs and desires and also efficiently deal with the business's cash flow (Jan et al., 2019). The economic performance of a given organisation reflects its contribution to stakeholders' economic well-being and the economic system as a whole, in terms of local, national, or global levels. Existing literature predominantly focuses on environmental effects, which remains a field with limited knowledge regarding the influence of GSCM practices on economic performance, particularly in industries. González-Torre and Adenso-Díaz (2021) emphasised that additional research on economic performance and GSCM practices and their linkage should be undertaken to bridge this knowledge gap.

Despite the global attention to sustainable SCM practices, research on how the practice of GSCM affects economic performance in Sri Lanka's food and beverage industry is limited. Kumar and Wang (2022) also emphasised the need for greater in-depth analyses of the specific barriers and enablers that influence the effective application of GSCM practices by the food and beverage industry in developing countries.

Green purchasing (GP) and economic performance

Green purchasing practices tend to involve close collaboration with suppliers who are committed to sustainable practices. Such cooperation can influence economic performance (Jones & Chen, 2019). Green buying can be defined as the buying behaviours that are focused on environmental factors like minimising waste, free of hazards and toxics (Vijayvargy et al., 2017). Jones and Chen (2019) conducted quantitative analysis examining the economic performance and green buying programs, and found a positive correlation between sustainable supplier performance and the purchasing organisation's economic performance. Another study by Greenberg and Wang (2020) reported statistically significant improvement in the market share of companies adopting green purchasing practices. However, De et al. (2020) suggested that green purchases serve a moderating role in economic growth.

H1: Higher levels of green purchasing will higher the economic performance

Eco-design (ED) and economic performance

Eco-design can be defined as designing a product that is green and that minimises the environmental footprint throughout its whole life cycle (Habib et al., 2020). Eco-design relies on the philosophy of reducing environmental footprint and is applied throughout the total life cycle of a product, from production, through use, to end-of-life. Organisations embrace the eco-design approach since it addresses environmental problems at all stages of the product lifecycle from raw material purchasing to end-use consumption (Arshad Ali et al., 2020). Previous research studies established that eco-design enhances positive economic performance measures (Ahmad et al., 2022; Gunasekara et al., 2023; Priyashani & Gunarathne, 2021).

H2: Higher levels of eco-design will enhance economic performance

Internal environmental management (IEM) and economic performance

Internal environmental management is a green practice impacting the decision-making process of the top management, and supporting the middle-level management to ensure the successful implementation of strategies and inter-department coordination (Vanalle et al., 2017). Also stressed that efforts from top management play a strong impact on adopting GSCM practices in the firm. The first step is to establish environmental sustainability goals and communicate them to all departments because all departments are responsible for embracing sustainable practices (Díaz & Ping, 2018). Giovanni (2012) rebutted that environmental management has a direct effect on environmental and social performance but an indirect effect on economic performance. There is earlier work that can be seen that IEM has a positive impact on performance metrics like economic performance (Priyashani & Gunarathne, 2021; Annika & Díaz, 2018).

H3: Higher levels of internal environmental management will higher the economic performance

Reverse logistics (RL) and economic performance

Rivers' logistics are organisational activities that involve collecting waste products and materials from the consumers with reuse and recycling intentions (Shamsuddin et al., 2020). Defective item repair, material reuse and recycling, and packaging materials are the most important factors in reverse logistics (Priyashani & Gunarathne, 2021). Reverse logistics have been used as the most common GSCM practice in earlier studies (Muma et al. 2014; Mitra & Datta, 2014). Reverse logistics were also used by Younis et al. (2016) to examine the link between GSCM practices and firm performance. Reverse logistics is one of the broadly used dimensions in the case of GSCM research. Most researchers nested reverse logistics as a variable in their theoretical models to find its impact on performance measures. As such, previous researchers found that reverse logistics positively impacts performance like economic performance (Priyashani & Gunarathne, 2021; Appiah & Odartey, 2021; Onyango et al., 2014).

H4: Higher levels of reverse logistics will higher the economic performance.

Investment recovery (IR) and economic performance

Investment recovery (IR) is the efficient, effective and profitable recycling, recovery, reselling and disposal of waste, excess inventory, scrap, defective, and obsolete products to economic benefit for the company and reduce environmental impact (Habiba & Bao, 2019).

Investment recovery is the most studied and most practised dimension in the GSCM research (Ahmed et al., 2018). The organisations' managers are forced to minimise wastage, selling excess inventories, and scraps for economic benefits. This is the phase of optimising organisations' idle assets through reuse or selling out. Investment recovery has strong and positive effects on organisational performance (Zhu et al., 2008). In addition, investment recovery significantly contributes to the economic performance of the firm (Asif, 2023). However, this contradicts Syakila's (2017) study, where a negative correlation was demonstrated between investment and firm performance. Moreover, Yildiz and Sezen (2019) also indicated that investment recovery significantly contributes to environmental and economic performance.

H5: *Higher levels of Investment recovery will higher the economic performance*

Methodology

This study used the deductive reasoning approach as the study followed the positivist philosophy. This quantitative study focuses on testing hypotheses and employs various statistical tools to analyse numerical data. A survey as a quantitative method utilised since this study involves numerical data. A structured questionnaire as a primary data collection method was distributed among relevant respondents. The questionnaire can be identified as the most effective method to collect data (Sekaran, 2003). The questionnaire for this study consisted of two sections: Section A and Section B; Demographics, and Scale questions, respectively. All scale questions were adapted from previous studies, and those were measured on a five-point Likert Scale where 1 indicated Strongly Disagree and 5 indicated Strongly Agree.

The target population of this research consisted of all registered food and beverage manufacturing firms operating in Sri Lanka. The sample comprised 100 food and beverage firms located in the Galle District, selected through a convenience sampling method. The Galle District was chosen as it represents a strategically significant industrial area in the Southern Province, hosting a diverse range of small, medium, and large-scale food and beverage producers that engage in both domestic and export-oriented operations. This regional diversity provided an appropriate representation of the industry's overall structure and operational practices across Sri Lanka. A convenience sampling method was used, which is used extensively in exploratory and correlational studies where the sampling frame of the entire population is difficult to access (Etikan et al., 2016). Such a sampling technique allowed the researcher to capture firms which were operationally active and willing to be incorporated in the study period. Although convenience sampling limits results' generalizability, it is suitable where hypothesis testing is necessary in pilot studies when one's aim is to record significant relationships and not predictions on the whole populations (Acharya et al., 2013). Data analysis was conducted using the "Statistical Package for Social Sciences" (SPSS) software. Validity and reliability of the data were tested, and satisfied the internal consistency and the validity of the data. Correlation analysis and regression analysis were also applied to establish the correlation and relationship between the independent variable and the dependent variable.

Empirical Results

Correlation analysis

As illustrated in Table 1, all independent variables show a positive and significant correlation with the dependent variable (economic performance), with the correlation values of 0.672, 0.624, 0.622, 0.820, and 0.855, respectively, as they are significant at 0.05 ($P < 0.05$). Green purchasing does not correlate with all other independent variables; however, eco-design shows a considerable correlation with other variables, but moderately.

Table 1
Correlation analysis

Variable	GP	ED	IEM	RL	IR
ED	.196				
IEM	.135	.126			
RL	.099	.625**	.140**		
IR	.045	.677**	.663**	.324**	
EP	.672	.624**	.622**	.820**	.855**

** Significant at 1% level

* Significant at 5% level

(Source: Survey-2025)

Multiple regression analysis

In order to test hypotheses, multiple regression analysis was run along with the Multiple Regression Anova, model summary and correlation coefficients. F value in this model indicates 67.363 which has a significant value of 0.000, which is less than 0.05. It indicates that the model is fit, and the regression model is significant.

The R value is 0.884 which indicates that there is a strong relationship with a value of 0.884. It means the predicted model is strongly related to the actual predictor. The adjusted R square value of this model 0.770 and it indicates that 77% of the variation of the EP can be explained by all five independent variables in this model.

According to Table 4, standardized coefficient value of green purchasing is 0.312 and its t value represents 2.262, while p value is 0.036 which is less than 0.05, which is significant. Accordingly, it can be said that green purchasing has a positive significant impact on economic performance. β value and t value of eco-design indicate as 0.010 and 2.108 respectively, while its p value is 0.14 which is also less than 0.05, which is significant. Eco-design has a significant positive impact on economic performance. Internal environmental management does not show any significant impact on economic performance as $\beta = 0.034$, $t = 0.386$ and $P = 0.700$ which is greater than 0.05, which is insignificant ($P > 0.05$). Reverse logistics show a positive significant impact on economic performance as $\beta = 0.321$, $t = 3.578$ and $P = 0.001$ which is less than 0.05, which is significant at ($P < 0.05$). Finally, β value and t value of investment recovery 0.566 and 5.962 respectively and it has a p value 0.000 which is less than 0.05, which means that investment recovery has a positive significant impact on economic performance.

Table 2
Coefficient table

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
GP	.301	.045	.312	2.262	.036
ED	.010	.092	.010	2.108	.014
RL	.325	.091	.321	3.578	.001
IR	.566	.095	.566	5.962	.000

(Source: Survey-2025)

The green purchasing positively impacts economic performance, which is consistent with the results of Greenberg & Wang (2020). Eco-design has a positive impact on economic performance, which is supported by Priyashani and Gunaratne (2021) and Annika and Díaz (2018). Internal environmental management has no significant impact on economic performance, which is in line with Giovanni (2012). Reverse logistics shows a positive impact on economic performance, which is supported by Ivanova, Rogaczewski and Lutsenko (2022). Investment recovery also shows a positive impact on economic performance, which is supported by Khan and Qianli (2017).

Conclusion

The research focused on the influence of GSCM practices on the EP of Sri Lankan food and beverage companies. Empirical findings indicate that green purchasing, eco-design, reverse logistics, and investment recovery have positive and significant effects on economic performance, whereas internal environmental management did not have any influence. The results reveal that environmentally sustainable supply chain operations can enhance cost effectiveness, operational efficiency, and market competitiveness. Practitioners are encouraged to pursue sustainable supply chain collaboration, adopt eco-design philosophies, utilise efficient reverse logistics, and incorporate investment recovery programs for effective maximisation of resource optimisation and profitability. Even though internal environment management had no direct impact, it is essential for long-term sustainability through training, leadership commitment, and performance monitoring. Green certifications, incentives, and regulations must be promoted by policymakers to encourage the implementation of GSCM. Potential areas for future research include exploring additional dimensions of GSCM, employing probability sampling, conducting longitudinal or comparative studies, and exploring multi-industry or cross-country contexts to improve generalizability.

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ROLE OF ARTIFICIAL INTELLIGENCE (AI) APPLICATIONS IN SUPPLY CHAIN AND LOGISTICS IN TRANSITION TOWARDS A CIRCULAR ECONOMY

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Abstract

This literature review examines the transformative impact of artificial intelligence (AI) on facilitating the transition of supply chain and logistics systems toward a circular economy (CE). Drawing on a synthesis of recent empirical and conceptual studies, the review identifies key AI technologies, including machine learning, deep learning, natural language processing, and Internet of Things (IoT) devices, and their applications across various CE practices, such as reverse logistics, waste minimisation, green procurement, and ethical sourcing. The findings indicate that AI significantly enhances operational efficiency, predictive capabilities, and resource optimisation, while also addressing environmental challenges through improved transparency and automation. Furthermore, the review highlights how the integration of AI with IoT and blockchain technologies enhances material traceability and emission tracking, thereby supporting the design of circular supply networks. Despite these advancements, notable challenges persist, including data silos, high infrastructure costs, and ethical concerns regarding the collaboration between humans and AI. The review also reveals a regional research gap, with limited localised models for developing economies like Sri Lanka. Conclusively, the study calls for multi-stakeholder collaboration, improved regulatory frameworks, and empirical validations to harness AI's full potential in achieving sustainable and circular logistics systems.

Keywords: Artificial intelligence, circular economy, green supply chain, supply chain management, smart logistics

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Proceedings of the 16th International Conference on Business and Information - ICBI 2025 © 2025 by The Faculty of Commerce and Management Studies, University of Kelaniya, Sri Lanka is licensed under CC BY-SA 4.0.

DOI:

Introduction

The global push toward sustainable development and environmental stewardship has positioned the circular economy (CE) as a vital strategy for reducing resource consumption, minimising waste, and enhancing operational resilience. At the heart of this transformation lies artificial intelligence (AI), a disruptive technological force revolutionising supply chain and logistics management. Over the past decade, AI has evolved from a promising innovation into a critical enabler of intelligent, data-driven decision-making across supply chain functions. Its integration has facilitated predictive analytics, real-time monitoring, autonomous routing, and lifecycle product tracking, aligning logistics operations with the principles of a circular economy. Technologies such as machine learning, computer vision, natural language processing, the Internet of Things (IoT), blockchain, and digital twins are now redefining core logistics processes, including demand forecasting, defect detection, predictive maintenance, and circular product traceability. However, despite these advances, several barriers hinder the widespread adoption of AI in CE-focused supply chains. These include high implementation costs, limited data availability, skills shortages, organisational resistance, ethical and regulatory concerns, and fragmented digital infrastructures, particularly prevalent in developing contexts such as Sri Lanka. As industries navigate this digital shift, understanding the role of AI, the tools involved, and the challenges faced is crucial for accelerating the transition toward circular, intelligent, and sustainable logistics ecosystems.

Objectives

This review aims to systematically analyse the existing body of literature concerning the role and impact of AI applications in logistics and supply chain management, with a particular focus on their contribution to the transition towards a circular economy. The objectives are as follows:

RO1: To identify and classify the key AI applications used in supply chain and logistics operations.

RO2: To investigate the barriers and challenges faced in adopting AI technologies for circular economy-focused supply chain transformation.

RO3: To identify and examine the key characteristics of circular economic practices

RO4: To analyse the observed environmental and operational impacts of AI adoption in supply chains transitioning toward circular models

RO5: To identify gaps in existing literature and propose future research directions for AI-driven circular supply chain development.

Methodology

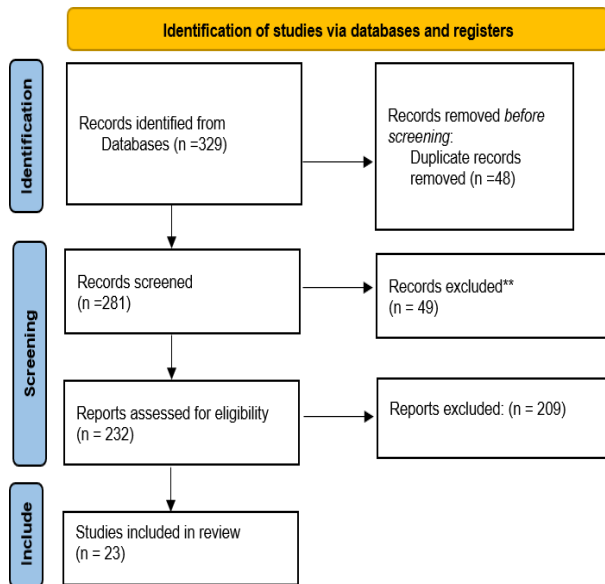
This study employs a Systematic Literature Review (SLR) approach, guided by the PRISMA 2020 framework, to investigate how AI supports the transition of supply chain and logistics systems toward a CE. The review ensures transparency, reproducibility, and comprehensive coverage by following a structured multi-stage process. Targeted Boolean search queries using keywords such as ‘AI in logistics’, ‘circular economy’, and ‘reverse logistics’ were executed across databases, including ScienceDirect, IEEE Xplore, SpringerLink, Emerald Insight, Taylor & Francis, and Google Scholar, focusing on peer-reviewed studies published between 2015 and 2024. This yielded 328 records, from which 48 duplicates were removed. A title and abstract screening of the remaining studies reduced the count to 232. After applying the inclusion criteria, 23 peer-reviewed studies were selected for final analysis, meeting the criteria of relevance to AI in supply chains, CE focus, and recency criteria. Each study was read in full, annotated, and coded using an open thematic coding strategy, allowing emergent patterns and relationships to be captured without conducting a quantitative meta-analysis due to the heterogeneous study designs. The PRISMA framework ensured systematic tracking and reporting at every stage of the review. Ultimately, this rigorous methodology lays a strong foundation for mapping AI applications, identifying research gaps, and proposing conceptual frameworks that support circular supply chain transformation, particularly in developing contexts like Sri Lanka.

Results and Discussion

The review of 23 academic studies highlights the transformative role of Artificial Intelligence (AI) in advancing circular economy (CE) practices within supply chain and logistics management. AI tools such as machine learning, predictive analytics, and natural language processing support demand forecasting, reverse logistics, and waste reduction, key enablers of circular systems. Notably, AI aids in end-of-life product recovery and material reuse. Integration with IoT, blockchain, and cloud technologies further enhances transparency, traceability, and real-time decision-making. However, adoption faces barriers, including technical limitations, high implementation costs, lack of expertise, and ethical concerns like data privacy. While most studies emphasise efficiency gains, fewer

directly link AI to CE outcomes, revealing a research gap. Nonetheless, findings confirm AI's broader potential in supporting strategic sustainability goals, from eco-design to lifecycle management, pointing to the need for interdisciplinary approaches in future research.

Figure 1
PRISMA flow diagram



(Source: Authors' Compilation)

Thematic Synthesis

Theme 1: To identify and classify the key AI applications used in supply chain and logistics operations.

The review highlights the diverse applications of AI in enhancing supply chain and logistics efficiency while supporting circular economy goals. Key areas include demand forecasting, predictive maintenance, and route optimisation, enabled by technologies such as machine learning, deep learning, and reinforcement learning. AI also drives process automation in smart warehouses, supports risk and disruption management through big data analytics, and improves transparency via blockchain integration. Additionally, tools like Natural Language Processing (NLP) streamline communication and contract management. Collectively, these AI applications help optimise resources, reduce waste, and improve decision-making across the supply chain.

Table 1
Key AI applications across supply chain functions

AI applications	Usage	Key Studies
Machine Learning	forecasting, pattern recognition, and demand	Zhang et al. (2020), Ali & Khan
Deep Learning	Real-time object detection.	Patel & Sengupta (2021), Li et al.
NLP	Text-based document handling.	Rahman & Chowdhury (2023), Kumar & Raj
Computer Vision	Inspection, visual quality	Singh & Tan (2021), Huang et al.
Robotics	Warehouse automation	Miller & Zhou (2020), De Silva et al.
AI-enabled Decision Support	Strategic & tactical decision	Chen & Liu (2018), Perera et al.
Multi-Agent Systems	Coordinated decision making	Ghosh & Sen (2019), Bui & Ha (2020)
Digital Twins	Virtual simulations for the process	Wang & Zhu (2023), Nanayakkara et al.
Blockchain + AI	Secure, traceable decision	Fernando & Silva (2022), Rai et al.
Data Mining	Pattern discovery from large	Chakraborty et al. (2019), Weerakoon & Fernando
Route Optimization	Optimising delivery paths, minimising fuel	Kim et al. (2021), Rathnayake & Zaman

Process Automation	Repetitive task execution	Jayasuriya & Gomez (2023), Nadeesha & Kumar
Demand Forecasting	Anticipating demand trends for inventory	Lim & Choi (2020), Wijesekara & Ranaweera (2022)
Predictive Maintenance	Failure prediction, maintenance	Wickramasinghe et al. (2021), Balamurugan & Rao (2022)

(Source: Authors' Compilation)

Theme 2: To investigate the barriers and challenges faced in adopting AI technologies for circular economy-focused supply chain transformation.

The literature identifies a network of systemic and organisational barriers constraining the adoption of Artificial Intelligence (AI) in circular economy (CE)-oriented supply chains. A central issue is the high upfront investment in infrastructure, such as IoT devices, machine learning platforms, and cloud architecture, which disproportionately affects small and medium-sized enterprises (SMEs), particularly in developing economies (Wang, 2021; Boute & Udenio, 2021; Mahmood et al., 2022). This financial burden is compounded by a scarcity of skilled professionals in AI engineering, data science, and systems integration, resulting in implementation failures and underutilization of technology (Onukwulu et al., 2024; Bhowmik et al., 2024).

Beyond technical readiness, many organisations face challenges related to data fragmentation and legacy system incompatibility, particularly with ERP and warehouse management systems (WMS), which obstruct AI deployment and cause costly operational disruptions (Al Doghan & Sundram, 2023). Cybersecurity concerns and regulatory uncertainty further inhibit adoption due to fears of data breaches and non-compliance (Dubey et al., 2023). From a socio-organisational perspective, resistance to change is prevalent, often rooted in job displacement anxiety and a lack of clarity regarding leadership's vision for AI's role in CE transitions (Agrawal et al., 2018; Hao & Demir, 2024). Ethical challenges, including algorithmic bias and a lack of transparency, also pose risks to the equitable deployment of AI (Dauvergne, 2020). These issues align with the Technology-Organisation-Environment (TOE) framework, which posits that innovation adoption is contingent not only on technical capacity but also on institutional pressures and organisational inertia.

Theme 3: To identify and examine the key characteristics of circular economy practices.

The reviewed studies identify ten key ways AI enables circular economy (CE) practice in supply chain and logistics. AI supports waste reduction, predictive maintenance, reverse logistics, eco-design, and emission tracking. It also enhances transparency through blockchain, real-time monitoring via IoT, and automates disassembly with smart robotics. Additionally, AI facilitates stakeholder collaboration and the development of secondary markets for recycled goods. Overall, AI acts as a powerful driver of sustainability and resource efficiency in circular supply chains.

Table 2

Key Circular Economy Characteristics and the Role of AI in Enabling Sustainable Supply Chain

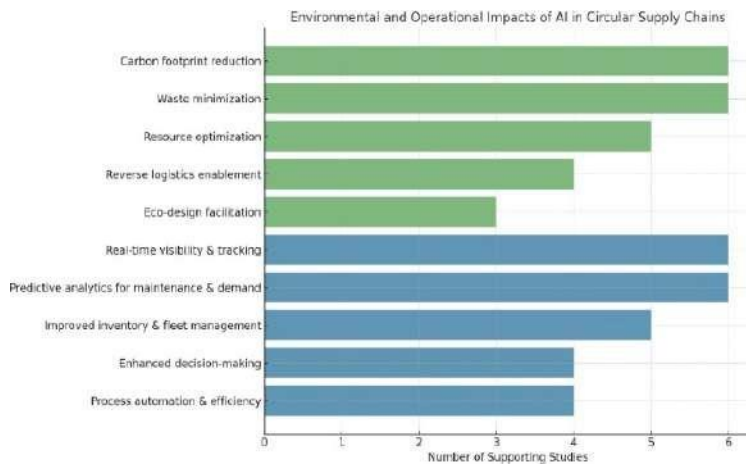
Circular Economy Characteristics	Usage in SCM/Logistics	Example Studies
Resource Efficiency and Waste Minimisation	AI optimises resource use and reduces waste through real-time monitoring and smart inventory management.	Bhattacharya et al. (2024); Dubey et al. (2023)
Product Life Extension	AI supports predictive maintenance and condition monitoring to extend asset lifespan.	Bhowmik et al. (2024); Ernst et al. (2019)
Reverse Logistics and Closed-Loop Systems	AI enables intelligent return routing and reprocessing systems, optimising remanufacturing loops.	Wang (2021); Mahmood et al. (2022)
Eco-Design and Green Packaging	AI supports sustainable product design and packaging decisions based on recyclability and minimal material usage.	Shinde & Phadke (2023); Hao & Demir (2024)
Sustainable and Ethical Sourcing	AI and blockchain monitor environmental and ethical compliance in supplier networks.	Dubey et al. (2023); Onukwulu et al. (2024)
Digitalisation and Intelligent Systems	Digital twins, AI, and IoT optimise operations and improve sustainability insights.	Shuaiqi Wang (2021); Boute & Udenio (2021)
Collaboration and Multi-Stakeholder Engagement	AI platforms enhance coordination and data sharing between circular economy stakeholders.	Bhowmik et al. (2024); Shinde & Phadke (2023)
Design for Disassembly and Material Recovery	AI aids in creating modular designs and guides automated disassembly for raw material recovery.	Agrawal et al. (2018)
Carbon and Environmental Footprint Reduction	AI tools track emissions and optimise transport to reduce environmental impact.	Dauvergne (2020); Hao & Demir (2024)
Economic Value Creation from Waste	AI evaluates waste for upcycling and finds market value in secondary materials.	Mahmood et al. (2022)

(Source: Authors' Compilation)

Theme 4: To analyse the observed environmental and operational impacts of AI adoption in supply chains transitioning toward circular models.

Figure 2

Distribution of Environmental and Operational Impacts of AI in Circular Economy-Oriented Supply Chains Based on Literature Evidence



(Source: Authors' Compilation)

A growing body of literature confirms that the adoption of AI in circular economy (CE)-oriented supply chains promotes both environmental sustainability and operational excellence. Environmentally, AI contributes to resource efficiency by enabling predictive maintenance and real-time monitoring, thereby extending product life cycles and reducing material waste (Rajabion et al., 2022; Farshadfar et al., 2024). For example, in reverse logistics, AI-powered systems enhance the precision of remanufacturing and recycling decisions, improving material recovery outcomes (Ramadoss, 2021). Additionally, AI supports emission tracking and eco-friendly packaging optimisation, functions aligned with CE principles of lifecycle thinking and closed-loop systems (Dubey et al., 2023; Hao & Demir, 2024). From an operational standpoint, AI enhances supply chain agility and resilience through real-time analytics, digital twins, and scenario modelling, all of which reflect the dynamic capabilities framework, the ability of firms to sense, seize, and reconfigure in volatile environments (Teece, 2007). Techniques such as demand forecasting and route optimisation streamline logistics and improve service levels (Onukwulu et al., 2024; Bhowmik et al., 2024). Moreover, interoperability tools facilitate integration across decentralised supply networks, a key enabler of system-wide circularity (Al Doghan & Sundram, 2023).

Theme 5: To identify gaps in the existing literature and propose future research directions for AI-driven circular supply chain development.

The literature on AI in circular supply chains highlights several key gaps. Most studies lack sector-specific insights, with a limited focus on industries such as apparel, agriculture, or electronics. There's also a shortage of research linking AI to measurable circular economy (CE) outcomes, such as resource circularity or reduction in environmental footprint. SMEs and developing regions remain underrepresented, as most frameworks are based on large firms in developed economies. Challenges around system interoperability, real-time responsiveness, and ethical concerns (e.g., algorithmic bias, transparency) are often overlooked. To address these gaps, future research should prioritise industry-specific AI models, standardised CE metrics, low-cost AI solutions for SMEs, the integration of real-time tools like digital twins, and the development of ethical governance frameworks to support equitable and sustainable circular transitions.

Table 3

Future research directions for advancing artificial intelligence integration in circular supply chains and logistics systems

Direction	Description
1. Sector-Specific AI Frameworks	Develop AI integration models tailored to individual industries (e.g., apparel, food, tech), addressing specific CE objectives like waste reduction and closed-loop flows.
2. AI-CE Impact Metrics	Define standardised KPIs linking AI adoption with CE goals such as resource circularity, reuse rates, and lifecycle optimisation.
3. Focus on Low-Income Economies	Investigate localised AI solutions in developing economies with emphasis on affordability, low-bandwidth tech, and mobile-first platforms.

4. Multi-Agent and Real-Time Systems	Explore decentralised AI (e.g., multi-agent systems, digital twins) to enable real-time reverse logistics and waste management decisions.
5. Life-Cycle Environmental Audits	Employ LCA (Life Cycle Assessment) to quantify the environmental benefits and drawbacks of AI integration in circular supply chains.
6. Ethics and Trust in AI	Examine AI transparency, stakeholder trust, data ownership, and greenwashing in circular supply chain AI solutions.
7. Cross-Sector Data Sharing Platforms	Research federated learning or secure AI models that allow data sharing across supply chain actors without compromising privacy.
8. Hybrid Models for Decision-Making	Combine AI with systems thinking, circular business models, and behavioural economics to co-design sustainable SCM practices.

(Source: Authors' Compilation)

Conclusion

This systematic review of 23 peer-reviewed studies confirms that Artificial Intelligence (AI) serves as a critical enabler of circular economy (CE) practices in supply chain and logistics systems. AI technologies such as predictive maintenance, demand forecasting, route optimisation, automated waste sorting, and sustainable sourcing consistently enhance resource efficiency, operational agility, and environmental performance. These tools align closely with CE principles by supporting closed-loop flows, lifecycle optimisation, and real-time decision-making. However, the transition toward AI-driven circular supply chains remains uneven and constrained by multiple barriers. Key limitations include a shortage of skilled talent, fragmented data ecosystems, high implementation costs, and limited infrastructure, which are particularly acute in developing economies like Sri Lanka. Institutional voids such as unclear regulatory guidance, low stakeholder awareness, and organisational resistance further impede adoption. To unlock AI's full potential in circular transformation, a multi-stakeholder approach is essential, combining technological readiness with capacity building, inclusive policy frameworks, and sector-specific innovation pathways. Future research should aim to bridge the gap between AI capabilities and CE outcomes through standardised metrics, ethical governance, and practical models tailored to diverse industry contexts.

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HUMAN RESOURCE MANAGEMENT, ORGANISATIONAL BEHAVIOUR, AND INCLUSIVE WORKPLACE

JUSTICE ON BRAIN DRAIN: ROLE OF PERCEIVED ORGANISATIONAL JUSTICE ON TALENT MIGRATION INTENTION OF HEALTH CARE PROFESSIONALS OF SRI LANKA

M. D. R. Harshani¹

Abstract

While migration in the healthcare sector has been widely examined, far less attention has been given to the role of perceived organisational justice, particularly in shaping the intentions of nurses in Sri Lanka to seek opportunities abroad. This study addresses that gap by exploring how fair perceptions within hospitals influence nurses' migration decisions. Using a quantitative approach, data were collected from nurses working in three major government hospitals in the Badulla District: the Badulla District Provincial General Hospital, the General Hospital Welimada, and the General Hospital Mahiyanganaya, representing a total workforce of 1,169 nurses. A total of 291 nurses were selected through simple random sampling, based on Morgan's table, and responses were gathered via a structured questionnaire using standard measurement scales. The data were analysed using SPSS and Excel through exploratory factor analysis (EFA) and multivariate hypothesis testing. Results revealed that perceptions of distributive, procedural, interpersonal, and informational justice significantly shape nurses' intentions to migrate, underscoring the importance of fostering fairness, equity, and respect in healthcare organisations. By highlighting organisational justice as a key determinant of migration intention, this study offers critical insights for policymakers and hospital administrators seeking to address the brain drain and strengthen Sri Lanka's health sector.

Keywords: Brain drain, organisational justice, talent migration

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DOI:

Introduction

The healthcare system in Sri Lanka operates on a dual basis, providing free healthcare to over 92% of the population through several strong public sector institutions, while also supporting an increasing private sector to offer more advanced diagnostic and specialised treatments. The public health services sector, overseen by the Ministry of Health, provides health services to the majority of the population and has facilitated numerous impressive health milestones in Sri Lanka, including high life expectancy and low maternal and infant mortality rates (SLMA, 2022). A variety of challenges currently exist in health service delivery, including the increasing intention of nurses to migrate. One of the primary issues is a shortage of nursing professionals, particularly in rural and underserved areas. This is due to poor staff selection and engagement, but it can also be attributed to an overarching global demand for health workers. This gap is more pronounced among nurses in rural areas, who are left with an increasing burden to fill the lack of doctors.

The migration of healthcare professionals has become a persistent global issue, especially for developing countries like Sri Lanka. Nurses, who form the backbone of the health system, often seek opportunities abroad due to economic, professional, and social reasons. This outward migration, often referred to as 'brain drain,' negatively impacts the local healthcare system by creating staff shortages, overburdening those who remain, and reducing the overall quality of healthcare. Sri Lanka's dual healthcare system offers free services through public institutions and advanced treatment through the private sector. Despite notable achievements, such as high life expectancy and low maternal and infant mortality rates, the system struggles to retain qualified nurses. Many cite poor working conditions, limited resources, stagnant salaries, and a lack of recognition as reasons for seeking employment abroad. The disparity between local compensation and benefits offered in developed countries such as the UK, Canada, and Australia makes migration an attractive option. While economic and social push-pull factors have been widely studied, the role of perceived organisational justice, nurses' perceptions of fairness in outcomes, processes, and interpersonal treatment, remains underexplored in Sri Lanka. This study aims to fill this gap by investigating how perceived justice affects migration intentions among nurses in government hospitals.

Literature Review

Migration intentions are shaped by multiple factors. Lee's (1966) push-pull theory posits that individuals are driven out of their home country by negative factors (low wages, political instability, poor work environments) and drawn to destination countries by positive factors (higher pay, career advancement, safety). For healthcare workers, these forces are particularly strong due to global shortages and high international demand.

Social exchange theory, as highlighted by Blau (1964), emphasises the reciprocal relationship between employees and organisations. If nurses perceive unfair treatment, such as inequitable rewards or a lack of recognition, they may choose to migrate to settings where their contributions are valued and appreciated. Adams' (1965) equity theory emphasised distributive justice, which is the fairness of rewards relative to effort. Similarly, Bies and Moag (1986) identified interactional justice, which stresses respectful and transparent communication. Together, these dimensions form the basis of perceived organisational justice. Empirical studies suggest that perceptions of justice have a strong influence on employee attitudes and turnover intentions. Buchan et al. (2019) found that unfair pay structures and opaque decision-making processes were key predictors of healthcare worker migration. Shah et al. (2020) highlighted that disrespectful treatment by supervisors further encouraged nurses to seek employment abroad. Thus, organisational justice is a critical but underexplored determinant of nurse migration in Sri Lanka.

Distributive justice

Distributive justice is concerned with the perceived fairness of the outcomes or rewards received by employees in exchange for their efforts, such as salary, promotions, and recognition. This dimension is based on the equity theory, which posits that equity exists when the ratio of inputs (work, time, skills) to outcomes (rewards, compensation) is perceived as equal among employees. Employee-level outcomes of such equity perceptions include organisational commitment and satisfaction when rewards are viewed as merit-based, effort-based, or need-based (Adams, 1965). Conversely, perceived inequities-whether under-or overpayment-may lead to negative emotions or responses, such as lack of motivation, turnover intentions, and poor organisational commitment (Greenberg, 1990).

Procedural justice

Procedural justice refers to the perceived fairness of the processes and procedures by which decisions are made within the organisation. In contrast to distributive justice, which pertains to the fairness of the outcome, procedures become the arena in which fair treatment determines whether decision-making processes are transparent, unbiased, and consistent. Procedural justice was introduced by Thibaut and Walker (1975), who argued that individuals cared about the fairness of decision-making procedures, as these processes had direct implications for

their hopes of subsequent outcomes. Procedural justice is crucial in shaping trust in management, commitment to organisational goals, and the acceptance of decisions that may not be favourable to employees (Tyler & Lind, 1992). Conversely, students or employees consider the necessary procedures to arrive at decisions to be fair and are more likely to be satisfied with the outcomes, regardless of how unfavourable (Leventhal, 1980).

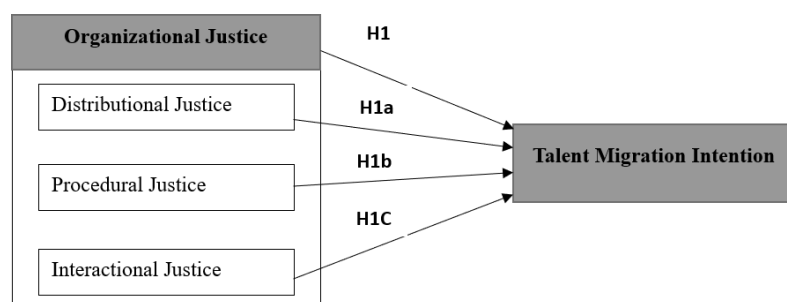
Interactional justice

Interactional Justice refers to the relatively fair way the employee is treated during decision-making. It concerns the quality of communication by employees with superior officials. There are generally two smaller dimensions within interactional justice: Interpersonal Justice, which emphasises that respect and decorum are reflected in decision-making, and, on the other hand, Informational Justice, which requires that explanations regarding decisions be transparent and accurate (Bies & Moag, 1986).

Hypothesis Development and the Conceptual Framework

A hypothesis is a provisional statement which can be subjected to empirical testing to determine the extent of the relationship between the variables (Sethy, 2021). Based on the theory of organisational justice and its potential impact on the migration intentions of nurses in Sri Lanka, the following hypotheses are developed. The hypotheses aim to explore the relationship between perceived organisational justice and the migration intentions of nurses, focusing on three dimensions: distributive justice, procedural justice, and interactional justice.

Figure 1
Conceptual framework



(Source: Authors' compilation)

H1: Organisational justice significantly impacts the talent migration intention of nurses.

Organisational justice has been identified as a crucial determinant of employee attitudes and behaviours, particularly in professions requiring high commitment, such as nursing (Colquitt et al., 2001; Niehoff & Moorman, 1993). When employees perceive fairness in workplace decisions, outcomes, and treatment, they are more likely to remain committed to their organisations (Cropanzano et al., 2007; Moorman, 1991). Conversely, perceived unfairness creates dissatisfaction and increases turnover and migration intentions (Abou Hashish, 2017; Mengstie, 2020). In the Sri Lankan healthcare context, nurses frequently face challenges related to resource allocation, promotion systems, and recognition of their contributions (Fernando & Jayawardena, 2020). As these factors are closely linked with organisational justice, it is reasonable to expect that the overall perception of justice will significantly influence their intention to migrate abroad (Gunawardana & Senadheera, 2023).

H1a: Distributive justice significantly impacts the talent migration intention of nurses.

Rewards, including salaries, promotions, and recognition. According to Adams' (1965) Equity Theory, when individuals perceive inequity between their input (effort, skills, and time) and outcomes (rewards and compensation), they experience dissatisfaction, which may drive them to seek better opportunities elsewhere. For Sri Lankan nurses, low salaries and limited recognition compared to their international counterparts represent a strong push factor. Therefore, distributive justice is expected to play a significant role in shaping their migration intentions.

H1b: Procedural justice significantly impacts the talent migration intention of nurses.

Procedural justice emphasises the fairness of the processes used to make organisational decisions, such as promotions, performance evaluations, and work assignments (Leventhal, 1980; Colquitt et al., 2001). Nurses are more likely to accept unfavourable outcomes if they perceive the processes as transparent, consistent, and unbiased (Greenberg, 1990; Folger & Konovsky, 1989). However, opaque decision-making, favouritism, or lack of employee involvement in policy formulation diminishes trust in the organisation (Cropanzano, Bowen &

Gilliland, 2007). In the Sri Lankan healthcare sector, the absence of fair and transparent procedures has been a recurring concern (Fernando & Jayawardena, 2020). Therefore, procedural justice is expected to be a particularly strong predictor of nurses' migration intentions (Gunawardana & Senadheera, 2023; Mengstie, 2020).

H1c: Interactional justice significantly impacts the talent migration intention of nurses.

Interactional justice refers to the quality of interpersonal treatment employees receive from supervisors and colleagues, as well as the adequacy of explanations provided for organisational decisions (Bies & Moag, 1986; Colquitt et al., 2001). Respectful communication, empathy, and transparency foster trust and commitment, while disrespect, neglect, or lack of information erodes employee morale (Greenberg, 1993; Cropanzano, Byrne, Bobocel & Rupp, 2001). For nurses who work under stressful conditions, supportive interactions are essential in building loyalty to the organisation (Abou Hashish, 2017; Hadian Nasab & Afshari, 2014). When such respect and recognition are absent, nurses may view migration as a path to more dignified and supportive workplaces (Fernando & Jayawardena, 2020; Gunawardana & Senadheera, 2023). Hence, interactional justice is expected to significantly influence migration intention.

Methodology

The study focused on three major government hospitals in the Badulla District: Provincial General Hospital Badulla, General Hospital Welimada, and General Hospital Mahiyanganaya, which together employ many government nurses in the region. These institutions were selected because they operate under a common administrative structure of the Ministry of Health, ensuring comparable organisational policies and work conditions. Moreover, the Badulla District has been identified as an area experiencing notable challenges in nurse retention and migration, making it a relevant context for examining the effects of perceived organisational justice on migration intentions (Ministry of Health, Sri Lanka, 2022; Creswell & Creswell, 2018). The population comprised 1,169 nurses, from which a sample of 291 was selected using Morgan's table and simple random sampling to ensure representativeness. Data were collected using a structured questionnaire consisting of standardised scales for distributive, procedural, and interactional justice (Flint et al., 2012) and migration intention (Hou & Shiau, 2020).

Responses were measured using a 5-point Likert scale. Reliability was tested using Cronbach's alpha, which yielded values above 0.85, indicating strong internal consistency. Validity was established using the Kaiser-Meyer-Olkin test and Bartlett's Test of Sphericity. Data analysis employed descriptive statistics, correlation, and multiple regression analysis with SPSS to test the hypotheses. The conceptual framework positioned organisational justice as the independent variable (with three dimensions) and migration intention as the dependent variable. Hypotheses were developed to test the direct impact of each justice dimension on migration intentions.

Results and Analysis

Descriptive statistics revealed moderate levels of perceived organisational justice among nurses, with mean scores around 2.4 on a 5-point scale. Migration intentions were also moderate, suggesting a mixed sentiment toward remaining in or leaving the profession. The descriptive statistics for the key variables in this study show that perceptions of organisational justice are moderate among the participants. Distributive Justice has a mean of 2.39, indicating a moderate perception of fairness in the distribution of reward, with a standard deviation of 0.95, reflecting some variability in responses. Similarly, Procedural Justice (mean = 2.40, SD = 0.96) and Interpersonal Justice (mean = 2.40, SD = 0.95) both suggest moderate levels of perceived fairness in decision-making and interpersonal treatment, with slight variations in responses. Regarding Talent Migration Intention, the mean of 2.44 suggests a moderate intention to migrate, with a standard deviation of 0.99, indicating a diverse range of intentions among the nurses. Overall, these results suggest that while perceptions of justice are relatively balanced, there is considerable variation in nurses' views on migration intention.

Correlation analysis showed strong positive relationships between all three justice dimensions and migration intention ($r > 0.87$, $p < 0.01$). Regression analysis further demonstrated that organisational justice explained 83.5% of the variance in migration intention ($R^2 = 0.835$). Procedural justice was the strongest predictor ($\beta = 0.397$, $p < 0.001$), followed by distributive justice ($\beta = 0.286$) and interpersonal justice ($\beta = 0.262$). These results suggest that perceptions of fairness, particularly in procedures such as promotions, evaluations, and resource allocation, play a significant role in determining whether nurses consider migrating.

The regression analysis confirmed the robustness of the model, with an R value of 0.914 indicating a very high correlation between distributive, procedural, and interpersonal justice and nurses' migration intentions. The R^2 value of 0.835 shows that 83.5% of the variation in migration intention is explained by the three justice dimensions, while the Adjusted R^2 (0.834) further confirms model fitness. The ANOVA results ($F = 480.235$, $p < 0.001$) validate the overall significance of the model, demonstrating that the predictors collectively have a

meaningful impact. Coefficient analysis revealed that distributive justice ($\beta = 0.298$, $p < 0.05$), procedural justice ($\beta = 0.410$, $p < 0.05$), and interpersonal justice ($\beta = 0.274$, $p < 0.05$) all significantly influence migration intention, with procedural justice emerging as the strongest predictor. These findings collectively suggest that perceptions of organisational justice play a critical role in shaping nurses' intentions to migrate, with fairness in decision-making exerting the greatest influence.

Discussion

The findings of this study indicate that organisational justice plays a significant role in influencing nurses' talent migration intentions in government hospitals in the Badulla district. The analysis confirms that perceptions of distributive, procedural, and interpersonal justice are positively correlated with the intention to migrate, highlighting the importance of fairness in organisational practices and their direct impact on employee retention and migration decisions. The regression analysis results reveal that the three dimensions of organisational justice, distributive, procedural, and interpersonal, collectively explain a substantial portion (83.5%) of the variance in talent migration intention. This suggests that when nurses perceive their workplace as just, in terms of both outcomes and processes, they are less likely to seek opportunities elsewhere. These findings align with previous studies, which have demonstrated that fairness in resource allocation (distributive justice), procedural fairness (the perceived fairness of decision-making processes), and interpersonal treatment (respectful interactions) significantly influence employees' attitudes and behaviours (Bankins et al., 2022).

Among the dimensions, procedural justice had the strongest effect on talent migration intention, followed by distributive justice and interpersonal justice. This is consistent with the work of Lambert et al. (2020), who found that procedural justice often has a more profound impact on employee behaviour than distributive justice, particularly when employees perceive that they have some level of control over the decision-making processes. Moreover, the positive influence of interpersonal justice underscores the significance of respectful and fair treatment by supervisors, supporting findings by Aboobaker and KA (2024) who argued that fair interpersonal treatment can foster trust and reduce employees' intentions to leave. The results also imply that healthcare administrators should focus on enhancing fairness in all aspects of organisational operations, as improving perceptions of justice can reduce the likelihood of talent migration. This is especially the case in areas like the health care system, where there is usually a huge demand for personnel with certain skills. This viewpoint is in agreement with social exchange theory, which postulates that organisational good treatment warrants commitment and loyalty from employees (Khan & Iqbal, 2020). When managers foster a good, premised work environment, they may aid in preventing talent migration amongst nurses.

Conclusion and Implications

This study highlights the pivotal role of organisational justice in shaping nurses' migration intentions in Sri Lanka. The study revealed that organisational justice is a significant factor influencing nurses' migration intentions, with fairness in rewards (distributive justice), decision-making processes (procedural justice), and interpersonal treatment (interpersonal justice) all playing crucial roles. Nurses who perceived fairness in these dimensions were less likely to consider migrating, while perceived injustice strongly increased migration intentions. Among these, procedural justice emerged as the strongest predictor, highlighting the importance of transparent, impartial, and standardised processes in decisions related to promotions, resource allocation, and scheduling. This finding is consistent with prior studies that identify procedural justice as a dominant factor shaping employee behaviour. Distributive justice, tied to equitable salaries, benefits, and recognition, also significantly reduced migration intentions when perceived positively. Meanwhile, interpersonal justice, characterised by respectful treatment and supportive relationships, was similarly linked to stronger retention. Overall, the results suggest that strengthening both the actual practice and the perception of organisational justice can be an effective strategy for discouraging migration among Sri Lankan nurses. This requires healthcare administrators to ensure genuine fairness in policy implementation, decision-making, and daily interactions with staff.

The findings of this study present several practical implications for healthcare administrators, policymakers, and organisational leaders in Sri Lanka. First, reducing unfairness in organisational processes is critical, particularly by strengthening procedural justice through transparent promotion, staffing, and resource allocation systems, while also involving nurses in decision-making to ensure their voices are heard. Second, enhancing the efficiency of organisational procedures requires fairness and clarity in task assignments and promotions, as transparency helps reduce perceptions of bias. Third, distributive justice must be prioritised by ensuring equitable salaries, recognition, and performance-based rewards so that nurses feel adequately compensated for their contributions. Finally, interpersonal justice should be strengthened by fostering respectful communication, empathy, and supportive supervisory practices, thereby creating a culture of fairness and dignity that discourages migration. Collectively, these measures can enhance job satisfaction, improve retention, and mitigate the brain drain of skilled nurses from Sri Lanka's healthcare sector.

Limitations and Directions for Further Research

Despite the findings of this study, it is essential to note that this study is not without limitations. The study was conducted with nurses in government hospitals in the Badulla district, thus limiting the generality of the study findings to the nursing sector in Sri Lanka or any other country. The study could be improved in the future by increasing the sample size and including more respondents from different regions, private facilities, and other sectors of healthcare. The study used a cross-sectional survey that only involved collecting data at one specific point in time. This results in limited evidence of the causal link between organisational justice and migration intention. Perhaps, more longitudinal research might provide a broader understanding of how fluctuations in organisational justice over the given time span affect the migration intentions of the nurses concerned. This research did not consider other environmental attributes that might affect migration decisions, such as political environments, economic influences, and personal aspirations.

The findings of this study set the stage for future research to look at the moderating role of these external factors on organisational justice and migration intention. While some qualitative information was obtained from a limited number of respondents, more regular and flexible qualitative study which investigates further the quantitative outcomes and individual characteristics of the participants, along with their beliefs and attitudes toward organisational justice, can produce a better understanding of the deeper causes of migration intentions observed among nurses.

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IMPACT OF REMOTE WORK ON JOB PERFORMANCE: MODERATING EFFECT OF EMPLOYEE WELL-BEING AMONG ENGINEERING STAFF IN IT INDUSTRY

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Abstract

Telecommuting has rapidly recast organisational processes, most notably in knowledge-intensive areas like information technology (IT). This study aims to evaluate the impact of remote work on job performance and to investigate whether the effect of remote work on employee well-being moderates these effects within the Sri Lankan IT sector. Using a quantitative research approach, a formal online survey was conducted involving 248 IT engineers to collect their perceptions on remote work, job performance, and psychological well-being. Hierarchical regression, descriptive statistics, and correlations will serve as the foundation for the study. The findings indicate that working remotely has a significant impact on performance, which is positively correlated with work-life conflict and organisational trust, and negatively correlated with flexibility. Notably, the second factor is that employee well-being serves as a vital moderator, reinforcing the positive impacts of remote work on performance. The above results highlight the necessity of developing balanced remote working approaches that incorporate both structured flexibility and organisational cultures based on trust, as well as facilitating employee well-being to optimise performance. For scholars, managers, and policymakers in developing countries, the study offers practical strategies for developing hybrid and remote work policies that are both efficient and sustainable for the workforce.

Keywords: Employee job performance, employee well-being, engineering staff, information and technology sector, remote work

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Proceedings of the 16th International Conference on Business and Information - ICBI 2025 © 2025 by The Faculty of Commerce and Management Studies, University of Kelaniya, Sri Lanka is licensed under CC BY-SA 4.0.

DOI:

Introduction

In recent years, Teleworking, also widely known as telecommuting or simply remote work, is one of the most significant changes in the global labour market of the past two decades. It has done this, powered by surging Information and Communication Technologies (ICT) that have transformed common practices of employment by affecting flexibility and decentralisation at every level. While remote work was previously viewed as a privilege or a minor consideration in previous versions, the COVID-19 pandemic marked a turning point that necessitated a complete shift to a virtual workspace. Therefore, companies across all industries had to reorganise their workflows to maintain continuity; the IT sector, in particular, spearheaded the move into digital (Allen et al., 2015).

Work in the IT sector is inherently digital, so tasks associated with it, such as software development, systems administration, and network design, can be accomplished anywhere there is a secure internet connection. The adoption of remote work in the sector has, therefore, been rapid and consistent. To provide an extreme example, the IT industry is one of the pillars of Sri Lanka's national economy. It provided employment opportunities to more than 150,000 professionals and generated around USD 1.2 billion in export revenue in 2023 (ICTA, 2023). An impressive percentage of these employees work in hybrid or entirely remote settings, underscoring the need for this study on the impact of workspace designs on employee outcomes and well-being.

Despite the recent and dramatic growth of remote working worldwide, empirical studies of its consequences in non-Western contexts, particularly in developing economies such as Sri Lanka, are scarce. Research on this topic suggests that it falls heavily on developed economies that have well-developed digital infrastructure, well-established organizational cultures, and other institutional and doctrinal norms that facilitate remote working (Bloom et al., 2015; Golden & Veiga, 2005). These contexts often have certain presuppositions that do not align with the socio-cultural and technological peculiarities of South Asian settings. In Sri Lanka, for example, the organizational solutions to remote work, accessibility to digital infrastructure, and the expectations of employees regarding flexibility and communication differ significantly from those found in the West. In line with this, the generalisation made by Western-focused research runs the risk of providing an inaccurate and/or partial account of the impact of remote work on Sri Lankan IT engineers, particularly in terms of productivity and mental health.

Research problem

There has been a significant rise in remote work, and the various impacts of this on work performance and employee well-being are still poorly understood, especially among Information Technology (IT) engineers in Sri Lanka. Although the practice appears to produce wider flexibility, a greater degree of time control, workplace autonomy, it also poses some serious problems: social isolation, a breakdown of the boundary between work and life, reduced social interactions, and a high probability of burnout, the phenomenon that affects psychological well-being negatively and, subsequently, productivity at the workplace (Gajendran & Harrison, 2007; Danna & Griffin, 1999). Such impacts cannot be described as universal and take place through the prism of organizational culture, management practices, role expectations, and factors of personal well-being.

Employee well-being is another moderator in the remote work-to-job performance nexus, recognised in the literature and observed to be essential, but often overlooked. Under certain conditions, reduced commuting stress and increased autonomy can lead to higher employee satisfaction; on the other hand, there are possibilities of social disconnection and decreased involvement, which can create uneven results that demonstrate the context-sensitivity of the relationship (Felstead & Henseke, 2017).

A combination of strategic dependence on the IT sector and high rates of remote working in Sri Lanka makes the study of its role in IT engineer performance rigorous enough. Such an evaluation must include a moderating factor of employee well-being, which is a specific variable in the context of a developing digital environment with its emerging infrastructure and changing organizational norms. This lack of empirical data is not only a problem for academics, but it is also essential for creating effective managerial and policy strategies that address the post-pandemic digital labour market.

Research objectives and questions

This study aims to investigate the impact of remote work on job performance among engineering staff in the Sri Lankan IT industry, with a particular focus on the moderating role of employee well-being. The following specific objectives guide this inquiry:

RO1: To investigate the impact of remote work on job performance among engineering staff.

RO2: To evaluate how work-life interference affects job performance.

RO3: To assess the influence of effectiveness and productivity on performance outcomes.

RO4: To analyse the role of organisational trust in enhancing performance under remote work settings.

RO5: To measure the impact of job flexibility on employee output.

RO6: To examine the moderating effect of employee well-being on the relationship between remote work and job performance.

Correspondingly, the primary research question is “What effects does remote work have on engineering employee job performance in the Sri Lankan IT industry, considering the moderating influence of employee well-being?”

Supporting this are several secondary questions aimed at dissecting the variables and identifying the mechanisms that underpin performance outcomes in remote work settings.

Significance of study

Both theoretical and practical insights are brought by the present study. In theory, it addresses the limited research on remote work by focusing on the Sri Lankan IT industry, which is a fast-growing industry in a developing economy. Unlike current research projects that are mainly located in the West, the given investigation incorporates the cultural, infrastructural, and organisational peculiarities that are distinct to Sri Lanka.

In practical applications, the conclusions provide recommendations that can be implemented by human resource practitioners and organisational leaders. These recommendations can help an organization formulate effective human resource strategies that will support both productivity and the mental health of workers by highlighting the connection between remote work, performance, and well-being. As an illustration, it has been suggested that remote work policies, with an emphasis on flexibility, mental health support, and an effective communication network, can become valuable. The policymaking in the industry and the national levels could also be informed by the insights that could be derived from this research and hence the formation of effective virtual workforce administration frameworks could be established through such research and policy inputs.

Long-term, the implication of the study goes beyond the scope of organisations. The Sri Lankan IT sector performs in close relationship with the national economy. The recognition of the impacts of remote work on key performance indicators will empower industry leaders and policymakers to continue advancing the sphere in the fast-changing global labour market.

Contextual relevance

In the modern debate about remote work, it has to be recognized that the Sri Lankan information-technology sector is placed in a unique socio-economic and technological environment. Despite the undeniable fact that global requirements of digital transformation are gradually penetrating organisational models, barriers associated with poor infrastructure, insufficient cultural preparedness, and some of the managerial paradigms are still present. As such, what seems to be a rather simple shift to a remote environment turns out to be a significant organizational transformation which realigns leadership, teamwork, and employee experience at large.

A new hybrid paradigm that combines remote and in-office work further complicates this picture. It requires circumstantial approaches in management and a relentless determination to adapt.

These challenges need to be addressed continuously and sustainability through empirically based context-responsive approaches. This research is therefore necessary, and it presents managers with a solid diagnostic model they can use to exploit the shifting landscape of remote and hybrid labour.

Literature Review

Technological progress over the last decade, with the widespread adoption of high-speed Internet, cloud computing, and an ever-expanding range of collaborative tools, has brought remote work (RW) into the spotlight, alongside a workforce that demands a healthy work-life balance (Gajendran & Harrison, 2007; Allen et al., 2015). All these strengths have culminated in the emergence of flexible work arrangements and especially RW that are not only possible but also enticing. The global trend has been accelerated by the COVID-19 pandemic, particularly in the IT sector, where most activities are no longer contingent on physical presence (Bloom et al., 2015).

However, RW is not very simple. On the one hand, it gives positive experiences like increased autonomy and the reduced impact of interruptions in the workplace, whereas on the other hand, it brings certain challenges when it comes to collaboration, communication, isolation, and, most of all, the ever-looming threat of such work and home interference (Wang et al., 2021). Role ambiguity, emotional exhaustion, and high cognitive requirements are frequent outcomes (Morgeson & Humphrey, 2020). Past independently undertaken studies by Mann and

Holdsworth (2003) also reveal that long-term remote interaction may trigger the emergence of psychological pressures due to the limited social interaction.

In the Sri Lankan setting, Information Technology (IT) professionals face a variety of Remote Work (RW) barriers. The first factor is an unstable and unreliable internet connection, along with a lack of ergonomic facilities for workers to rest, which dampens motivation and performance rates. Despite these limitations, RW has already received official support as one of the anchors of the national digital economic strategy by policymakers (Weerakkody et al., 2009) but time and time again, its promotion is being hindered by both cultural opposition and variance in management backing and commitment (Wijegunawardhana, 2022).

The current study thus investigates the level at which RW affects job performance (JP) among IT engineers in Sri Lanka, and the effect that employee well-being (WB) has on reducing this effect. Remote work can be characterized as a job where workers conduct daily activities out of their customary office and is therefore facilitated by digital advancement, globalization as well as the changing workforce demands. RW, however, has a context-dependent effect on JP and that is a mixed and variable one, depending on the setting.

In the study, a multi-dimensional model by Grant et al. (2019) which breaks down RW into 4 dimensions, Work-Life Interference (WLI), Effectiveness/Productivity (EP), Organizational Trust (OT), and Flexibility (FX) are used. This framework enables a more nuanced evaluation of RW than a two-group solution, making the analysis more comprehensive.

Grant et al. (2013) note that remote work (RW) is based on two principal components: an effective technological framework and the personal abilities of employees to self-regulate. Similarly, Bloom et al. (2015) show that there is an initial productivity increase among distance officers, which is mainly caused by a lack of on-site distractions, but they emphasize the importance of supporting mechanisms. Extending these understandings, Bartsch et al. (2021) discuss factors that impact performance in virtual environments and conclude that managerial approval, clearly outlined tasks, and online collaboration tools collectively influence performance.

Over-trust, more so organizational one is a critical variable. According to Golden and Veiga (2005), consistent communication, positive feedback messages from the manager, and a psychologically safe climate are among the factors that contribute to developing trust. Therefore, virtual teams need a consistent communication process to maintain harmony that cannot be achieved without video conferencing and instant-messaging applications as stated in the study of Maruyama and Tietze (2012).

Flexibility, which encompasses both the choice of time and method, has been proven to have a positive influence on employee motivation and satisfaction (Spreitzer, 1995). However, in the absence of any clear delineation, such flexibility increases the chances of overworking and burnout (Ashforth et al., 2000). To mitigate these adverse effects, managers should define these limits in a clear and concise format.

In the modern context of remote work, work-life interference (WLI) has proven to be a vital scientific and business concern. Once the professional personal boundary is permeable, an employee tends to experience a substantial increase in conflict, a pronounced decline in job satisfaction, and an acute loss of emotional resources (Greenhaus & Powell, 2006). To reduce the effects of such an event, organizations can undergo specific interventions, one of which includes a structured norm of scheduling and frequent well-being checks, which proved to be effective in preventing WLI (Allen et al., 2015).

Job performance (JP) comprises the extent to which an individual employee carries out his/her assigned duties in adherence with the organisational goal. Ramos-Villagrasa et al. (2019) identify three major dimensions that JP has: 1) Task Performance; 2) Contextual Performance; and 3) Counterproductive Work Behaviour.

Task performance is about doing the core duties and is always evaluated by measures like quality of output, efficiency and realization of goals. In remote situations, it has been emphasized that self-regulation and technology preparedness are essential elements in maintaining this aspect of JP (Judge & Kammeyer-Mueller, 2012).

Contextual performance is a combination of interpersonal aspects, i.e. team collaboration, flexibility, and intrinsic motivation that build a favourable working environment (Pulakos et al., 2000). To perform well, remotely distributed employees must be engaged with coworkers and attend virtual meetings.

On the other side, in remote arrangements, there is a tendency to increase counterproductive behaviours, including cyberloafing, absenteeism, and a lack of concern with deadlines, due to a decrease in supervision. These habits are associated with job dissatisfaction and turnover intentions, which in turn destroy the total JP (Griffeth et al., 2000).

Job performance (JP) in a remote environment, in the context at hand, proves itself to be a result of three major factors, which include individual capability, organisational support, and quality of communication. Employee well-being (WB) is then presented as a moderator through which these variables exert their influence on JP. Pradhan and Hati (2022) consider WB to be a multidimensional construct that has a set of psychological, social and physical dimensions, and the current study focuses on psychological well-being (PWB). Ryff et al. (1995) propose the concept of PWB, which encompasses autonomy, personal growth, purpose, and environmental mastery. Advanced studies have found that with strong PWB, employees have high resilience, flexibility, and productivity. Remoteness can in turn either increase PWB by the increased autonomy and flexibility as well as reduce PWB by adding additional isolation and lack of structure.

According to Ryan and Deci (1985), self-determination theory suggests that well-being and intrinsic motivation are enhanced when certain psychological requirements, such as autonomy and competence, are fulfilled. Furthermore, concern and disinterest might result from an excessive degree of freedom without helpful feedback.

Workplace relations, team integration and recognition procedures shape social well-being (SWB) (Golden et al., 2008). In remote work, there is a lot of social disconnection, and according to Marshall et al. (2007) in the absence of systematic contact, there is a risk that employees will develop emotional exhaustion.

It is also important to have physical well-being (PWB). Remote contexts cannot be discussed effectively without proper ergonomic arrangements, regular physical activity, and moderation of screen exposure. Ineffective home working conditions and a lack of physical activity, on the contrary, negatively affect performance and health (Felstead & Henseke, 2017).

Overall, the way work performance dynamics play out in remote jobs is conditioned by the interaction of his/her competence, organizational support, the effectiveness of communication, and employee well-being.

Concerning the organizational duty to remote working, the management has a duty to observe and promote the well-being (WB) of the employees to ensure the effectiveness of remote working (RW) to maintain the performance levels. The connection between RW and Job performance is complex and depends on both contextual and individual factors, as well as organizational factors. On the positive side, RW will be able to improve job performance by introducing flexibility, independence, and reducing travel distance (Bloom et al., 2015). On the negative side, a lack of supervision and reduced social contact can lead to decreased productivity and a dulling of responsibilities (Bailey & Kurland, 2002).

Individual qualities, including conscientiousness, self-motivation, and digital fluency, have a strong impact on RW success. Additionally, the working conditions require a high level of goal clarity and self-determined motivation (Allen et al., 2015).

In addition to personal traits, such important facilitators include organizational culture, leadership style and technological preparedness. Managers should reconsider performance goals, introduce virtual methods for team creation, and ensure equality in the digital space (Grant et al., 2013).

In this context, WB acts as the amplifier or the buffer of the relationship between RW and JP. In situations where it is strong, WB brings employees more resilience, motivation, and concentration, even in detached settings. In contrast, low WB would likely result in low participation and a subsequent decline in performance levels.

Allen et al. (2015) discovered that high psychological WB has a positive effect on promises of increased satisfaction and task accomplishment, and Wang et al. (2021) demonstrated that poor WB has an adverse impact on digital burnout and performance deterioration.

In a logical way, Tavares (2017) emphasized the importance of enhancing remote effectiveness by means of interventions which support physical well-being, physical posture, proper illumination, and scheduled breaks. It is also of equal importance to maintain the support of the social connection, even in its virtual forms to maintain the team cohesion (Golden et al., 2008).

Upon synthesising these insights, one can discover that employee well-being not only enhances the benefits of remote work but also mitigates its associated downsides. Therefore, the proper management of remote working experiences should encourage organizations to perceive well-being as a critical company resource.

For example, the information technology (IT) industry in Sri Lanka is a swiftly growing economic factor, expected to reach USD 5 billion in terms of export earnings by 2025 (Export Development Board of Sri Lanka, 2024). The profession is monopolized by young and highly educated, highly skilled practitioners who after COVID-19 are increasingly being exposed to inflexible employment settings. Thus, it is hypothesized that these theoretical lenses

can provide a hard lens towards the scrutiny of the interplay between remote work, performance, and well-being at work in this fluid environment.

Work-from-remote conditions have presented Sri Lankan IT workers with unprecedented benefits, including the opportunity to venture into business outside the local context, expand their skill set, and prioritise work-life balance (Perera & Weerakkody, 2018). However, long-term infrastructure limitation, the most prominent of which turn out to be unstable internet access and frequent power cuts, paradoxically limit productivity (Wijesooriya, 2020). Moreover, most teleworkers do not have a home office environment, which can lead to physical fatigue and a lack of focus (Tavares, 2017).

There is further complexity with strong collectivism values in Sri Lanka. Virtual work reduces unplanned communication and casual social networks that have always been central in team-based IT initiatives (Marshall et al., 2007; Olson & Olson, 2000). At the same time, the issue of rapid technological development in the sphere of information technology demands constant learning. Working remotely may limit team knowledge exchange, mentoring, and informal learning opportunities (Day et al., 2010).

These contextual factors make Sri Lanka unique, indicating the need for locally grounded empirical research to investigate the impact of remote work on job performance and employee well-being in Sri Lanka.

Whereas few studies highlight the increased autonomy and work satisfaction (Gajendran & Harrison, 2007), other studies provide light on the isolation, loss of boundaries, and high levels of stress (Allen et al., 2015). The interaction and co-occurrence of these opposing effects have not been comprehensively investigated, especially in developing countries.

The research gap as one of the studies has focused rather narrowly on employee well-being as a variable influencing the relationship between remote work and job performance. Despite the existence of numerous studies that investigate the impact of remote work on well-being and performance separately, there are many fewer that research their interactive relationships.

The relationship is either amplified or buffered by well-being. Employees with high well-being are more likely to cope effectively with the stressors of remote work, which can help maintain or even enhance their performance. In contrast, individuals with lower well-being can have multiple adverse effects of isolation or role conflict. The pertinence of this moderating dynamic to the Sri Lankan IT sector can be traced to the fact that roles in the IT sector are cognitively demanding, and performance expectations are high.

The current study examines the dynamic relationship between remote work, job performance, and employee well-being in the context of a multicultural IT workplace in Sri Lanka. The three guiding bodies of literature used in the analysis are remote work, job performance, and employee well-being, thereby providing a rigorous empirical framework through which the effectiveness of remote work practices in emerging economies can be evaluated.

All in all, this discussion underscores the importance of incorporating well-being as a key variable in remote work. Considering this disparity between existing conclusions and the identified tendencies, the research cautions against projecting studies carried out in high-income countries onto low-income or middle-income countries, especially in cases where inconsistencies in technological capabilities and cultural demands are prevalent.

Operationalisation

The Independent variable is remote work

The term remote work here refers to the degree to which employees can perform organisational tasks at locations that are not typically the workplace and utilise digital communication technologies. In the current study, the construct of remote work is operationalised by a multidimensional, opinion-based scale that encompasses four subscales: Work-Life Interference, Effectiveness/Productivity, Organisational Trust, and Flexibility. Items of this scale are based on research by Grant et al. (2019) that has been proven in various organisational settings, and which is considered to capture both structural and psychological aspects of telecommuting.

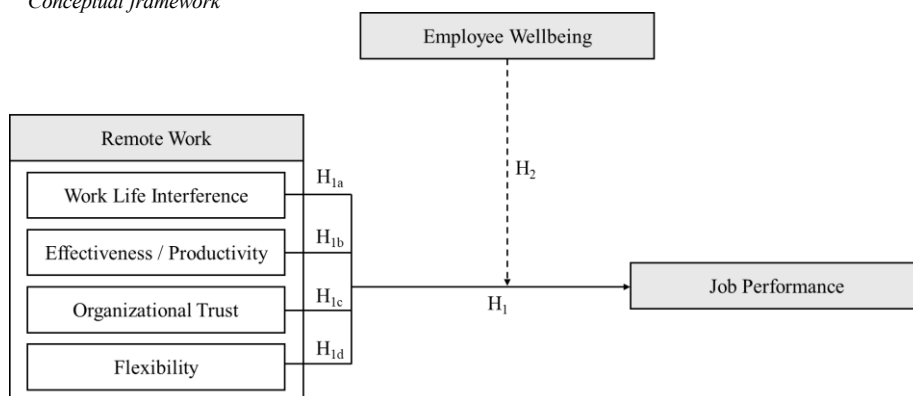
Job performance as a dependent variable

Performance at work is characterized by the rate at which people perform optimally in work-related tasks and furtherance of the objectives of an organization. The construct has the following components: task performance, contextual performance, and counterproductive work behaviours. In our case, job performance evaluation focuses on the outcomes and behaviours related to task performance and contextual performance measurements as opposed to counterproductive work behaviours. The tool that is used is a modification of the proven multidimensional scale, suggested by Ramos-Villagrasa et al. (2019).

Employee well-being would act as the moderating variable

The term 'employee well-being' can be defined as the overall physical, mental, and social health that employees experience at work. Employee well-being is expected to moderate the linkages between remote work and job performance, as its measure is based on a standardised index adapted from Pradhan & Hati (2022).

Figure 1
Conceptual framework



(Source: Developed by authors)

Hypotheses

Six primary hypotheses guide this study; each is aimed at exploring the relationships between the key variables as shown in Figure 2.1.

H1: Remote work significantly impacts job performance among engineering staff in the Sri Lankan IT industry.

H1a: Work-life interference significantly impacts job performance among engineering staff in the Sri Lankan IT industry.

H1b: Effectiveness/Productivity significantly impacts job performance among engineering staff in the Sri Lankan IT industry.

H1c: Organizational Trust significantly impacts job performance among engineering staff in the Sri Lankan IT industry.

H1d: Flexibility significantly impacts job performance among engineering staff in the Sri Lankan IT industry.

H2: Employee well-being moderates the relationship between remote work and job performance among engineering staff in Sri Lanka's IT industry.

A series of hypotheses are posed in this context and are tested with the help of correlation and simple and multiple regression analysis and including moderation analysis to understand the moderated effects of remote working on job performance. These methods can quantify these relationships to make results generalizable to the IT industry's engineering staff population (Baron & Kenny, 1986).

Methodology

This study was conducted using a quantitative research design and which is a deductive research design to analyze the effects of remote work on the job performance of the employees and whether employee well-being has moderating effects on the IT professionals in Sri Lanka. Its target population consisted of IT engineers working in Sri Lanka. With the use of a purposive sampling strategy, we identified participants working in a remote-work environment and other participants under the same environment; the final number of valid responses was 248 after an online, self-administered survey which utilized professional networks and emails.

Instruments to make up the survey included standardized scales, including such items as those developed by Grant et al. (2019) on remote work, Ramos-Villagrasa et al. (2019) on job performance, and Pradhan and Hati (2022) on employee well-being. Each of the items was rated on a five-point Likert scale that ranged from strongly disagreeing to strongly agreeing. The clarity and the reliability of the instrument were checked by conducting a pilot test in a small sample.

Analysis of data was done using SPSS and descriptive statistics, correlation analysis and multiple regression have been used to evaluate direct and moderating effects. The alpha coefficient of Cronbach proved the reliability of the construct, and factor analysis was also used to prove construct validity.

This approach to the methodology provided a systematic rigorous way of testing the hypotheses tested in the Sri Lankan IT scenario.

Findings

The current study confirms that Remote Work has a significant impact on the performance of engineering professionals in the Sri Lankan IT industry. Hypothesis H1-solid and statistically significant positive connection between remote work and performance ($t = 14.662, p < 0.001$) confirms the strategic advantage of remote working practices in the current IT environments. There were detailed findings of the exploratory sub-hypotheses: H1a proved that work-life interference promotes performance probably due to the fact of employee adaptive coping mechanisms or an elevated sense of personal responsibility. Such trade-offs may exist, though, with H1b displaying a negative link between effectiveness/productivity and performance. H1c was confirmed that when people have trust in an organization, it boosts performance, thereby necessitating to creation of transparent and supportive organizational cultures. Nevertheless, H1d suggested that performance could be undermined by too much flexibility possibly due to weak structure and accountability.

The second hypothesis, H2, examined how the employee's well-being moderates the relationship between remote work and performance. The inclusion of this variable substantially enhanced the model's explanatory power ($\Delta R\text{-squared} = 0.280, F = 270.777, p < 0.001$), indicating that the positive effect of remote work on performance is stronger in individuals with high well-being. A combination of these findings supports the significance of a balanced distant working structure by implementing flexibility with structure along with prioritizing employee wellness to maintain high performance in the IT industry.

Discussion and Conclusion

The reflection on the impact of remote work on the performance and social well-being of engineering professionals, who work in the information technology (IT) sector of Sri Lanka, allows putting several significant findings forward. One, through analysis, it has been evidenced that remote-work facilities in Sri Lanka improve the overall job performance of IT engineers through minimizing interruptions at the workplace as well as the time used to commute to and out of an office. Respondents also indicate that they are more productive when they are in their own homes, as they can work during the most productive hours that align with their personal time preferences. All these observations affirm earlier studies which stated that telecommuting eliminates the disturbances that usually come with specified working hours in the traditional office set-ups.

Second, the evidence suggests that the high level of autonomy afforded by remote work arrangements fosters successful and motivated IT professionals. Such an observation is especially striking because IT professionals in the studied group had extraordinarily high intrinsic motivation rates even before switching to remote employment. Conversely, the existing literature consistently reports that an increase in autonomy enhances levels of intrinsic motivation in various occupational settings. Combined, these two observations provide a strong case for why remote-work modalities should be extended to the global IT industry.

Third, the current study emphasises that the introduction of remote work also contributes to enriching the social lives of engineers, giving them a chance to recover mentally and physically. Particularly, the statistics illustrate that the remote work system empowers engineers to adopt mental-health disciplines such as exercise, meditation, and relaxation, which were previously limited by the time constraints of traditional office routines. This finding especially applies to Sri Lankan engineers as they use specific rituals associated with health along with their daily activities.

Altogether, the current results contribute to understanding the complexity of the effects of remote work on the performance, satisfaction, and social well-being of engineering professionals in Sri Lanka's IT sector. These findings can give practical recommendations to the stakeholders of any organization that is intent on perfecting work-from-home solutions and their accommodating services with a goal of getting the best out of IT human capital.

In the empirical study, work-life interference is another point that stands out as a concern: academics are unsure whether the work-to-family conflict will ultimately reduce or increase job performance. One of the important conclusions is however, that remote work forces the employees to consider arranging their own time, and in that process, the possibility of work colliding with personal life at some point is there. Many of the interviewees admitted to the inability to establish boundaries, a situation that often decreased their satisfaction with such a situation as well as the efficacy of work performance. Other respondents on the other hand gave the opposite description that the option to work during times that suit them when taking care of their family as in the case of telecommuting contributed to increased work performance. Even though remote work frees one from the constraints of a defined work schedule by the employer, it is paramount to come up with ways to balance work and personal commitments.

An additional lesson pertains to the evaluation of effectiveness and job performance as sound yet complex entities. In the current analysis, the pattern was complicated: it turned out that the majority of the participants managed to assign better job performance to remote work, though such correlation did not predetermine the better results. In fact, figures of the chosen research projects showed workers with high scores in Job Performance dimension but with the failure to maintain the performance, a tendency that could be attributed to the so-called mental fatigue, diminishing motivation, or poor social support. Collectively, these observations present an argument in support of considering the lived experiences of employees, in addition to the narrow quantifier of job performance. Structured breaks, mental health mindfulness, and a reasonable balance between working remotely and Job Performance may thus be used to preserve exemplary performance far beyond the current period of remote employment.

As it excellently presents the literature in question, there is a thing such as organisational trust, which is a strong performance-driving factor among remote workers. The evidence shows that the higher the trust is in an organisation, the higher the job performance is. Managers should therefore encourage such trust, as any statement of confidence or encouragement by management is directly associated with employee engagement. In other words, when organisations invest in assets, share information, and create a climate of openness, they send a message to their distant employees that their talents are recognised and put to use. With regards to Sri Lankan IT engineers, the study proves that such inclusion eliminates the sense of isolation and increases feelings of belongingness; hence, remote employees feel that they are valued, thereby increasing their motivation and productivity.

Further, in the analysis it is seen that flexibility has a categorical positive effect on performance. Although previous research has already established that flexibility increases job satisfaction and lessens stress, it is still notable that extreme flexibility can create a performance gap, where high performance requires rigidity. Repeated workforce complaints suggest that unstructured work is a hindrance to meeting deadlines, particularly due to irregular working hours. The results hence indicate that flexibility, although beneficial, needs gritty boundaries: producers must implement working times like the working hours of a business or some time-management tools to improve productivity.

The current question highlights one more, but no less significant, observation, which is that the well-being of the employee is a moderating factor between the effects of job performance on remote work and organizational outcomes. The current findings state the fact that emergent work facilitators, in particular mental health, have a high predictive effect on the likelihood of excellent organizational performance when working at home. In a practical sense, significantly better benefits both in terms of long-term job performance and self-reported satisfaction were reported by higher well-being employees. The results leave organizations with motivation to invest resources into improving the health conditions of the membership, especially by way of mental-health resources, check-ins unique to an organization, and specific health-promoting efforts. This way, companies will develop working environments that facilitate long-term physical fitness and reduce diseases that can adversely affect performance.

It is also important that this study is based on well-established instruments to assess job performance, aspects of remote work, and well-being. The values of Cronbach's Alpha for these constructs are satisfactory, the values of KMO are also very good, and the significant results of the Bartlett test support these values. These stringent reliability and validity tests support the study's findings and provide assurance that the constructs identified accurately represent the phenomena being studied, forming a solid foundation for further analysis.

This research paper provides a scholarly insight into how remote working changes job performance in the fast-growing Information Technology industry in Sri Lanka, where it already has a cozy niche. The evidence indicates on the one hand that teleworking provides flexibility and improves job performance and on the other hand reveals that due to teleworking, some challenges of operation emerge such as the work-life imbalance, lack of consistent working schedules, and deteriorating mental health. Collectively, the evidence indicates that remote work can only work when supported by an organizational culture that aligns with its goals, where staff well-being is attended

to and when the balance between work requirements and personal liberty is well-balanced. Altogether, the obtained outcomes provide a reliable source of reference to any organisation that is determined to capitalise on the opportunities of teleworking offered to IT engineering staff and, at the same time, enhance efficiency and safety in the dynamic job environment.

Organisational trust, a key determinant in sustaining productivity, is made possible through open communication and independent teamwork. Lastly, legal provisions that would clearly include remote work would enhance equality and employment equality.

In the social and cultural context peculiar to Sri Lanka, the balance between work and life should be purposely sought. The radical focus on family life proposes that information technology (IT) companies should establish clear working boundaries, along with agreed-upon hours, as a way to reduce work-related stress. This will encourage Independence and, at the same time, establish strong mechanisms of accountability. One very promising model would be a flexi-hour system, where workers concentrate their efforts during the most important hours of business and utilise the time-management skills they learned in specific training exercises. In doing so, the firms are not only saving on their own and enhancing the quality of their human capital but also ensuring that the capital has the skills needed to help them compete effectively in the broader international IT world.

On an organizational resilience scale, long-term engagement programs, i.e. employee wellness programs, online counselling services, and programs that strengthen group cohesion are among the things that can effectively work to reverse the psychological isolation remote work may encourage. Similarly, the use of advanced collaboration tools enables effective communication and should therefore be incorporated into standard practice, accompanied by corresponding training. The value of cultural diversity cannot be overstated; acknowledging family obligations and encouraging different behavioural standards will also decrease work-life conflict and, at the same time, improve employee satisfaction and the overall work-life balance.

As the stakeholders ensure implementation of the system through strong promotion of collaborative work models and use of technology and at the same time insist on provision of better system infrastructures, Sri Lanka is in a good position to become a highly desirable work destination in remote IT jobs. These developments will in parallel be able to heighten the performance of organizations and the levels of satisfaction of employees thus playing an active role in the economic life of a country.

Limitations & Future Research Directions

In the context of discussing the antecedents of remote work and its effect on job performance, to the extent that employee well-being acts as a moderating factor in the information technology sector in Sri Lanka, several methodological limitations must be addressed. To begin with, the use of the cross-sectional design in the investigation makes it hard to draw causative effects, which is due to the fact that the information is limited to a study snapshot that only shows a temporal moment. The implications of the outcomes are thus only correlated in nature as far as cause-and-effect conclusions are concerned. Second, self-reported data, convenience sampling, and snowball sampling make the study likely to show common-source bias; the answers of the participants may be distorted by the fact that the questions have the same wording. Third, there is the convenience sampling approach, which is supplemented by the fact that the probability of a representative random sample is not taken into consideration, potentially concealing the degree to which the research population accurately reflects the IT workforce of Sri Lanka as a whole. In addition, the survey conducted took place within a non-Western environment, but its extension into other regions or industries is also limited by the possible cultural differences that can be significant. Lastly, moderators of employee well-being (i.e. organizational culture or institutional technological support) are under-represented. Furthermore, the underlying assumptions regarding participants' access to reliable internet and sufficient computer resources overlook the obstacles posed by Sri Lanka's digital divide. All these methodological shortcomings combined mitigate the study's external validity and generalizability.

Remote working should be further investigated in this sphere that goes beyond the limits of the working industry and should examine how it will impact such industries as the hospitality sector, transportation, and construction industries. The explored sectoral lens offers a nuanced understanding of the benefits and accompanying challenges that remote work is bringing about in the fields, thereby providing insight into how alternative arrangements shape both the performance of work and the well-being of employees. Furthermore, the longitudinal research design, which measures the changing ability to work remotely, satisfaction, and organizational outcomes over a long time frame, will also reveal the way the remote trends develop and influence the satisfaction levels, adaptability, and general performance, providing insight into the new directions of remote work.

It is also necessary to focus on team processes and cooperation in teleworking environments. Determining the connections between virtual meeting environments, communication technologies, and team cohesion based on

performance and satisfaction yields concrete tactics to optimize the efficiency of remote teams. Moreover, the evaluation of the consequences of the new inventions such as AI-based collaborative tools and automation related to productivity and job satisfaction can inform the recommendations on whether there is a need to adjust to the technologies and explore prolonged innovation in remote settings. Altogether, these spheres highlight the vital areas of future research and can provide us with empirically based knowledge that will be used in policymaking and practice related to remote work.

The hybrid work system, which involves a combination of office presence and remote working models, requires a thorough investigation. The given inquiry will shed light on the effects of such an arrangement on organizational relations, creativity, and morale of employees, thus helping to polish our understanding of remote work and its implications in different contexts. To this end, the review of the hybrid model, which combines the freedom of the WFH arena with the team spirit of the office environment, is another important addition. Working at home saves time on travel and gives workers more time to devote to their hobbies. Making the workplace personal increases your work satisfaction and it ignites more performance, thus fueling functional output. In-office days, in their turn, are conducive to regular face-to-face communication, which promotes teamwork, creativity, confidence, and cohesion, which may lead to a decline in a remote environment. Focusing the attention of the scholars on the hybrid model is critical in overcoming the challenges inherent to remote work.

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IMPACT OF PSYCHOLOGICAL CAPITAL ON EMPLOYEE SUBJECTIVE WELLBEING OF GOVERNMENT BANKING SECTOR IN SRI LANKA

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Abstract

In an era where employee well-being is paramount to organisational success, psychological capital emerges as a transformative asset, offering a pathway to unlock resilience, optimism, and positivity among the workforce. During an economic crisis, a country's financial sector relies heavily on its people. That's why government banks prioritise their human capital; hence, this need inspired the focus of this study. Therefore, a current study investigated the impact of psychological capital on employees' Subjective well-being of government bankers using Broaden and Build theory of positive emotions as a foundation for the study. Based on theory and existing literature, the researcher developed a conceptual model grounded in the Broaden-and-Build Theory and supported by empirical evidence. The study used an online-based questionnaire to collect the primary data from the sample. Multiple linear regression analysis and Correlation analysis were applied as data analysis techniques to examine the hypothesis acceptance or rejection of this quantitative study, using SPSS 27 software. The results indicated that psychological capital has a significant positive impact on employee subjective well-being, and resilience had the most significant impact, with is +0.368 beta value of and that impact was significant at a 95% confidence level (P=0.000). Self-efficacy, Hope, and Optimism also have a significant positive impact, respectively. Finally, implications and recommendations that help policymakers and top management to enhance employee subjective well-being through developing related policies, programs and future directions were discussed.

Keywords: Hope, optimism, psychological capital, resilience, subjective well-being

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[Proceedings of the 16th International Conference on Business and Information - ICBI 2025](#) © 2025 by [The Faculty of Commerce and Management Studies, University of Kelaniya, Sri Lanka](#) is licensed under CC BY-SA 4.0.

DOI:

Introduction

In today's world, strengthening psychological resources like hope, resilience, optimism, and self-efficacy is crucial for well-being (Luthans et al., 2007). After the pre-literature review of the annual reports of Sri Lanka's government banks, the researcher noticed that even though employee benefits and welfare provisions had increased, staff turnover rates were still high. This surprising pattern suggested that there might be deeper issues affecting employees' subjective well-being. As a result, the researcher recognized a practical gap as well as empirical gap by the reason of, there were limited empirical evidence in the context of Sri Lanka related to PsyCap and SWB. Thus, researcher hypothesize that psychological capital could play a key role in explaining this situation.

This study, based on Fredrickson's Broaden and Build theory (2004), but the theory provides only a partial explanation for the research problem and cannot directly apply for the context of Sri Lanka, thus based on Broaden and Build theory researcher examines how Psychological Capital (PsyCap) influences subjective well-being (SWB) among Sri Lanka's government bankers. Using a quantitative, deductive approach and narrative design, data were collected through questionnaires and analyzed with multiple regression. Given the government banking sector's vital role and growing concerns about employee turnover and migration (Central

This study outlines the context, research aims, significance, and limitations while adding insight to the existing literature.

This study contributes theoretically by extending the Broaden-and-Build Theory to Sri Lanka's public banking sector, showing that psychological capital resilience, self-efficacy, hope, and optimism enhance employees' subjective well-being. Managerially, it highlights the importance of HR programs that develop resilience and self-efficacy to complement financial incentives and reduce turnover. Policy-wise, the findings support national well-being goals by emphasising initiatives that foster psychological capital, promoting sustainable workforce performance and overall employee well-being.

Background of the study

Sri Lanka's banking sector is a cornerstone of the nation's economy, ensuring financial stability and driving development. According to Wheelen et al. (2018), every organization's strategic aim is to maximize shareholder value and maintain a competitive edge—goals that, for banks, depend on employee productivity and well-being. From tellers to security staff, every employee shape customer trust and service quality. However, Sri Lanka's state-owned banks face stiff competition from private banks, increasing pressure on employees to meet demanding targets. Psychological capital (PsyCap), defined by Luthans et al. (2004, 2007) as

self-efficacy, hope, optimism, and resilience, has proven crucial in supporting employees' positive attitudes and performance. Unlike tangible assets or knowledge capital, PsyCap emphasizes “who you are” and “who you are becoming,” shaping behavior and service delivery in customer-focused sectors like banking (Avey et al., 2009).

Recent reviews of annual reports from major state banks such as Bank of Ceylon and People's Bank show rising voluntary turnover, despite heavy investments up to 60–70 million rupees annually in training and welfare. This suggests deeper factors like mental well-being and job satisfaction influence retention. Subjective well-being (SWB), covering life satisfaction and emotional states (Diener et al., 1995), directly affects performance, engagement, and loyalty. Poor SWB, however, fuels burnout and turnover (Morin et al., 2015; Rothausen et al., 2017). The Broaden and Build theory (Fredrickson, 2004) underlines that positive psychological resources help employees cope and flourish.

Table 1
Volunteer turnover and provisions for employee benefits

Year	Turnover Bank of Ceylon	Turnover Peoples Bank	Provisions for Employees Bank of Ceylon	Provisions for Employees Peoples Bank
2019	86	272	18.4 billion	13 billion
2020	32	147	15 billion	19.7 billion
2021	50	145	25 billion	22.8 billion
2022	130	178	-	26.6 billion
2023	274	-	25.8 billion	-

(Source: Annual reports People bank & BOC (2024))

According to Table 1, upon reviewing the annual reports of government banks in Sri Lanka, the researcher observed that, despite increased employee benefits and provisions, turnover rates remained high. This contradiction indicated potential issues in employees' subjective well-being. Consequently, the researcher

identified a practical gap and hypothesised that psychological capital may significantly influence this phenomenon. “Thus, understanding how PsyCap impacts SWB is vital for retaining talent and sustaining service quality in Sri Lanka’s state banking sector.

Problem statement

The success of service-driven sectors like banking heavily relies on employees’ psychological well-being (Avey et al., 2010; Campbell et al., 2012). Sri Lanka’s economic crisis and COVID-19 have intensified pressures on its banking sector, despite significant investments in human capital. Annual reports from Bank of Ceylon and People’s Bank show a sharp rise in voluntary resignations, highlighting that pay alone doesn’t retain staff.

Despite increased investments in employee benefits and welfare provisions within Sri Lanka's government banks, employees' subjective well-being remains suboptimal. While turnover rates are often used as indicators of employee dissatisfaction, they are influenced by a multitude of factors beyond well-being alone, such as organisational culture, career advancement opportunities, and socio-economic pressures. This complexity underscores the necessity to directly assess subjective well-being to gain a comprehensive understanding of employees' experiences.

Existing literature highlights that subjective well-being encompasses emotional, cognitive, and work-related dimensions, which are crucial for enhancing employee engagement and performance. For instance, studies have shown that psychological capital, comprising self-efficacy, hope, optimism, and resilience, positively influences employees' subjective well-being and organisational commitment. Furthermore, research indicates that psychological capital can mediate the relationship between work-life balance and job satisfaction, suggesting its pivotal role in fostering a positive work environment (Anushi et al., 2022).

Recognising this, the present study aims to directly assess the subjective well-being of employees in Sri Lanka's government banks and examine the influence of psychological capital on their well-being. By focusing on these internal psychological resources, the study seeks to provide actionable insights for improving employee well-being, thereby enhancing overall organisational effectiveness and reducing turnover intentions.

Research gap

In Sri Lanka, government banking jobs are respected and secure, yet annual reports reveal rising turnover and employee migration despite good pay and benefits. Research indicates that financial rewards alone can’t retain employees if their mental well-being suffers (Fredrickson, 2004). State banks invest heavily in staff development and welfare, but persistent resignations suggest a deeper issue. According to the Broaden and Build theory, strong Psychological Capital hope, optimism, resilience, and self-efficacy enhance satisfaction and retention. However, few studies directly examine how PsyCap affects overall well-being in Sri Lanka’s state banks, where unique cultural and economic factors apply. This creates a local research gap (Luthans et al., 2007). Therefore, this study aims to answer: How does PsyCap impact government bankers’ subjective well-being, and how do its dimensions individually contribute? By addressing this practical and empirical gap, researcher derived the following questions and objectives.

RQ1: What is the impact of self-efficacy on employee subjective well-being in the government banking sector in Sri Lanka?

RQ2: What is the impact of Hope on employee subjective well-being of government banking sector in Sri Lanka?

RQ3: What is the impact of Optimism on employee subjective well-being of government banking sector in Sri Lanka?

RQ4: What is the impact of Resilience on employee subjective well-being of government banking sector in Sri Lanka?

Based on the four elements of the Psychological Capital (psy cap) construct, specific research objectives were developed as follows.

RO1: To study the impact of Self efficacy on employee subjective well-being of government banking sector in Sri Lanka.

RO2: To study the impact of Hope on employee subjective well-being of government banking sector in Sri Lanka.

RO3: To study the impact of Optimism on employee subjective well-being of government banking sector in Sri Lanka.

RO4: To study the impact of Resilience on employee subjective well-being of government banking sector in Sri Lanka.

Significance of the study

In Sri Lanka, the government banking sector plays a critical role in economic stability, with its biggest asset being its people. Since banks are service driven, understanding factors that shape employees' well-being is vital not only for individual welfare but for the sector's overall success. This study makes key contributions by exploring how Psychological Capital (PsyCap) hope, optimism, resilience, and self-efficacy—influences bankers' subjective well-being (SWB). While global research links PsyCap with positive work outcomes (Luthans et al., 2007; Avey et al., 2009), evidence in Sri Lanka's unique banking context is scarce. Unlike heavily digitalized banking systems elsewhere, Sri Lanka's banking still depends on face-to-face service, making human factors even more critical. Practically, the findings guide policymakers and senior managers on fostering PsyCap through targeted programs—like resilience training or confidence-building workshops—to keep staff motivated, engaged, and less likely to resign (Avey et al., 2011). Such investments align with corporate social responsibility (CSR) goals, enhancing reputation and stakeholder trust while boosting employee well-being. Ultimately, strengthening PsyCap supports both individual mental health and sustainable organizational performance. This study also encourages future research on PsyCap's effects on stress, work-life balance, leadership, and commitment. By unpacking these links, Sri Lanka's banks can design precise, meaningful support systems that help employees thrive—securing the sector's competitiveness and resilience.

Theoretically, this research expands Fredrickson's Broaden and Build theory (2004), showing how positive psychological traits help build enduring personal resources, such as happiness and job satisfaction, among government bankers. Theoretically, this study contributes to the Broaden-and-Build Theory by extending its application to the Sri Lankan banking sector. While the theory suggests that positive psychological resources broaden individuals' thought-action repertoires, limited empirical work has explored this process in relation to employee well-being within developing economies. By integrating psychological capital as a key construct, the study provides a deeper understanding of how internal psychological resources influence subjective well-being, despite favorable financial conditions. Hence, the research enriches existing theory and offers a framework for future investigations into the psychological mechanisms of workplace well-being.

Literature Review and Hypotheses Development

Subjective well-being

Subjective well-being (SWB) refers to individuals' evaluations of their lives, encompassing life satisfaction, emotional experiences, and domain satisfaction. It represents not merely the absence of illness but a holistic state including physical, mental, emotional, and social health (Sahai, 2020). Research links SWB with happiness, financial security, and psychological capital (Diener et al., 1995; Singhal & Rastogi, 2018; Bjørnskov et al., 2008). Recent studies highlight broader determinants such as social capital, which better predicts well-being than economic factors (Moro-Egido et al., 2022). The concept has evolved from focusing solely on life satisfaction to including momentary and projected SWB, reflecting experiences and future expectations (Kopsov, 2019). Despite global growth in SWB research (Jebb et al., 2020), studies in Sri Lanka remain limited (Naradda et al., 2017; Roy et al., 2023; Wickramasinghe et al., 2011). This study examines how psychological capital influences government banking employees' SWB amid rising stress and turnover (Khalid et al., 2020; Kang & Busser, 2018).

Psychological capital

PsyCap has been widely studied in organizational psychology and is theoretically and empirically established to comprise four core dimensions. Psychological Capital (PsyCap) is built on four key dimensions: hope, resilience, optimism, and self-efficacy (Luthans & Youssef, 2004). These dimensions evolved from the positive organizational behavior tradition, which focuses on measurable, developable strengths that boost workplace performance (Luthans, 2002; Luthans & Youssef, 2007). Each dimension meets strict criteria: theoretical grounding, valid measurement, uniqueness to organizational behavior, potential for growth, and a clear positive effect on work outcomes (Luthans & Youssef, 2004). These four dimensions were identified through an extensive review of literature in positive organizational behavior and validated scales, particularly the Psychological Capital Questionnaire (PCQ) developed by Luthans et al. (2007). Each dimension captures a distinct but interrelated aspect of PsyCap, providing a comprehensive framework to assess the overall psychological resources of employees.

Hope is defined as the motivational drive to pursue goals and the flexibility to find alternative paths if needed (Luthans, et al., 2007; Snyder, 2012). Hope is a positive motivational state reflecting perseverance toward goals and the planning to achieve them (Snyder et al., 1991). Studies show hope positively influences job performance (Kappagoda et al., 2017), though research directly linking hope to SWB is limited (Avey et al., 2009). Resilience is the capacity to recover and grow through challenges and change (Luthans, 2002b). Though

workplace research on resilience is sparse (Hamel & Välikangas, 2003), studies link resilience with higher life satisfaction and lower psychological distress (Tecson et al., 2019; Bajaj & Pande, 2016). Optimism is seen as a mindset where individuals expect positive outcomes and interpret situations in a favorable way (Schneider, 2001). Optimism is a cognitive tendency to expect positive outcomes in the future (Carver & Scheier, 2014). Optimism relates to life satisfaction and lower stress, though its specific impact on SWB needs more study (Seligman, n.d.). Self-efficacy is perhaps the most researched dimension. It refers to one's belief in their ability to mobilize motivation, skills, and actions to complete tasks successfully (Luthans, 1998; Kappagoda et al., 2017). Altogether, PsyCap offers a valuable framework for strengthening employee well-being and performance

Theoretical perspectives

The Broaden and Build Theory by Fredrickson (2001) explains how positive emotions expand people's thinking and actions, boosting resilience and coping skills. By broadening the mind, good feelings help counteract stress and negative emotions, supporting better adaptation and overall mental well-being. The Broaden and Build Theory (Fredrickson, 2004) explains how positive emotions expand people's thinking and help them build valuable personal resources like resilience and strong relationships, boosting well-being over time. In Sri Lanka's government banking sector, where secure jobs still face rising resignations and migration, this theory helps reveal why financial comfort alone does not guarantee employee happiness. Despite investing nearly 20 billion rupees annually in employee welfare, banks struggle to reduce turnover, hinting at overlooked psychological needs. Psychological Capital (PsyCap) comprising self-efficacy, hope, optimism, and resilience (Luthans et al., 2007; Avey et al., 2011) offers a deeper perspective. Unlike fixed traits, PsyCap can be developed, empowering employees to thrive and stay engaged. This study fills a gap in local research by exploring how PsyCap influences bankers' subjective well-being (SWB) (Diener et al., 1995), aiming to guide banks to strengthen their greatest asset: their people.

This study is theoretically anchored in Fredrickson's Broaden-and-Build Theory of Positive Emotions, which posits that positive psychological states broaden individuals' thought-action repertoires and build enduring personal resources. By applying this theoretical lens, the research advances understanding of how psychological capital (PsyCap) a higher-order construct encompassing hope, efficacy, resilience, and optimism act as a reservoir of positive resources that enhance employees' subjective well-being (SWB). While the Broaden-and-Build Theory has been widely validated in Western contexts, empirical testing in non-Western and collectivist cultures remains limited.

The present study therefore extends the theory's cross-cultural relevance by situating it within the Sri Lankan government banking sector, a context characterized by high job security, hierarchical structures, and cultural emphasis on community and stability. Despite improved employee benefits, persistent turnover and declining well-being, it suggests that material provisions alone do not ensure positive work experience. By integrating insights from cross-cultural well-being literature, this study argues that psychological capital may function differently across cultural contexts, offering a nuanced understanding of how internal psychological resources interact with socio-cultural and organizational factors.

Hypotheses development

This study's hypotheses are grounded in research showing that employees with higher psychological capital (PsyCap) tend to be more motivated, work harder, and perform better leading to greater subjective well-being (SWB). People with strong PsyCap display confidence (self-efficacy), determination (hope), positive expectations (optimism), and the ability to bounce back from setbacks (resilience) (Luthans, 2002; Luthans et al., 2004). These qualities help them tackle tasks more effectively and maintain higher well-being than those with lower PsyCap (Avey et al., 2010). Studies like Avey et al. (2011) and Youssef-Morgan & Luthans (2013) support PsyCap's role as a higher-order construct that improves employee attitudes, behaviors, and performance. Research also shows PsyCap buffers the negative effects of job stress and insecurity on well-being (Luthans, 2002; Avey et al., 2010). Self-efficacy, or belief in one's ability to complete tasks, predicts higher levels of SWB. Nurses with high self-efficacy feel more capable of handling their roles while studies in India confirm self-efficacy's positive link to workplace well-being (Prasad Panigrahy et al., 2021). This supports the first hypothesis:

H1: There is an impact of self-efficacy on SWB.Hope.

The motivation to pursue goals and find pathways to achieve them is also tied to SWB. Higher levels of hope typically link to higher well-being, though the strength of this link can vary (Pleeging et al., 2021). Hopeful people cope better with challenges and maintain positive emotions (Yalçın & Malkoç, 2015). Hence the second hypothesis:

H2: There is an impact of hope on employee SWB.Optimism.

A positive outlook on future outcomes, has shown strong connections with job satisfaction, commitment, and overall happiness (Luthans et al., 2005; Youssef & Luthans, 2007). Optimism reduces fear of failure and stress, boosting SWB. So, the third hypothesis is:

H3: There is an impact of optimism on employee SWB.

Finally, resilience, the capacity to recover from setbacks, is a well-documented driver of well-being (Fredrickson, 2004; Athota et al., 2020; Satıcı, 2016). Studies show resilient individuals experience higher life satisfaction, happiness, and quality of life (Bajaj & Pande, 2016; Tecson et al., 2019). This supports the last hypothesis

H4: There is an impact of resiliency on employee SWB.

Together, these hypotheses build on strong theory and evidence to explore how PsyCap shapes well-being among Sri Lankan government bank employees.

Methodology

Target population

The target population for this study was all employees working in government banks in Sri Lanka. This choice is justified by the critical role state-owned banks play in the country's financial sector. With crowded branches and competitive pressures, government bankers routinely handle stressful interactions, highlighting the need to study how Psy Cap influences their well-being.

Sample and sampling frame

A sample is a manageable subset of the target population (Sekaran & Bougie, 2016). For this study, the researcher determined an ideal sample size of 374 out of an estimated 13,000 government banking employees. This size was calculated using the Raosoft calculator (2004) and Morgan's table, ensuring a 95% confidence level and a 5% margin of error. Due to strict HR policies and ethical limits within government banks, the researcher couldn't use random sampling. Instead, convenience sampling was selected. As Henry (1990) notes, convenience sampling is practical when there are access and logistical constraints, even if a complete sampling frame exists.

Data collection techniques and procedures

Accurate data collection is vital to ensure valid results (Sekaran & Bougie, 2016). For this research, the survey method was chosen because it aligns with the study's quantitative and positivist approach. The primary data collection instrument was an online questionnaire. The google form link distributed through area managers of the respective areas of the Bank of Ceylon and The Peoples Bank through the official WhatsApp groups to reach employees directly and efficiently.

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Methodological approach

Given the focus on testing clear, measurable relationships, this investigation chose a quantitative approach. Data were collected using structured questionnaires designed to generate numeric data that could be analyzed statistically specifically through multiple linear regression (MLR). This method helped quantify how each dimension of PsyCap impacts SWB, ensuring the results were scientific, objective, and aligned with the positivist philosophy. The quantitative method also matched the deductive approach, as it used empirical data to confirm or refute theoretical assumptions about PsyCap's influence on job satisfaction, life satisfaction, and work-life balance among bankers.

Time horizon and unit of analysis

This study adopted a cross-sectional design, gathering data from government bankers within a specific two-week window. This time horizon suited the study's aim of testing immediate relationships between PsyCap and SWB,

rather than monitoring changes over time. The unit of analysis defines what or whom the data describes (Sekaran & Bougie, 2016). Units can range from individuals to teams, departments, or even entire organizations. Here, the unit of analysis was individual employees within government banks. This means that each banker's responses formed a single unit of data for analysis.

Ethical considerations

Prior to data collection, all participants from the selected government banks in Sri Lanka were clearly informed about the purpose, objectives, and procedures of the study examining the relationship between psychological capital and employees' subjective well-being. Participation was entirely voluntary, and informed consent was obtained from each respondent. Participants were also assured that they could withdraw from the study at any stage without facing any disadvantage or consequence.

Strict measures were taken to ensure confidentiality and anonymity. No identifying information was collected, and all responses were treated as strictly confidential. The data obtained were used solely for academic and research purposes, stored securely, and accessed only by the researcher.

Multiple linear regression analysis (MLR)

Multiple regression is a statistical technique used to analyse the impact of one dependent variable and two or more independent variables. Hence, the multiple linear regression model was used to determine the impact of psy cap (Self-efficacy, Hope, Optimism, Resilience) on SWB (Job satisfaction, Life satisfaction) and descriptive analysis tools also performed.

Results and Analysis

Validity & reliability analysis

Table 2

Validity & reliability analysis

Variable	AVE (≥ 0.5)	Cronbach's Alpha (≥ 0.7)	CR (≥ 0.7)
SE	0.5950	0.820	0.8783
H	0.6452	0.814	0.8773
R	0.6081	0.816	0.8851
O	0.5950	0.824	0.8783
SWB	0.5184	0.805	0.9633

Source Author's work (2024)

Figure 1

Discriminant validity

	SE	H	R	O	SWB
SE	$\sqrt{0.596}$ 0.773				
H	0.722	$\sqrt{0.646}$ 0.803			
R	0.336	0.556	$\sqrt{0.609}$ 0.780		
O	0.088	0.284	0.446	$\sqrt{0.596}$ 0.772	
SWB	0.782	0.716	0.358	0.222	$\sqrt{0.519}$ 0.720

Source Author's work (2024)

Testing for normality

Table 4

Skewness and kurtosis indexes for normality

Variable	Skewness	Kurtosis
SE	-0.342	2.441
H	-0.850	1.834
R	-1.768	7.515
O	-2.528	7.704
SWB	-0.236	1.624

Source: Author's work (2024)

Testing multicollinearity

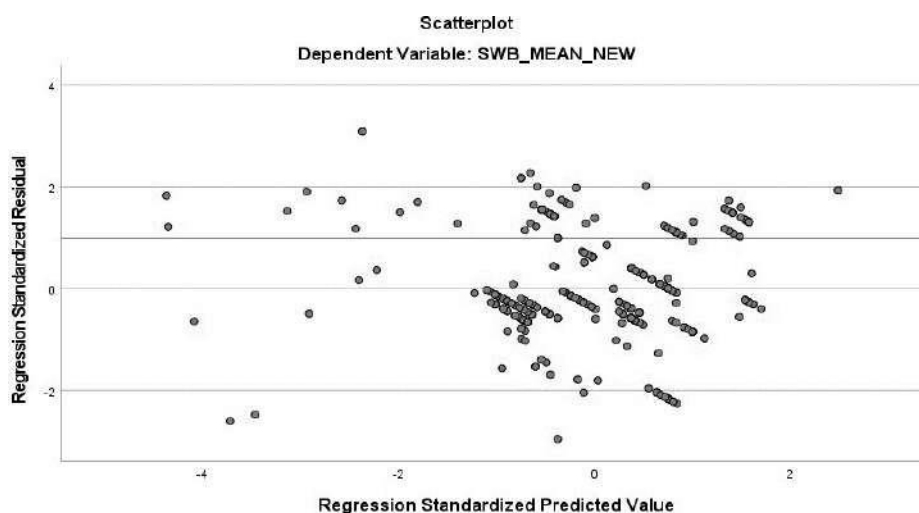
Table 5
Testing the multicollinearity of independent variables

Model	Collinearity Statistics	
	Tolerance	VIF
1 (Constant)		
SE_COMP	0.868	1.152
H_COMP	0.623	1.605
R_COMP	0.592	1.690
O_COMP	0.759	1.318

Source: Author's Research (2024)

Testing homoscedasticity

Figure 6
Analysis of homoscedasticity



Source: SPSS output (2024)

Correlation analysis

A correlation analysis is a statistical technique that determines the degree and direction of a relationship between two or more random variables. It assists professionals in determining the existence of a relationship between variables and the extent to which they are related, without establishing a “cause-and-effect relationship” (Field, 2013). The degree of correlation between the variables is indicated by the coefficient's absolute value (Asuero et al., 2006a). where correlation coefficient is $0.1 < r < 0.3$ shows small correlation between variables, $0.3 < r < 0.5$ shows medium /moderate correlation, $0.5 < r$ indicates strong correlation.

Regression analysis – hypotheses testing

The coefficient of determination, or R Square, in regression denotes the extent to which a given percentage of variance in DV can be explained by all IVs combined. The Anova table highlights the importance of the model that describes how well the IVs work together to explain and predict DV. In contrast, a coefficient table evaluates how much the independent factors affect the dependent variable and aids in determining whether to accept or reject the hypothesis. The following table denotes the model summary generated from the SPSS output.

Table 6
Model summary model summary

Model	R	R square	Adjusted square	Std. Error of the Estimate	Durbin-Watson
1	.276 ^a	0.760	0.660	0.1999	1.659

Predictors: (Constant), O_COMP, SC_COMP, H_COMP, R_COMP

Dependent Variable: SWB_COMP

Source: Author's work (2024)

The coefficient of determination, often known as the R-squared value, shows how much of the variation in the dependent variable or the result can be accounted for by the independent variables in a given regression model. The above table represents the strength of the relationship between the model and DV. The current study R-square value as shown above model summary table is 0.760 (76%). The R-Square value determines the proportion of the variance in the dependent variable that can be predicted or accounted for by the independent variables. Hence the study concludes that 76% of the variance in Subjective wellbeing (SWB) was predicted by IVs together. (SC, H, R, O). Consequently, R-square showed that the independent variables in the current study are explained by 76% of the dependent variable.

Table 7
ANOVA table

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	32.389	4	8.097	181.361	.000
	Residual	15.894	356	.045		
	Total	48.283	360			

Source: Author's Research (2024)

A significant value (P value) less than 0.05 indicates a statistically significant model, thus values beyond this cutoff are regarded as nonsignificant. According to the ANOVA table mentioned above, this study's model was statistically significant, as indicated by the "P" value of 0.000, which is less than 0.05 ($P < 0.05$).

Table 8
Coefficients table

Model		Unstandardized Coefficients	Std. Error	Standardized Coefficients	t	Sig.
1	(Constant)	2.994	1.690		1.771	.077
	H_COMP	.288	.044	.328	6.499	.000
	SE_COMP	.368	.029	.568	12.747	.000
	O_COMP	.088	.027	.112	3.278	.001
	R_COMP	.808	.335	.095	2.414	.016

Source: Author Research (2024)

The table above illustrates that the independent variables' beta values are H – 0.288, SE – 0.368, O – 0.088 and R – 0.808 while sig. values less than 0.05 at 95% confident level. Hence it provides justification for H, SC., O, and R positively impact to the SWB of government banking employees in Sri Lanka. Current study tested the hypothesis using two-tailed test by the cause of hypothesis of this study were non-directional.

Discussion

The current study, based on the Broaden and Build Theory of Positive Emotions, investigated how Psychological Capital (PsyCap) dimensions Self-Efficacy, Hope, Optimism, and Resilience affect the Subjective Wellbeing (SWB) of government banking employees in Sri Lanka. Using a robust survey approach, 374 responses were collected, and, after careful data cleansing and removal of 13 outliers, 361 valid responses were analyzed. The study confirmed strong validity and reliability, supported by a Cronbach's alpha above 0.7, CR values over 0.7, and AVE values above 0.5, meeting the required goodness-of-measures criteria. Multiple parametric assumptions were also tested and met, including normality, linearity, independence of residuals, homoscedasticity, multicollinearity, and the normal distribution of residuals, ensuring the data was suitable for multiple linear regression. Regarding the key findings, the first objective was to assess the impact of Self-Efficacy on employee SWB. The results showed a significant positive impact, with an unstandardized coefficient of +0.368 and a p-value of 0.000 ($\beta = +0.368$, $p < 0.05$). This finding aligns well with earlier studies, including, Prasad Panigrahy et al. (2021), all of which confirmed that self-efficacy is crucial for boosting wellbeing. Next, the study confirmed that Hope also has a significant positive impact on employee SWB, with an unstandardized coefficient of +0.288 and a p-value of 0.000 ($\beta = +0.288$, $p < 0.05$). This supports Tripathi (2011), Pleeging et al. (2021a, 2021b), Frone

et al. (1997), and Yalçın & Malkoç (2015), who Similarly found that higher hope levels are strongly linked to greater wellbeing outcomes.

Optimism showed a smaller yet significant positive impact, with an unstandardized coefficient of +0.088 and a p-value of 0.001 ($\beta = +0.088$, $p < 0.05$). Although this dimension contributed the least among the four, its positive role is consistent with Luthans & Youssef-Morgan (2007), YALÇIN et al. (2019), Duy & Yıldız (2019), and Sridevi & Srinivasan (2012), who all found that optimism positively influences job satisfaction, commitment, and general wellbeing.

Among the four PsyCap dimensions, Resilience demonstrated the strongest positive impact on SWB, with an unstandardized coefficient of +0.808 and a p-value of 0.016 ($\beta = +0.808$, $p < 0.05$). This confirms that resilience is a major factor supporting employee wellbeing, echoing Athota et al. (2020), Bajaj & Pande (2016), and Satıcı (2016), who all concluded that resilience boosts people's ability to maintain wellbeing even under stress. Overall, the regression model showed an R-squared value of 0.76, meaning 76% of the variance in SWB is explained by PsyCap dimensions. This result aligns with findings by Avey et al. (2011), Luthans et al. (2007), Youssef & Luthans (2007), and Newman et al. (2014), confirming that PsyCap as a whole has a meaningful positive impact in work settings. In Sri Lanka, Kappagoda et al. (2017) previously found that PsyCap is positively related to job satisfaction, but this study extends that understanding by showing PsyCap's combined influence on the broader concept of SWB covering both job and life satisfaction together, closing a gap noted by Angner (2010). Thus, this research confirms that boosting PsyCap, especially resilience and self-efficacy, can meaningfully improve the wellbeing of government bankers in Sri Lanka.

Limitations and Future Research Directions

This study has several limitations that future research can address. It focused only on Sri Lanka's government banking sector, limiting the generalizability of findings; thus, future studies could explore the private banking sector for broader validation. The use of convenience sampling may have introduced bias, so probabilistic sampling is recommended to enhance representativeness. Additionally, subjective well-being (SWB) was measured only through job and life satisfaction; future research could include other factors like work-life balance to deepen understanding. Including variables such as stress could help test mediating or moderating effects between PsyCap and SWB. Longitudinal studies are also encouraged to examine how PsyCap influences well-being over time, especially in contexts like post-pandemic recovery. Finally, while this study followed a quantitative approach, future research can adopt qualitative or mixed methods to gain richer insights and contribute more nuanced understanding of PsyCap and employee well-being.

Conclusion

This study confirms that Psychological Capital—Self-Efficacy, Hope, Optimism, and especially Resilience—positively impact the subjective wellbeing of Sri Lankan government bankers. Rooted in the broaden and build theory, the findings highlight that stronger PsyCap helps retain employees and reduces turnover. Therefore, bank leaders and policymakers should strengthen PsyCap development, as it directly supports employees' wellbeing and, in turn, the future success of Sri Lanka's government banking sector. Cultural, organizational, and stress-related factors significantly influence the PsyCap–well-being relationship in Sri Lanka's banking sector. Collectivist culture promotes harmony but may limit open stress expression, while hierarchical structures reduce autonomy and affect self-efficacy. High job demands and regulatory pressures increase stress, making resilience and optimism vital for sustaining employee well-being.

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IMPACT OF TECHNOLOGICAL ADVANCEMENTS ON EMPLOYEE-PERCEIVED PRODUCTIVITY IN THE APPAREL INDUSTRY OF SRI LANKA

M S F Ishfa ¹

Abstract

The apparel industry is one of Sri Lanka's biggest sectors, making a significant contribution to both employment and economic growth. Employee roles and industrial processes are changing because of rapid technology breakthroughs, including Automation and Robotics, Digital tools and software, Smart wearable technology, and Big Data. The influence of these technologies on employee-perceived productivity, which is the employees' self-evaluation of how well they perform their jobs, is examined in this study. 130 workers, including supervisors, quality inspectors, administrative personnel, and machine operators from five of the apparel firms in the Colombo area, participated in a quantitative, cross-sectional study. Every variable was measured using a five-point Likert scale, which was modified from well-established literature. Descriptive statistics, multiple regression, and correlation analysis were used in SPSS to analyse the data. The results show that employee-perceived productivity is greatly and favorably impacted by automation and robots, smart wearable technologies, and digital tools and software, with automation having the most impact. However, big data revealed no significant correlation, indicating a low level of integration into day-to-day operations. The report provides managers in the Sri Lankan apparel industry with useful insights by highlighting the strategic significance of matching labor capabilities with technology investments to improve operational efficiency and employee engagement.

Keywords: Apparel industry, employee-perceived productivity, technology advancement

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Proceedings of the 16th International Conference on Business and Information - ICBI 2025 © 2025 by The Faculty of Commerce and Management Studies, University of Kelaniya, Sri Lanka is licensed under CC BY-SA 4.0.

DOI:

Introduction

Every industry is changing due to technological advancements, and the apparel industry is no exception. This sector is essential to Sri Lanka's economic development, and becoming more competitive requires the use of cutting-edge technologies, including automation and robotics, digital tools and software, smart wearable technology, and big data. These technologies increase productivity, simplify processes, and have the power to modify how workers view their output, which in turn impacts engagement, job satisfaction, and adaptability. Although objective metrics like line productivity and on-time delivery are still crucial, employee opinions provide insightful information for matching labor skills with technology expenditures. Understanding these impressions is crucial for maintaining operational effectiveness and staff engagement in a world of intense global competition (Bresnahan & Trajtenberg, 2013).

Even while international clothing manufacturers have embraced technology at a quick pace to increase efficiency and personalization, many Sri Lankan organizations continue to struggle to reap the benefits (Kamalendu & Ansar, 2020). Sometimes, technology expenditures are made without defined implementation methods, which leads to outmoded tools and underutilization, which hinders employee performance. Studies that have already been conducted in Sri Lanka have concentrated on organizational agility and ICT adoption; however, there is no empirical data on how certain technical developments impact workers' perceptions of productivity in the apparel industry (Hanifah et al., 2024). Because employee perceptions may impact the success or failure of technology adoption, particularly in sectors where worker adaptation and operational efficiency are essential for survival in a fiercely competitive global market, this gap is crucial (Monika et al., 2020).

By investigating the effects of four technological factors—digital tools and software, smart wearable technology, automation and robotics, and big data—on employee-perceived productivity in Sri Lanka's apparel sector, this study closes an important gap in existing knowledge. The main objective of the study is to examine how these technological advancements influence employees' perceptions of their productivity and to determine which technologies have the most significant impact. This human-centred perspective focuses on employees' experiences rather than purely objective performance indicators, offering industry-specific insights through a quantitative analysis. The study is significant as it provides valuable implications for multiple stakeholders. For apparel industry managers, the findings offer guidance on selecting and implementing technologies that enhance both efficiency and employee engagement. Policy makers and industry bodies can use the outcomes to design strategies that encourage technology-driven innovation while ensuring workforce adaptability. Furthermore, academics and researchers will benefit from the empirical evidence generated, which contributes to the literature on technology adoption and human productivity in developing economies. Ultimately, the study strengthens understanding of how aligning technological investment with employee readiness can improve competitiveness and sustainable growth in Sri Lanka's apparel industry.

Literature Review

Employee perceived productivity

Employee-perceived productivity is a person's estimate of how well and efficiently they can accomplish tasks at work using the resources at their disposal (Guendalina, 2021). Perceived productivity, as opposed to objective productivity metrics like queue efficiency or cost per minute, offers important information about the work experience and influences engagement, job satisfaction, and adaptability (Bresnahan & Trajtenberg, 2013). Employee impressions may make or break new systems in the garment industry, as technology adoption is progressively influencing labor processes. Using viewpoints from innovation diffusion theory and socio-technical systems thinking, the current study investigates how four technological elements, digital tools and software, automation and robotics, smart wearable technology, and big data, influence perceived productivity (Monika et al., 2020).

Automation and robotics

The production of clothing is being revolutionized by automation and robots, which increase uniformity, speed, and precision while decreasing manual labor and mistakes (Kamalendu & Ansar, 2020). They make it possible for both customized and large-scale manufacturing, relieving workers of monotonous work so they may concentrate on higher-value endeavours. These technologies can increase employees' perceived productivity by boosting their confidence in their performance when properly integrated and backed by the right training (Dilshan & Wanninayake, 2022).

Digital tools and software

Digital tools and software, such as communication platforms, workflow management systems, and specialized production programs, facilitate decision-making, enhance collaboration, and simplify information flow. These tools aid workers in manufacturing environments by helping them plan jobs, cut down on delays, and instantly access vital data. The way that individuals assess their own productivity can be positively influenced by this operational openness and control (Miriam, 2018).

Smart wearable technology

Smart wearables, such as health sensors, safety monitors, and performance trackers, are being utilized more and more in manufacturing to track job progress and enhance operational safety. By offering immediate feedback, these technologies encourage self-control and skill improvement, which can improve worker well-being and efficiency, two important aspects of perceived productivity (Deepika & Jung, 2016).

Big data

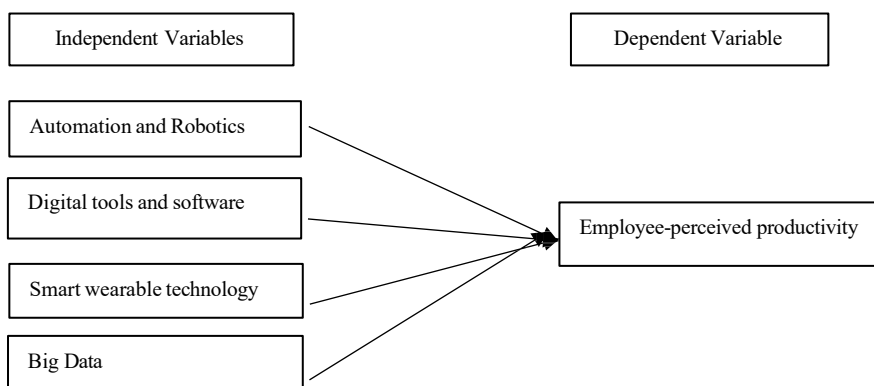
Big data analytics is the process of improving decision-making by gleaning useful insights from huge, intricate databases. Big data may help with production scheduling, quality assurance, and demand forecasting in the apparel industry. Employee perceptions of its worth, however, rely on how easily the insights can be accessed and applied to everyday work. Big data's influence on perceived productivity could be restricted if operational responsibilities lack concrete applicability (Nada & Ahamed, 2014).

There is little empirical study, particularly in Sri Lanka, that examines the combined impact of these technologies on employee-perceived productivity in the garment business, despite the fact that previous studies have looked at each technology separately. By evaluating the connections between automation and robotics, digital tools and software, smart wearable technology, and big data, this study fills that knowledge gap and offers industry-specific data to support efficient technology integration that complements workforce capabilities and boosts competitiveness.

Methodology

This study adopted a quantitative, cross-sectional design to examine the impact of technological advancements on employee-perceived productivity in Sri Lanka's apparel sector. The sample consisted of 130 employees from five leading apparel manufacturing firms in the Colombo district, selected through convenience sampling based on their technological adoption, operational scale, and accessibility. Colombo was chosen as it is the main industrial hub of Sri Lanka's apparel industry. The structured questionnaire contained five sections: demographic details and measures for automation and robotics (10 items), digital tools and software (6 items), smart wearable technology (7 items), big data (7 items), and employee-perceived productivity (8 items), all rated on a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). The questionnaire was prepared in English and translated into Sinhala to ensure clarity among operational-level employees. Content validity was verified through expert review and a pilot test with 20 respondents. Reliability analysis using Cronbach's alpha confirmed strong internal consistency, with all constructs scoring above 0.70.

Figure 1
Conceptual framework



Source: Authors' work

- H1: There is a positive relationship between Automation and Robotics and Employee Perceived Productivity.
H2: There is a positive relationship between Digital tools and Software and Employee Perceived Productivity.
H3: There is a positive relationship between Smart Wearable Technology and Employee Perceived Productivity.
H4: There is a positive relationship between Big Data and Employee Perceived Productivity.

Results and Discussion

Table 1
Descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Gender	130	1.00	2.00	1.4769	.50140
Age	130	1.00	5.00	2.7154	.98228
Education	130	1.00	5.00	3.7308	1.19293
Employment	130	1.00	4.00	2.9231	.96139
Income level	130	1.00	5.00	3.6154	.97555
Valid N (listwise)	130				

Source: Survey data (2025)

The demographic profile of the respondents shows a near-balanced gender distribution. The average age group was between 26–35 years, with most respondents holding a diploma or equivalent qualification. Employment type averaged close to supervisory or mid-level positions, and the mean income level corresponded to the mid-range bracket. These results indicate that the sample represents a mix of genders, relatively young to middle-aged employees, with varied educational backgrounds, job roles, and income levels.

Table 2
Reliability table

	Cronbach's Alpha	N of Items
Employee_Productivity	.803	8
Automation_and_Robotics	.843	10
Digital_tools_and_software	.867	6
Smart Wearable Technology	.899	7
Big_Data	.822	7

Source: Survey Data (2025)

This table measures the internal consistency or reliability of the constructs analysed in the study. All constructs demonstrate Cronbach's Alpha values exceeding 0.8, Cronbach's Alpha value which reflects good to excellent internal consistency. These figures indicate that the items within each construct are well correlated.

Table 3
KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.818
Bartlett's Test of Sphericity	Approx. Chi-Square	743.376
	df	10
	Sig	.000

Source: Survey data (2025)

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's Test of Sphericity indicates that the data is suitable for factor analysis. A KMO value above 0.8 is considered good, which confirms that the study's sample size and distribution of variables are adequate for further analysis. The significant result of Bartlett's Test ($p < 0.001$) further validates that there are significant relationships between the variables, making factor analysis a relevant tool to explore the data structure in subsequent analyses.

Table 4
Correlations

		Employee_Productivity	Automation_and_Robotics	Digital_tools_and_software	Smart wearable technology	Big_Data
Employee_Productivity	Pearson Correlation	1	.778**	.403**	.143	-.122
	Sig. (2-tailed)		.000	.000	.105	.167
	N	130	130	130	130	130

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Survey data (2025)

The results show a strong, positive, and significant correlation between employee-perceived productivity and automation and robotics ($r = 0.778$, $p < 0.01$), indicating that higher automation is associated with higher perceived productivity. A moderate, significant positive correlation was also found with digital tools and software ($r = 0.403$, $p < 0.01$). Smart wearable technology showed a weak, non-significant positive relationship ($r = 0.143$, $p > 0.05$), while big data displayed a weak, non-significant negative correlation ($r = -0.122$, $p > 0.05$).

Table 5
Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. Change
1	.752 ^a	.724	.532	.253	.554	738.576	4	125	.000

Source: Survey data (2025)

Table 6
ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	36.924	4	9.231	738.576	.000 ^b
	Residual	1.562	125	.012		
	Total	38.486	129			

Source: Survey data (2025)

Table 7
Multiple regression coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Beta	Beta		
1	(Constant)	-.042	.121		-.345	.730
	Automation and Robotics	.893	.040	.911	22.114	.000
	Digital tools and software	.060	.026	.044	2.268	.025
	SWT	.098	.045	.088	2.170	.032
	BigData	-.055	.045	-.035	-1.201	.232

Source: Survey data (2025)

The regression analysis aimed to examine the influence of four technological advancements, automation and robotics, digital tools and software, smart wearable technology, and big data, on employee-perceived productivity in Sri Lanka's apparel sector. The model summary indicated an R value of 0.752, demonstrating a strong positive relationship between the combined independent variables and the dependent variable. The R² value of 0.724 revealed that approximately 72.4% of the variance in employee-perceived productivity can be explained by the four technological factors. This suggests that technological advancements collectively play a substantial role in shaping employees' perceptions of their productivity, aligning with previous research highlighting the productivity-enhancing potential of technology integration in manufacturing (Kamalendu & Ansar, 2020; Hanifah et al., 2024).

The ANOVA results confirmed that the regression model was statistically significant ($F = 738.576$, $p < 0.001$), indicating that at least one of the technological factors significantly predicts employee-perceived productivity. This finding supports the study's conceptual framework, which proposed that modern technological systems contribute meaningfully to how employees evaluate their own work performance. The significance of the overall model reinforces the necessity for apparel companies to strategically implement and integrate technology to maximize workforce efficiency and engagement.

Examining the regression coefficients, automation and robotics had a $\beta = 0.911$, $p < 0.001$, signifying a strong, positive, and statistically significant effect on employee-perceived productivity. This outcome is consistent with prior studies (Dilshan & Wanninayake, 2022), which found that automation reduces repetitive tasks, improves accuracy, and increases production speed, thereby enhancing employees' perceived efficiency. Digital tools and software also showed a statistically significant effect ($\beta = 0.044$, $p = 0.025$), suggesting that real-time communication, streamlined workflows, and improved task management foster higher productivity perceptions (Miriam, 2018). Smart wearable technology recorded a $\beta = 0.088$, $p = 0.032$, indicating a positive and statistically significant relationship, although weaker than automation and digital tools. While previous research (Deepika & Jung, 2016) highlighted the benefits of wearable devices in monitoring performance and safety, the present result suggests that adoption in Sri Lanka's apparel industry is still developing, which may limit its overall perceived value. In contrast, big data had a $\beta = -0.035$, $p = 0.232$, indicating a weak and non-significant negative relationship with employee-perceived productivity. Although big data analytics can enhance decision-making (Nada &

Ahamed, 2014), its practical impact on individual productivity perceptions may depend on the extent to which insights are accessible and applied in daily operations.

The model demonstrates both statistical and practical significance, providing strong support for most of the study's hypotheses. The results indicated that H1, H2, and H3 were accepted, while H4 was rejected. Specifically, automation and robotics (H1) showed a strong positive and significant relationship with employee-perceived productivity, aligning with previous findings (Dilshan & Wanninayake, 2022), which confirmed that automation enhances efficiency and employee confidence by reducing repetitive tasks. Digital tools and software (H2) also demonstrated a significant positive impact, who highlighted that digital systems improve communication and workflow transparency (Miriam, 2018). Smart wearable technology (H3) recorded a weaker yet significant positive relationship, the wearable devices can enhance self-monitoring and workplace safety, though adoption in the apparel industry remains limited (Deepika & Jung, 2016). In contrast, big data (H4) showed a non-significant negative relationship, leading to its rejection. The big data's limited practical integration into day-to-day apparel operations reduces its perceived impact among employees (Nada & Ahamed, 2014). Overall, the findings confirm that technologies directly embedded in daily work processes—such as automation and digital tool generate higher employee-perceived productivity than those used for managerial or analytical purposes.

Conclusion

This research examined how employee perceptions of productivity in Sri Lanka's apparel industry are influenced by technological advancements automation and robotics, digital tools and software, smart wearable technologies, and big data. The results demonstrate that automation and robotics, as well as digital tools and software, have strong and significant positive effects on employee-perceived productivity, while smart wearable technology and big data show weaker, non-significant relationships. These findings suggest that employees experience the greatest perceptual benefits from technologies directly embedded in daily tasks and workflows. Therefore, apparel manufacturers should prioritize investments in automation and digital systems, supported by proper training and process alignment, to maximize productivity outcomes.

The findings of this study carry important theoretical and practical implications. Theoretically, the study enriches the literature on technology adoption and employee perceptions by providing empirical evidence from a developing economy context. Practically, it offers valuable insights for apparel industry managers and policy makers to design technology integration strategies that enhance both operational efficiency and employee engagement.

However, the study is not without limitations. It focused only on five apparel firms in the Colombo district, which may limit the generalizability of findings to other regions or industries. The cross-sectional design also restricts the ability to observe long-term effects of technological changes on employee perceptions.

Based on these limitations, future studies are encouraged to include a larger and more geographically diverse sample across Sri Lanka's apparel sector or other manufacturing industries. Longitudinal studies could provide deeper insights into how technology-driven changes evolve over time. Moreover, incorporating qualitative approaches such as interviews or focus groups could capture richer perspectives on how employees adapt to and experience new technologies in their work environments.

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INTEGRATING LEAN PROCESS IMPROVEMENT INTO EMPLOYEE PERFORMANCE MANAGEMENT: EVIDENCE FROM SRI LANKA'S APPAREL INDUSTRY

K.C.U Jayarathne¹, W.A.J.S Kularathne², Hasitha Ayeshmantha³, K.V.J.M Karunapala⁴, V.M Wickramasinghe⁵

Abstract

Sri Lanka's apparel industry is acknowledged as a key contributor to the Sri Lankan economy in terms of national GDP and providing employment. However, the sector continues to face operational challenges in relation to employee performance management (EPM), considering many areas like inconsistent evaluation criteria and having limited feedback mechanisms in PE processes. Thus, by conducting this study, the authors have attempted to address the underexplored potential of integrating Lean process improvement with a special focus on employing Value Stream Mapping (VSM) into EPM systems to enhance productivity and engagement of the apparel employees. The whole study was guided by three objectives, including exploring existing EPM processes, assessing the applicability of Lean/VSM, and providing practical recommendations considering the use of process improvement using VSM within PE processes. This study was conducted as a qualitative single-case study based on a medium-sized apparel firm in Bibila. The required data were collected through 12 semi-structured interviews with management and operational staff, complemented by document analysis of HR policies, appraisal forms, and training records. Thematic analysis and review of documents were used as the analysis tools. The thematic analysis results revealed five key weaknesses: lack of standardisation, narrow feedback channels, training gaps, process inefficiencies, and communication barriers in the existing employee performance management process. Findings indicate that VSM could streamline appraisal processes, reduce delays, standardise evaluation, and link performance outcomes to targeted training. The given recommendations through the study were included: baseline VSM mapping, phased implementation, digital feedback systems, and fostering a continuous improvement culture. These insights offer a replicable framework for Lean-based EPM adoption in labour-intensive sectors of developing economies.

Keywords: Apparel industry, employee performance management, lean process improvement, Sri Lanka, value stream mapping

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Proceedings of the 16th International Conference on Business and Information - ICBI 2025 © 2025 by The Faculty of Commerce and Management Studies, University of Kelaniya, Sri Lanka is licensed under CC BY-SA 4.0.

DOI:

Introduction

The textile industry stands as one of the largest industrial areas in Sri Lanka, being the main contributor to export earnings and an important driver of economic activity. In 2024, the revenue from apparel exports was nearly USD 4.7 billion, a 5% increase from 2023 but still 10.3% below the pre-pandemic peak of USD 5.3 billion in 2019 (DailyFT, 2025). This apparel sector provides an approximate contribution to the national GDP of around 7%, while also directly engaging with about 350,000 people, and making up indirect employment of approximately another 350,000 people. Thus, this apparel sector is considered central to the rural livelihood and industrial growth contribution in Sri Lanka (EconomyNext, 2024; JAAF, 2024). The importance of this industry can be seen from its labour-intensive characteristics, where much of the production includes sewing and other manual jobs. Nearly 78% of the workers are women, and their work involves low-skilled, repetitive tasks. Although there have been attempts to improve gender equality, such as retention of women in supervisory and managerial roles largely remain minimal (IPS Policy Insights, 2019; Better Work IFC/ILO, 2023).

Even though this apparel sector in Sri Lanka is very important in many areas, the sector is functioning with many risks: pricing pressures with global buyers, which are aggravated by the lower-cost pristine producers like Bangladesh and Vietnam, threaten the competitiveness (Athawale et al., 2023). In fact, currency depreciation due to the previous economic downturn has raised wage costs in terms of USD, and compliance with labour and sustainability standards globally increases operational costs (Ramanayake, 2019). Add to these things, high employee turnover and absenteeism are typically related to scant welfare provision and participation (Global CEO Magazine, 2025).

Most of the Employee Performance Management (EPM) systems in the apparel firms in Sri Lanka are traditional, mainly based on annual or semi-annual ratings done by line supervisors. In addition to this, the performance appraisal systems lack mechanisms for continuous monitoring of employee behaviour during the appraisal period, comprehensive job descriptions, or structured paths for career development (Rathnakara & Arachchige, 2020). Training modalities are mostly irregular, and discussions about performance are very uncommon and rare; this results in low employee engagement and misalignment of individuals with the goals of the organisation. These gaps lead to inefficiency, increased defect rates, and very high turnover rates (Gammanpila & Kodisinghe, 2021). Structured training, regular feedback, and process-based performance management usually contribute greatly to increased productivity and employee job satisfaction, based on empirical evidence (Maduranga & Harshani, 2024).

Lean conceptual approaches within the area of process improvement have permeated the last few years into applications beyond manufacturing that include an entire spectrum of activities within human resources (HR) and administrative function performances (Mehta, 2023). By implementing these, the existing non-value-added activities in HR processes should be eliminated, workflow and process visibility tend to increase, and be streamlined through these Lean principles. Value Stream Mapping (VSM) is one of the core tools from Lean methodology whereby organisations visualise an entire process and, from there, identify what wastes are present and design more efficient workflows (Lyu et al., 2021). Practically, VSM is focused on production optimisation; it is also successfully applicable with HR processes like recruitment and onboarding, leading to cycle time reduction and enhancement of communication flows (Purdue Lean Six Sigma, 2024). When applied as an EPM practice, the use of VSM can help clarify performance expectations, standardise evaluation processes, and ensure continuous performance monitoring.

When focusing the existing literature relating to the global contexts, some studies are available which have explored Lean integration into HR and PM systems in manufacturing firms (Khatib & Pachorkar, 2015), healthcare (Mehta, 2023), and there are many studies only focusing how to use VSM for process improvements in different contexts (Tesfaye, 2021), but not focused on PM or any HRM processes. Like that, literature relating to the Sri Lankan context, researchers have largely focused on how lean applications can be used for production efficiency rather than HR or EPM improvements (Wickramasinghe & Wickramasinghe, 2017). Thus, there remains a clear empirical gap in understanding how Lean-based tools, like VSM, can enhance PM processes within labour-intensive apparel firms in developing economies like Sri Lanka.

Further, these Lean Transformations into the application of areas like PE in HRM still remain underexplored in terms of labour-intensive industries in developing countries (DiVA Portal, 2020). Most efforts on Lean adoption in Sri Lankan apparel concentrate on manufacturing efficiency alone rather than on HR process optimisations. The lack of empirical research on how VSM-based EPM improvement can offer clearer paths for further research into how Lean principles can eliminate systemic weaknesses in performance management while creating workplace productivity and retention gains.

Therefore, this study primarily assesses the existing EPM processes based on a selected apparel firm in Sri Lanka, evaluates the possibilities of the application of Lean process improvement, focusing on the VSM tool, to augment these systems to provide valuable insights to the firm and to the sector. The specific objectives expected from this study are:

RO1: To explore the existing employee performance management process in a selected apparel firm in Sri Lanka, identifying strengths and weaknesses.

RO2: To evaluate the applicability of Lean process improvement methods, particularly VSM, in enhancing EPM systems.

RO3: To provide practical recommendations for apparel firms on implementing Lean-based performance management to improve productivity and engagement.

Significance of the study

This study contributes to the relevant body of knowledge theoretically and practically. When discussing the theoretical contribution of the study, it attempts to extend the application of Lean process improvement concepts into the understudied area of EPM, particularly within labour-intensive industries of developing economies, such as Sri Lanka. When discussing the practical view, this research provides evidence-based insights relating to and helping industry professionals to integrate VSM into EPM systems. This would enable the development of a stage to demonstrate how Lean principles can mitigate inefficiencies in processes, promote employee engagement, and enhance organisational productivity in the apparel industry in Sri Lanka.

Literature Review & Conceptual Background

Employee performance management (EPM)

Employee performance management (EPM) encompasses all systematic processes through which organisations set work goals, monitor performance, provide feedback, appraise individuals, and plan employee development—always with a view to aligning individual contributions with organisational objectives (Armstrong, 2018; Aguinis, 2013). This is not a single event confined to an annual perspective but rather an ongoing eligible management practice that pervades human capital processes and contributes to overall success (Armstrong, 2018).

EPM work processes are fundamentally divided into goal setting, performance monitoring, feedback, appraisal, which is based on formal reviews of progress, and development planning. The distinguishing character of these processes is that goal setting ensures the primacy of alignment between individual and organizational objectives; monitoring involves the observation of behaviors and outcomes on an ongoing basis; feedback involves giving constructive and timely input to motivate and correct performance; appraisal involves formal review; and lastly, development planning involves training and development needs (Armstrong, 2018; CIPD, 2025; (International Labour Organization [ILO], 2018)).

The integration of EPM with strategic planning, in concert with employee engagement and the promotion of continuous, as opposed to intermittent, feedback has been recognised as an important hallmark of global best practice (CIPD, 2025). The innovative approaches also uphold as key principles: 360-degree feedback systems, real-time feedback technologies, fairness, and transparency. The International Labour Organisation (ILO, 2018) provides a structured performance cycle commencing with joint planning between the manager and employee, mid-term reviews for assessing progress against objectives as well as barriers, and end-of-cycle evaluations in order to inform future development planning.

Evidence suggests that performance management in labour-intensive industries enhances productivity, product quality, and employee retention. Positive performance appraisal experiences engender positive employee engagement, job satisfaction, and organisational commitment, thus bringing about operational excellence (Maseke et al., 2022).

Lean process improvement

Lean describes a management philosophy focusing on maximum value delivery to customers with minimum waste; it is driven by five core principles: defining value, mapping the value stream, creating flow, establishing pull, and pursuing perfection (Womack & Jones, 1996). This philosophy originally derived its roots mainly from manufacturing but has now begun to extend toward other contexts such as HR, healthcare, and administrative services (Lopez, 2025).

In an HR environment, Lean principles standardise workflows, increase visibility and transparency of the process while eliminating wasteful non-value-adding activities, thereby shortening cycle times and enhancing service quality (Vorecol HRMS, 2024).

An application of Lean methods within the Toyota HR department reported a 30% turnover reduction, while a Fortune 500 company achieved a 30% time-to-hire reduction, alongside a 25% decline in recruitment cost (Vorecol HRMS, 2024; SHRM, 2024). These figures illustrate Lean's potential to optimise HR functions, including performance management, securing both process efficiency and strategic alignment.

Value stream mapping (VSM)

Value stream mapping (VSM) is recognised as a supreme Lean tool that is designed to visually map existing process flows while differentiating value-adding activities from non-adders so as to detect bottlenecks, delays, and waste (Kumar et al., 2024). A current state map shows the present process steps and inefficiencies, while a future state map is drawn up to indicate the newer, redesigned and streamlined process. The entire VSM process also encompasses systematic identification of waste coupled with the development of improvement plans that aim to increase flow and efficiency (Kumar et al., 2024).

Currently, VSM is widely applied to non-production activities, including HR processes such as recruitment, training, and performance appraisal (Wang et al., 2022). The use of VSM is to identify processes with bottlenecks, minimise feedback cycle delays, and raise the synergy of performance management with strategic organisational goals. In EPM, VSM could clarify the performance cycle and its different stages, enhance transparency, eliminate redundancies, and improve communication between managers and workers in order to optimise performance monitoring and development planning (Lyu et al., 2021).

Integration potential of lean tools with EPM

Integration of lean tools, particularly VSM, with EPM, generates enormous gains in productivity, cost reduction, and employee engagement. Quantitatively, the surveys reveal increases in productivity by 20–30% and a cut-down turnover by 15–30% against the Lean-EPM integration (Deloitte, 2024). Qualitatively, evidence has emerged in support of cultural advantages ingrained in the Lean acceptance of increased staff participation in solutions, subsequent enhancement of dialogue, and drift toward a continuous improvement mentality (SHRM, 2024). However promising these results may be at the international level, a distinct research gap remains in the local context of Sri Lanka. Given that Lean adoption in the garment industry in Sri Lanka has often been quite focused on production efficiency, an empirical study on the application of Lean tools to HR processes, with particular focus on EPM, appears to have received limited attention.

Methodology

Research design

This study followed a qualitative single case study approach, as it provides deeper explorations on how Lean process improvement can be integrated into Employee Performance Management (EPM) in Sri Lanka's apparel industry.

Case selection

The selected company is a medium apparel manufacturing organisation named Randi International Private Limited, where the operational employees employed around 400, and staff members, including supervisors, 30, work in the production process, which is also based in the Bibila district in Sri Lanka. This firm was purposively selected for this study considering three criteria: (1) it represents a typical labour-intensive apparel operation in Sri Lanka; (2) it operates with an aforesaid traditional EPM system; and (3) this firm has internal institutional aspirations for Lean-based HR process improvements. Therefore, the associated EPM statutes could provide insight into the operational difficulties with conventional EPM practices and their opportunities for Lean transformation.

Data collection

Data were collected using semi-structured interviews complemented by document review. The interviews were conducted with 12 participants, comprising six management/supervisory level staff (HR managers, production managers, and line supervisors) and six operational level employees. Purposive sampling ensured that the participants had direct experience of the organisation's EPM processes and were therefore considered to have had informed perspectives of the experiences. The approach was preferred to capture rich context-specific insights rather than data with a statistically generalizable significance. Moreover, internal HR policy documents, performance appraisal forms, and training records were reviewed as a contrasting source to the interviews, allowing for a blended view in understanding the current EPM situation.

Methodological clarifications

According to internal HR records (2024), the total workforce population of this selected apparel firm was with of 430 employees, including around 400 operational workers and 30 managerial and supervisory staff members. Based on this known population, twelve employees were purposively sampled to collect multiple perspectives on EPM. Six of those participants were from the management and supervisory category, representing HR managers, production managers, and line supervisors, while the other six were operational-level employees. This helped to ensure the use of both managerial and employee perspectives regarding performance practices.

The study was conducted using a single-case design method. The use of this method can be justified with its benefits since it has the ability to enable an in-depth exploration of contextual and process-specific dynamics within one apparel firm. This can allow the researcher to make a detailed examination of how Lean principles can be integrated into EPM systems, considering a real organisational setting.

A self-prepared semi-structured interview guide has been developed by the researchers based on key literature relating to EPM (Armstrong, 2018; CIPD, 2025) and Lean process improvement (Womack & Jones, 1996; Lyu et al., 2021), and it developed as comprises open-ended questions considering existing appraisal processes, feedback mechanisms, training and development, process efficiency, and communication effectiveness in the selected firm. After the interview guide had been prepared, two HR experts were consulted before data collection to assess its clarity and relevance to the study objectives.

Data analysis

Thematic analysis was used for the main data analysis based on the interview insights, as it allowed for a systematic identification and interpretation of patterns arising from the qualitative data. An inductive coding approach was utilised, allowing for thematic emergence from the data while concurrently being guided by the objectives of the study. The developed themes for the study are summarised as Lack of Standardisation of PE criteria, Limited Feedback Mechanisms, Training and Development Gaps, Process Inefficiencies and Communication Barriers.

Ethical considerations

Both the data collection and reporting were carried out in compliance with standard ethical research practices. For conducting the research process, including collecting data and doing interviews based on the Randi International (Pvt) Ltd, the relevant permissions were gained from the company management before conducting the study and also for the use of the organisation's name and to collect relevant data for academic purposes. The objectives of the study were explained to all participants, along with voluntary participation and confidentiality of their responses. Informed consent was obtained verbally and in writing before each interview. No sensitive or proprietary data beyond the approved scope was released.

Analytical technique justification and thematic findings

The primary method used for analysing this research work was thematic analysis. The use of this thematic analysis would allow researchers to conduct a systematic identification, organisation, and interpretation of patterns considering the qualitative data collected from the respondents (Braun & Clarke, 2006). This method was ideal for the present exploratory case study, investigating process-level weakness areas and improvement opportunities in EPM. The analysis revealed five main themes: lack of standardisation, limited feedback channels, training and development gaps, process inefficiencies, and communication barriers. This set of themes aligns with earlier literature insights within the scope of this study, which identified the same qualities in non-standardised appraisals (Rathnakara & Arachhige, 2020; Gammanpila & Kodisinghe, 2021). Concurrently, Armstrong (2018) and CIPD (2025) have highlighted that gaps in linking performance reviews with training and ineffective communication act as barriers to engagement and productivity. Thematic insights thus corroborate the existing literature while extending it further by showing how Lean principles of VSM can help address the identified problems through process visibility, standardisation, and continuous improvement.

Analysis and Discussion

Examining the existing employee performance management process

The current EPM of the selected apparel company really relies on the process of annual performance appraisals done by an immediate supervisor; thus, there is very little monitoring of mid-year performance. This is captured in HR policy manuals as part of understood operations at the lower level, but inconsistency was witnessed across departments.

Strengths also encompass the fact that there is a formal appraisal system in place, that appraisal periods correspond with the production calendar, and that there is some connection between performance results and incentive payments. These features show partial alignment with best-practice EPM principles enunciated by Armstrong (2025) and the ILO (2018), which emphasise structured planning, feedback, and development cycles.

Several weaknesses, however, emerged through the interview and document analysis:

- a. Absence of standardisation: Different supervisors had distinct criteria for rating their employees, leading employees to feel biased and inconsistent regarding evaluation.
- b. Narrow feedback channels: Basically, there is feedback only during annual appraisals, which leaves employees hanging for the rest of the year as to whether they are on the right track. This is against the continuous feedback model argued within global best practices (CIPD, 2025).
- c. Training and development gaps: Performance reviews seldom ended with prescribed training plans, thus severing the relationship between appraisal outcomes and skills development.
- d. Process inefficiencies: Due to documentation delays, most of the time, results are finalised after weeks of review, rendering the findings less relevant to an immediate performance improvement.
- e. Communication barriers: As most interviews indicated poor communication between employees and supervisors when it comes to goal clarity and expectations, this finding is also in line with the same results of other studies done in Sri Lanka concerning apparel EPM studies (Gammanpila & Kodisinghe, 2021).

Applicability of lean process improvement methods, particularly VSM, to EPM systems

The evidence from the thematic analysis pointed out that Lean process improvement principles, particularly VSM, as mentioned above, would be very much appropriate for addressing the identified weaknesses. The first aspect of lack of standardisation has to do with Lean's interest in the consistency of processes. The VSM of appraisal processes should uncover inconsistencies in terms of rating criteria and documentation flows. This, in turn, may provide a common evaluation framework across departments. In other words, the Process Inefficiencies theme goes along with Lean's elimination of waste. The appraisal documentation presently passes through all the human handovers that eat time and also pose the risk of data loss. VSM-based redesign would be a streamlined framework of these flows with reduced cycle time and real-time recording of appraisal results-highlighting similar HR efficiencies documented in non-manufacturing contexts with Lean application (Vorecol HRMS, 2024; Lopez, 2025). Another two flow and pull principles of Lean could be set in attitude for improving feedback mechanisms. At present, the feedback is "pushed" toward employees once a year; whereas suggested Lean-informed, process-enabled feedback would allow for more frequent, "pulled" feedback as a function of employee or supervisor request, thus enhancing responsiveness and engagement (SHRM, 2024). Lean's intent to serve continuous improvement really gets taken up a notch when we think of Training and Development Gaps. Current-state performance-to-training pathways mapped through VSM will expose where feedback does not convert into competence, thereby creating closed-loop systems wherein performance gaps trigger automatic targeted training interventions.

This definitely proves that VSM is well-suited for addressing procedural inefficiencies and under-engagement by the EPM system of the firm.

Practical recommendations for apparel firms on lean-based EPM implementation

Now, after analysing the existing PE process and assessing the applicability of implementing VSM, the study gives these actionable recommendations to apparel firms for embedding Lean into EPM:

Conduct Baseline VSM of Current EPM Processes:

By involving cross-functional teams including HR, production supervisors, and line employees to capture the whole process landscape, while using the mapping exercise for waste identification-categorized such, unnecessary approvals, duplication of record keeping, and delayed feedback.

Adopt a Phased Implementation Approach:

Standardisation of evaluation criteria, moving on to digitisation and real-time feedback tools and also leveraging to pilot Lean EPM in one department before broadening its scale.

Linking EPM to Training and Development Plans:

Every performance gap to have a direct training intervention, and there should be monitoring mechanisms to post-training performance improvements for validating the training effectiveness.

Develop a Feedback Culture:

Teaching supervisors how to give timely and constructive feedback. Encourage upward feedback from subordinates about managerial performance.

Development of Continuous Improvement Mindset:

Incorporate regular review meetings to evaluate EPM process efficiency and adapt based on employee and manager feedback. Recognise and reward teams or individuals contributing to process improvement initiatives.

These recommendations not only address the inefficiencies and gaps present in the case study but also have the potential to be replicated for other apparel firms facing similar challenges.

Implications of the study

The research has several important implications for managerial, practical and policy implications. First, managerially, it offers important insights for clothing firms into how they can create or refine their employee performance management systems around and using Lean tools, which promotes an efficient, feedback and engagement approach to performance management. Second, practically, this study illustrates how a series of process improvements can help to bridge HR functions and organisational production goals and performance. Finally, considering the important policy implications, it shows how frameworks for continuous improvement and externally standardised performance systems can support labour welfare, maintain organisational competitiveness and promote standards for the Sri Lankan apparel sector as a whole, contributing to the construction of a regulatory framework that can enhance practices across the industry.

Conclusion

In this study, the researchers have examined how process improvement principles that lean contextualise, particularly in the area of VSM, could enhance employee performance management systems in Sri Lanka's apparel industry. As per the findings, this study has exposed significant weaknesses in the current practices towards EPM, ranging from the absence of standardisation to infrequent feedback and poor alignment between training and performance evaluation. Lean could address the inefficiencies from its own precepts, which streamline workflows, clarify performance expectations, and maintain continuous feedback and learning. The integration of VSM creates a clearly structured framework for non-value-adding activity identification and enhances communication and transparency in HR processes, resulting in improved employee engagement and productivity.

However, this study has a few weaknesses as well. The use of the single-case design of the study restricts its applicability to other areas of the broad apparel sector. Data were only collected from managerial and supervisory areas, and hence, they may not cover the 360-degree perspectives of the HR processes. Further, future researchers could use a multi-firm or longitudinal approach and include qualitative and quantitative sources of information to validate the effects of Lean-based EPM interventions. A broader inquiry across diverse manufacturing contexts will offer deeper insight into how lean principles could systematically transform HR processes in developing economies.

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DEVELOPMENT OF CONCEPTUAL FRAMEWORK FOR JOB AUTONOMY, WORK RESILIENCE AND PSYCHOLOGICAL EMPOWERMENT

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Abstract

This study examines how job autonomy influences employee resilience, emphasising the mediating role of psychological empowerment. Using as methodology Systematic Literature Review (SLR) under the PRISMA protocol, 62 peer-reviewed articles (2010–2025) were analysed across five databases. Bibliometric mapping with VOSviewer identified three co-occurrence clusters: job autonomy, psychological empowerment and resilience. Findings reveal that job autonomy acts as a vital job resource that enhances psychological empowerment through meaning, competence, self-determination, and impact-thereby strengthening work resilience. Grounded in Self-Determination Theory (SDT), the Job Demands-Resources (JD-R) model, and Conservation of Resources (COR) theory, the study develops an integrated conceptual framework linking autonomy, empowerment, and resilience. It highlights the importance of autonomy in reducing workplace stressors and the role of empowerment in fostering proactive, adaptive performance. Practically, it recommends culturally responsive HR strategies such as flexible work design, participative decision-making, and resilience-building programs to enhance adaptability and retention, offering an evidence-based framework for resilience development in emerging economies.

Keywords: Bibliometric analysis, job autonomy, psychological empowerment, SLR, work resilience

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DOI:

Introduction

This research examines how job autonomy influences work resilience through the mediating role of psychological empowerment, aiming to develop a conceptual understanding of how employees adapt and perform effectively in dynamic environments. Job autonomy reflects employees' freedom, discretion, and control in organising work, fostering responsibility and intrinsic motivation (Jusdienar et al., 2024). Psychological empowerment comprises meaning, competence, self-determination, and impact, promoting confidence, engagement, and proactive behaviour (Okatta et al., 2024). Work resilience denotes the ability to adapt, recover, and grow amid workplace stressors (Wursthorn et al., 2023). The study integrates three theoretical perspectives: the Job Demands-Resources (JD-R) model, highlighting autonomy as a vital job resource; Self-Determination Theory (SDT), explaining how autonomy fulfils intrinsic needs; and Conservation of Resources (COR) theory, emphasising the protection and accumulation of personal resources. Despite extensive research on these theories individually, no prior study has conceptually linked job autonomy, psychological empowerment, and work resilience together. Addressing this gap, the study offers an integrated explanation of how autonomy-driven empowerment enhances resilience, promoting sustainable motivation, engagement, and organisational development.

Theoretical Grounding

This article reviews research on job autonomy, psychological empowerment, and work resilience, three important factors that support employee adaptability and performance. But critically argues that existing theories are limited when used separately. The Job Demands-Resources (JD-R) model views autonomy as a key job resource that helps reduce strain and improve motivation; however, it gives little attention to the internal psychological processes that explain how autonomy turns into resilience. Self-Determination Theory (SDT) adds value by explaining how autonomy satisfies needs for competence, meaning, self-determination, and impact, leading to empowerment, yet it focuses too narrowly on motivation and overlooks how employees sustain resilience in stressful environments. Conservation of Resources (COR) theory explains how people build, protect, and use resources such as autonomy and empowerment to remain resilient, but it does not clearly show how these resources are activated through motivation or supported by work context. By critically integrating these three theories, the study provides stronger theoretical grounding: JD-R explains autonomy as a structural job resource, SDT clarifies the psychological process that turns autonomy into empowerment, and COR shows how empowered employees protect and grow resilience. This integrated framework offers a more complete and balanced explanation of how job autonomy, psychological empowerment, and work resilience interact to promote employee well-being and performance.

Literature Review

Job Autonomy and Work Resilience

Job autonomy represents employees' freedom, discretion, and independence in organising and executing work tasks (Jusdienar et al., 2024). Work resilience refers to adapting, recovering, and thriving under workplace challenges (Wursthorn et al., 2023). The Job Demands-Resources model recognises autonomy as a crucial resource for resilience (Bakker & De Vries, 2020). Conservation of Resources theory views it as a means to preserve adaptive capacity (Yang & Oh, 2024).

Job autonomy enhances work resilience by enabling employees to effectively manage demands and regulate emotional responses (Park & Johnson, 2022). The Job Demands-Resources model positions autonomy as a protective factor against work stressors (Bakker & De Vries, 2020). Conservation of Resources theory explains that autonomy is a psychological resource supporting sustained performance (Yang & Oh, 2024). Empirical evidence shows autonomy fosters proactive coping strategies and adaptability in service industries (Mehmood & Saeed, 2021). Limited studies address this link in high-pressure organisational contexts (Satwika et al., 2025).

P1: Job Autonomy significantly affects Work Resilience.

Job autonomy satisfies the intrinsic need for self-determination, fostering psychological empowerment (Ryan & Deci, 2020). Psychological empowerment is characterised by meaning, competence, self-determination, and impact in one's work (Spreitzer, 1995). Autonomy enhances empowerment by increasing decision-making authority and aligning tasks with personal values (Zhang & Bartol, 2020). The Job Demands-Resources model highlights autonomy as a resource that promotes proactive behaviour (Bakker & De Vries, 2020). Empirical studies confirm autonomy's positive effect on empowerment in dynamic organisational settings (Okatta et al., 2024).

P2: Job Autonomy significantly affects Psychological Empowerment.

Psychological empowerment strengthens work resilience by equipping employees with confidence, competence, and adaptability (Yang & Oh, 2024). It enhances coping with challenges and maintaining performance levels (Satwika et al., 2025). Conservation of Resources theory identifies empowerment as a resource that mitigates stress (Hobfoll et al., 2018). The Job Demands-Resources model explains empowerment's role in amplifying job resources to build resilience (Bakker & De Vries, 2020). Studies show empowered employees maintain higher engagement and adaptability under pressure (Mehmood & Saeed, 2021).

P3: Psychological Empowerment significantly affects Work Resilience.

Psychological empowerment mediates the link between job autonomy and work resilience by transforming autonomy into adaptive capacity (Yang & Oh, 2024). Self-Determination Theory explains that autonomy fulfilment increases empowerment (Ryan & Deci, 2020). Empowered employees effectively utilise autonomy to address challenges (Okatta et al., 2024). The Job Demands–Resources model positions empowerment as a mechanism converting resources into resilience (Bakker & De Vries, 2020). This mediating role is underexplored in organisational contexts requiring high adaptability and performance (Satwika et al., 2025).

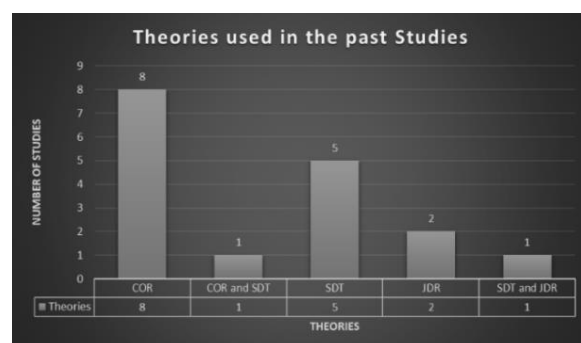
P4: Psychological Empowerment mediates the relationship between Job Autonomy and Work Resilience.

Theoretical Gap

Figure 1 demonstrates that existing literature has predominantly employed COR (Conservation of Resources Theory) as the primary theoretical lens (8 studies), followed by SDT (Self-Determination Theory; 5 studies) and JDR (Job Demands-Resources Theory; 2 studies) in examining well-being and performance in high-pressure environments. While minimal research has explored dual-theory integrations (1 study each for COR-SDT and SDT-JDR combinations), a critical gap persists: no study has incorporated COR, SDT, and JDR frameworks simultaneously.

This tripartite integration is theoretically imperative, as COR explains resource dynamics, SDT elucidates motivational pathways, and JDR contextualises environmental demands – three interdependent dimensions essential for comprehensively understanding stress-performance relationships. By developing a novel COR-SDT-JDR synthesis, this study addresses this theoretical limitation and provides a more robust foundation for designing multidimensional interventions in high-stakes occupational contexts.

Figure 1
Theories used in past studies



(Source: Authors' compilation)

Methodology

This study combines Systematic Literature Review (SLR) and bibliometric analysis to ensure comprehensive and unbiased results. The SLR offers a structured, transparent process for identifying and synthesising literature (Kraus et al., 2020), while bibliometric analysis provides a quantitative approach to map research trends and relationships (Donthu et al., 2021). As noted by Zupic and Čater (2015), this method minimises interpretive bias and enhances analytical rigour. Using VOSviewer supports accuracy by identifying keyword clusters and emerging themes (Van Eck & Waltman, 2014), ensuring a valid, evidence-based analysis.

Article Selection for the Review

This study adopts a five-stage Systematic Literature Review (SLR) approach to explore job autonomy and its impact on work resilience. SLR enables a structured examination of literature to identify key constructs, themes, and trends (Kraus, Breier & Dasi-Rodriguez, 2020).

Stage 1: Relevant keywords were identified to define the study scope.

Stage 2: Peer-reviewed articles were selected from five academic databases: ResearchGate, Sage, Emerald, Taylor & Francis, and Wiley Online, covering 2010 to 2025. These sources ensure credibility, broad disciplinary coverage, and up-to-date, high-quality research.

Stage 3: The PRISMA method (Liberati et al., 2009) was used for article selection, including identification, screening, and inclusion. Keywords included “Job Autonomy,” “Work Resilience,” “Psychological Empowerment,” “SLR,” and “Bibliometric Analysis.” Boolean operators "OR" and "AND" were used to refine the search screening involved automatic and manual reviews, with article inclusion validated by two authors through discussion.

Out of 82 initially identified articles, 62 were retained for final analysis. These were exported to Excel and then analysed using VOSviewer. The PRISMA process and inclusion criteria are shown in Table I and Figure 2.

Table 1
Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
1. Articles published between 2010 and 2025 in well-known databases: Research Gate, Taylor and Francis, Emerald, Springer, Wiley Online Library, Elsevier and Sage	Any publication before the year 2010 and after 2025
2. Academic journals	Books, online sites and grey literature (conferences, papers, working papers from research groups and technical reports) are excluded.
3. Publication as an article	The publication is not an article.
4. Articles are written in the English language	Articles are written in any language other than English

(Source: Authors' compilation)

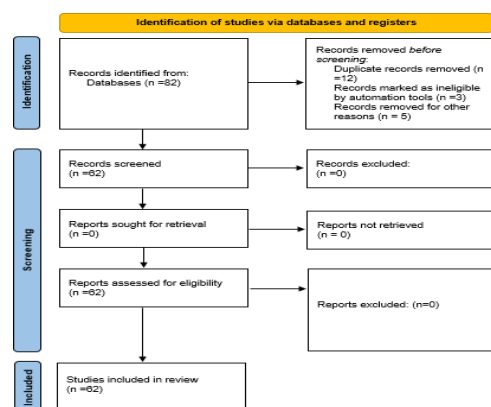
Stage 4: A bibliometric analysis was conducted on 62 articles using VOSviewer software to identify key research patterns and visualise the study areas.

Stage 5: Content analysis was performed on articles within each VOSviewer-defined cluster to examine the relationships between the core variables.

Risk of Bias Assessment

To minimise researcher bias in article selection and analysis, this study followed the PRISMA framework and a Systematic Literature Review (SLR) approach to ensure transparent and objective inclusion of studies. (Xiao and Watson 2019) emphasised that systematic and predetermined selection procedures reduce subjective judgment in reviews. Two independent reviewers conducted parallel quality assessments to further reduce selection bias, as recommended by Brereton et al. 2007). In addition, a predefined protocol specifying analytical techniques was used to prevent analysis bias (Xiao & Watson, 2019). These strategies enhanced the overall credibility and validity of the review.

Figure 2
PRISMA flow diagram



(Source: Authors' compilation)

Analytical Methods

A bibliometric analysis was conducted using VOSviewer, which quantitatively maps and analyses research patterns. Aparicio et al. (2019) highlighted that bibliometric analysis helps identify research trends objectively, while Paule-Vianez et al. (2020) supported its use in evaluating scientific output. Co-occurrence analysis was applied to extract and cluster frequently used terms from article abstracts. According to Van Eck and Waltman (2014), this method visually represents conceptual relationships and minimises interpretive bias. The resulting clusters revealed key themes related to the antecedents and outcomes of entrepreneurial intention (Priyashantha et al., 2023).

Results

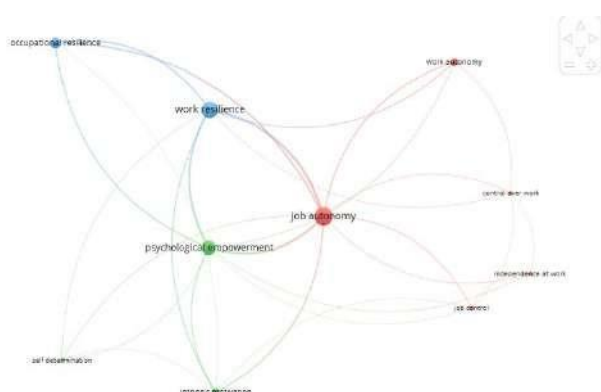
The study analysed 62 articles, with 45% sourced from ResearchGate, highlighting its prominence as an open-access platform. Emerald (16%) and Sage (13%) were secondary sources, while Taylor & Francis (5%) and Wiley (3%) contributed fewer works. Geographically, Europe (40%) and Asia (32%) dominated the research output, followed by North America (18%), Africa (8%), and Oceania (2%), reflecting a strong Euro-Asian scholarly focus with global representation.

Themes of the antecedents and outcomes of work resilience

This section addresses the study's first objective to objectively explore the themes of Job Autonomy and Work Resilience using VOSviewer's term co-occurrence network visualization. The minimum threshold for term occurrence was set at five, meaning only terms appearing five or more times in article abstracts were included. This threshold ensures analytical reliability by focusing on frequently occurring, conceptually significant terms while excluding infrequent or irrelevant ones, as recommended in bibliometric studies (Zupic & Čater, 2015). The network, displayed in Figure 3, identified 10 key terms connected by co-occurrence links, illustrating conceptual relationships.

Figure 3

Co-occurrence network



(Source: Authors' compilation)

The VOSviewer automatically grouped these terms into three distinct colour-coded clusters, justified by their conceptual proximity and thematic coherence. Three clusters were selected to capture the main research variables -work resilience, psychological empowerment, and job autonomy without over-fragmenting the dataset, ensuring interpretive clarity and theoretical alignment (Van Eck & Waltman, 2014). These clusters are:

Cluster 01 (Blue) - Work Resilience Factors: This cluster links resilience with optimism, emotional intelligence, and leadership support (Mache et al., 2014). It connects to job autonomy and psychological empowerment, highlighting their joint role in enhancing adaptability and coping (Mehmood & Saeed, 2021).

Cluster 02 (Green) - Psychological Empowerment: Representing empowerment-related terms, this cluster emphasises participative leadership, autonomy, and intrinsic motivation (Thanh & Van Quang, 2022; Van Den Broeck & Parker, 2017). Organisational practices promoting feedback and inclusivity further enhance empowerment (Okatta et al., 2024).

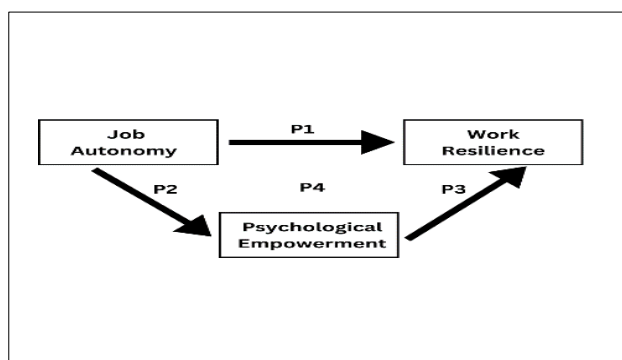
Cluster 03 (Red) - Job Autonomy: Rooted in Hackman and Oldham's (1976) model, this cluster highlights decision-making freedom, task scheduling, and work methods. Leadership style also shapes perceived autonomy (Iqbal et al., 2021).

Overall, the three-cluster model provides a clear, balanced representation of the interconnections among job autonomy, psychological empowerment, and work resilience.

Conceptual Framework Development

This study integrates the JD-R model, SDT, and COR theory to explain how job autonomy (JA) fosters work resilience (WR) through psychological empowerment (PE). JA functions as a job resource (Bakker & Demerouti, 2017) and satisfies psychological needs (Ryan & Deci, 2020), leading to PE (Spreitzer, 1995), which strengthens resilience by protecting psychological resources (Hobfoll et al., 2018). The framework positions PE as the link between JA and WR, contextualised for Sri Lanka's insurance sales sector.

Figure 4
Conceptual framework



(Source: Authors' compilation)

Theoretical Implications

This study advances theoretical integration by connecting Self-Determination Theory (SDT), the Job Demands-Resources (JD-R) model, and Conservation of Resources (COR) theory to explain how job autonomy enhances work resilience through psychological empowerment. (Ryan and Deci, 2020) emphasise autonomy as a critical psychological need within SDT, while Bakker and Demerouti 2017) highlight autonomy as a key job resource in the JD-R framework. Future research could test this integrated model across different industries, cultures, and organisational contexts to examine its generalizability. Seibert et al. (2011) suggest exploring autonomy alongside competence and relatedness to assess multi-dimensional effects on empowerment. Hobfoll et al. (2018) recommend investigating how resource gain and loss cycles sustain resilience over time. Moreover, Kossek and Perrigino 2016) propose analysing autonomy-demand balance in remote or hybrid work settings to refine resilience theory. Future studies could also introduce new moderators or variables, such as emotional intelligence, leadership style, or organisational support, to explore boundary conditions and strengthen the explanatory power of the model.

Practical Implications

These findings offer culturally relevant strategies for organisations across sectors, including software and insurance, to boost workforce resilience. Given Sri Lanka's high-power-distance workplace culture, structured autonomy interventions, such as flexible task scheduling (Hackman & Oldham, 1976) and localised decision-making on project execution, can balance hierarchy with empowerment (Thanh & Van Quang, 2022). Training should incorporate collectivist values by framing empowerment as team-based competence development (Satwika et al., 2025), aligning with Sri Lankan communal work norms. Given project pressures and rapid technological changes, HR and policy frameworks should combine autonomy with regular resilience workshops addressing local work stressors such as tight deadlines and resource constraints (Kossek & Perrigino, 2016). Such tailored measures can guide managers and policymakers in enhancing retention and performance across diverse organisational contexts.

Limitations of the study

This study has several limitations. First, it focuses on a specific employee group, limiting generalizability across organisational contexts. Second, the cross-sectional design restricts causal inferences, as resilience and empowerment may change over time. Third, reliance on self-reported data may introduce common method bias. Fourth, non-English and grey literature (e.g., conference papers, unpublished reports) were excluded, potentially omitting relevant insights. Finally, contextual factors such as organisational culture and market conditions were not controlled, which may affect outcomes. Addressing these limitations in future research can enhance the robustness and applicability of the conceptual framework.

Conclusion

This study establishes a comprehensive conceptual foundation for understanding the dynamic relationships among job autonomy, psychological empowerment, and work resilience. By integrating the Job Demands–Resources model, Self-Determination Theory, and Conservation of Resources Theory, it offers a multidimensional framework that positions psychological empowerment as the critical mediating mechanism linking autonomy to resilience. Through a systematic and bibliometric analysis, the study consolidates theoretical and empirical insights, addressing key gaps in prior research that examined these constructs in isolation. The findings emphasise the necessity of exploring autonomy-driven empowerment processes across diverse organisational contexts to better understand how employees adapt and sustain performance in complex, demanding environments. Overall, this work contributes to both theory and practice by advancing a holistic framework that highlights the strategic role of autonomy and empowerment in cultivating a resilient, motivated, and high-performing workforce.

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A BIBLIOMETRIC REVIEW OF TALENT MANAGEMENT, ORGANISATIONAL WELL-BEING, AND EMPLOYEE RETENTION RESEARCH

D.W.W.Dahanayake¹, H.M.S.V.Silva²

Abstract

This study explores the relationship between talent management practices and employee retention, emphasising the mediating role of organisational well-being. The research aims to determine how strategic HR initiatives such as talent acquisition, training and development, performance management, and reward systems, enhance employee retention through improved well-being. A systematic literature review (SLR) was conducted using a five-stage PRISMA-based approach, analysing 54 peer-reviewed journal articles published between 2015 and 2025 from major databases. Bibliometric analysis using VOSviewer identified three thematic clusters: talent management, organisational well-being, and employee retention. The study aims to determine the way strategic HR practices, such as talent attraction, training and development, performance appraisal, and improve employee retention by improving organisational well-being.

Keywords: Employee retention, organisational well-being, performance management, talent acquisition, talent management, training and development

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Introduction

Bibliometric mapping combined with systematic reviews allows scholars to trace intellectual structure, identify leading authors and journals, and reveal gaps where the mechanism of well-being–retention remains under-researched in contexts and across sectors. The dynamic interaction of talent management, organisational well-being, and employee retention has accelerated in tempo, becoming the centre of HR scholarship and practice, especially in the wake of COVID-19 dislocations that reshaped work, expectations, and mobility (Menezes et al., 2025). Talent management research has grown rapidly, and recent bibliometric research has identified growing thematic clusters in the themes of digital HR, strategic retention, and inclusive development practice. At the same time, review and empirical research indicate high correlations between initiatives for well-being, from psychological support to flexible work arrangements, and lower turnover intentions and higher commitment (Mathur & Srivastava, 2024). To provide a research agenda connecting theory and practice for resilient talent systems, this research synthesises the literature from 2020–2025 to study publishing patterns, map co-authorship and keyword webs, and detail methodological decisions (Sinisterra et al., 2024). The study offers evidence-based recommendations for managers, HR professionals, policymakers, and researchers interested in human capital construction and organisational performance maintenance through the three connected variables. To inform transdisciplinary policy worldwide, it also identifies methodological blind spots, regional variations, and practical implications for managers, HR professionals, and policymakers worldwide.

Theoretical Framework

Theoretical underpinnings of this bibliometric study converge employee retention (ER), organisational well-being (OWB), and talent management (TM) into a multidimensional human resource framework. The Resource-Based View (RBV), upon which talent management has been formulated, postulates that companies are able to maintain competitive advantage by the strategic attraction, development, and retention of desirable people assets (Barney, 1991; Shah et al., 2024). This is matched by emerging research that identifies technology-driven and inclusive TM systems that lift the level of employee engagement and value propositions (Menezes et al., 2025). Based on Self-Determination Theory (SDT) and Positive Organisational Psychology, Organisational Well-Being establishes psychological safety, autonomy, and a sense of meaningful work as key factors linking TM practices to positive outcomes (Ryan & Deci, 2020; Mujajati et al., 2024). According to Sinisterra et al. (2024), the supportive environment that facilitates well-being increases emotional commitment and intrinsic motivation and decreases turnover intentions. This article highlights the changing intellectual landscape and suggests directions for the future development of an integrative theory relating human capital development, well-being, and long-term retention sustainability in turbulent work environments through the combination of bibliometric mapping and theoretical synthesis.

P1: Relationship Talent Management practices and Employee retention

Again and again, it is demonstrated that talent management activities like recruitment and selection, learning and development, performance management, career/succession planning, rewards, and inclusive development have a positive impact on staff retention by enhancing employees' positive feelings of their worth, fit, and opportunities for career progression within the company (Menezes et al., 2025). Effective direct impacts of TM on retention and lower turnover intentions are evident in empirical research in various industries.

P2: The Relationship between Talent Management Practices and Organisational Well-being

According to the most recent research, Talent Management (TM) practices highly contribute towards Organisational Well-Being (OWB) through constructing empowering, supporting, and building work cultures. Some of the effective TM systems include training, career development, and equitable performance management that positively affect employee engagement, psychological safety, and satisfaction, ultimately leading to organisational well-being (Menezes et al., 2025; Shah et al., 2024).

P3: The Relationship between Organisational Well-being and Employee Retention

According to more recent studies, organisational well-being (OWB) and employee retention (ER) have a very strong positive relationship, and employees wish to remain in organisations that provide a healthy and positive workplace environment. Psychological safety, blending of work and life, and supportive leadership are all characteristics of an organisation that increase organisational commitment and job satisfaction and decrease turnover intentions (Mujajati et al., 2024; Sinisterra et al., 2024).

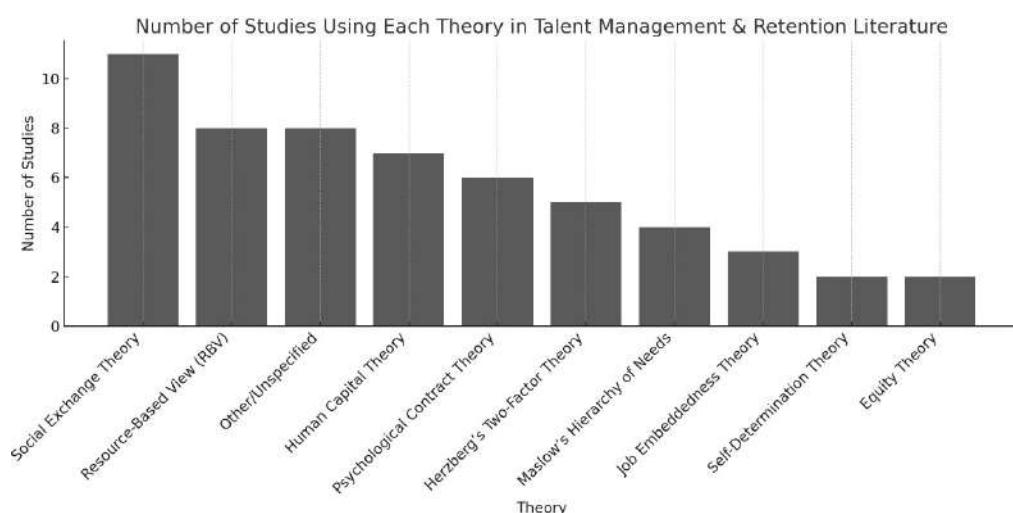
P4: Mediating Role of Organisational Well-being

Organisational well-being (OWB) has also been found in contemporary research as an important mediating variable between employee retention (ER) and talent management (TM) strategies. By creating participation, psychological safety, and job satisfaction, effective TM strategies like staff development, recognition, and equitable incentive schemes improve OWB (Menezes et al., 2025; Shah et al., 2024). Additional OWB further improves retention performance through stress reduction and intentions to turnover (Mathur & Srivastava, 2024; Sinisterra et al., 2024).

Theoretical gap

As research on the connection between employee retention (ER), organisational well-being (OWB), and talent management (TM) is on the rise, no theoretical integration among them exists as yet. Rather than a single paradigm, existing studies tend to apply the Organisational Citizenship Behaviour (OCB) Theory, Self-Determination Theory (SDT), and Social Exchange Theory (SET) separately. Though recent research rarely connects how

Figure 1
Theoretical Map



Source: (Authors' work)

TM practices result in OCB through well-being mechanisms that facilitate retention. OCB Theory describes how organisational performance is increased by employees' discretionary behaviours (Sinisterra et al., 2024). So, SDT recognises relatedness, competence, and autonomy as internal motivational drivers that promote engagement and well-being; however, little has been explored to evaluate these internal motivational processes within TM–ER models (Menezes et al., 2025).

Although research never examines how OWB serves as a mediator of this exchange to preserve retention outcomes, SET gives a foundation on how the bidirectional relationship between organisational support and employee loyalty can be understood (Mathur & Srivastava, 2024; Mujajati et al., 2024). Therefore, the lack of an overarching model that integrates OCB, SDT, and SET ideas to explain how TM practices support OWB, which in turn boosts retention, is a theoretical shortfall

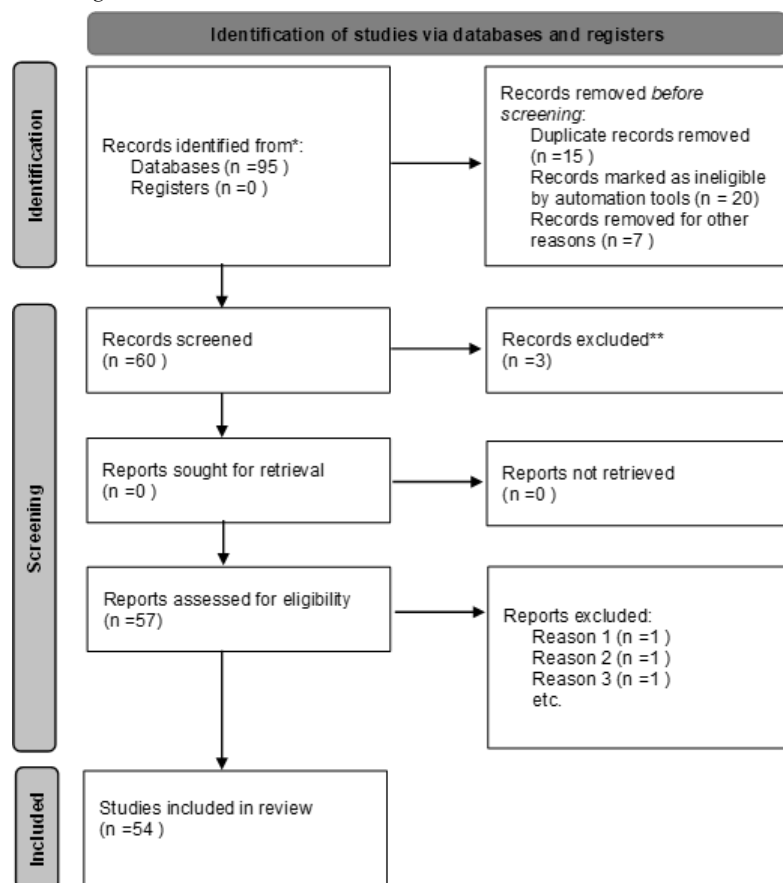
Methodology

The PRISMA diagram illustrates the study selection process in the research. Initially, 95 records were identified through databases and registers. After removing 15 duplicates, 60 records were screened. Of these, 54 were excluded based on titles and abstracts. The remaining 54 full-text articles were assessed. Ultimately, studies met the inclusion criteria and were included in the final review. This systematic filtering ensures transparency and rigour in selecting relevant studies for the analysis. SLR facilitates evidence-based decision making, understanding research gaps, and gaining deeper insight into the body of knowledge related to existing knowledge.

The scope of the study was established in the first phase by determining 10 key terms: organisational well-being, managerial-level sales employees, retention strategies, job satisfaction, career development, organisational culture, turnover interventions, work-life balance, and talent management practices. In the second phase, peer-reviewed and published research articles from 2015 to 2025 were selected from reliable databases.

Relevant metadata, such as title, abstract, authors, journal information, DOI and citations, were systematically recorded with the aid of Zotero reference management software. All data were exported to Microsoft Excel for analysis, and additional relevant variables such as respondent type, country, continent, and ideology were included manually. Finally, 54 high-quality research papers were selected, which provide a good empirical foundation for studying the relationship between talent management strategies and employee retention.

Figure 2
PRISMA diagram



Source: (Authors' work)

Analytical methods

This bibliographic literature review of talent management, organisational well-being, and retention uses quantitative and qualitative analysis methods to determine publications' trends, thematic trends, and influential contributions to the field. These data were initially collected from major academic databases, such as Scopus, Web of Science, Emerald, Elsevier and Taylor & Francis for publications 2015–2025. After data cleaning and removal of duplicate entries, VOSviewer and Biblioshiny (R Studio) software were used to perform bibliographic data analysis, including author, title, keywords, journal, citation, and year of publication. To facilitate simple visualisation of the intellectual architecture and topic clusters of the research area, VOSviewer provided author co-authorship trends, keyword co-occurrence networks, and citation mapping. Identification of trends, annual growth in publications, and identification of the most cited journals and authors were enabled by Biblioshini. Additionally, studies were coded using content analysis based on theory models such as Self-Determination Theory (SDT), Organisational Citizenship Behaviour (OCB), and Social Exchange Theory (SET). Through emergent-based identification of issues, knowledge gaps and potential research opportunities at the nexus of talent management, organisational well-being and employee retention, our mixed methods analytical process produced an all-embracing understanding of the emerging research landscape.

Table 1
Bibliographic literature review

Inclusion criteria	Exclusion criteria
1. Articles published between 2015 and 2025 in well-known databases: Emerald, Sage, Taylor and Francis, Springer, Wiley Online Library and Elsevier	1. Any publication before the year 2010 and after 2025
2. Academic journals	2. Nonacademic databases include books, online sites, and grey literature (conferences, papers, working papers from research groups, and technical reports)
3. Published as an article	3. Not Published as an article
4. Articles are written in the English language	4. Articles are written in any other language

Source: (Authors' work)

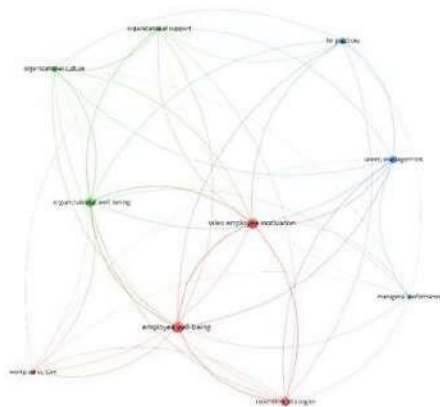
Themes and antecedents, and outcomes

Organised into three main groups – blue, red and green – the VOS viewer map visually displays the main topics, precursors and results of research in employee retention, organisational well-being and talent management.

The Blue Cluster names the precursor topics of talent management, human resource processes, and managerial performance. These are organisational strategic activities aimed at acquiring, developing and retaining high-quality employees. They are the structural and management foundation supporting performance as well as long-term retention outcomes.

They establish a healthy internal environment that promotes psychological well-being, motivation and job satisfaction. Overall, the map shows an interactive relationship in which organisational processes (mediators) are influenced by talent management practices (antecedents), which further promote employee retention and motivation.

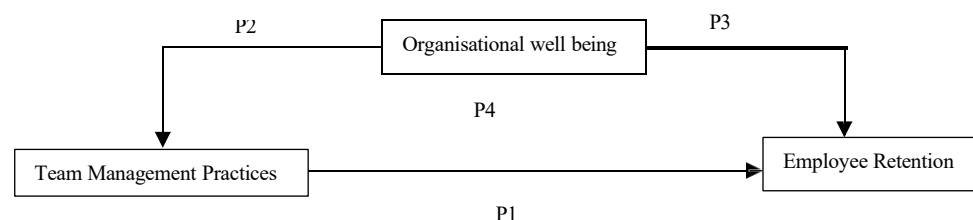
Figure 2
Vosviewer map



Source: (Authors' work)

Conceptual framework

Figure 3
Conceptual framework



Source: (Authors' work)

Theoretical implications

The theoretical significance of this bibliographic study for talent management, organisational health, and employee retention focuses on the integration and development of multiple organisational behaviour theories explaining employee attitudes and retention behaviour.

Self-determination Theory (SDT) confirms this research in demystifying the manner in which intrinsic motivation, psychological fulfilment and autonomy guarantee long-term employee satisfaction and retention. Furthermore, the theory of Organisational Citizenship Behaviour (OCB) defines the way in which efficient management processes and favourable company cultures motivate employees to act above and beyond the call of duty, further enhancing the organizational overall performance. Organisational well-being, naturally, also acts as a mediator between retention outcomes and talent management practices, with well-being-focused cultures allowing HR practices to be effective over the long term.

Limitations of the study

It is important to recognise the various limitations of this bibliographic review. First, given that the study only includes articles published during 2015 and 2025, it may not include earlier fundamental research applied to employee retention and talent management. Second, the databases searched included only a few of them to collect data, such as Scopus, Emerald, Elsevier, Taylor and Francis, and Springer, which may not have included important studies published in other academic sources. Third, due to poor consistency in terminology, the study relied on keyword-based searching, which may have missed some relevant publications. Furthermore, VOSviewer and Biblioshiny are bibliometric visualisation software with a main emphasis on quantitative mapping and co-occurrence analysis, providing limited information. Finally, the theoretical and practical relevance of research contributions may be insufficiently expressed by citation count and network intensity.

Conclusion

This current study contributes to the general body of literature by describing emerging trends in research, emphasising areas of theoretical gaps, as well as avenues for future research in creating strong, people-centred HR systems in an effort to sustain organisational performance. This bibliographic analysis provides a comprehensive understanding of the relationship between talent management (TM), organisational well-being (OWB), and employee retention (ER) through a systematic and measurable examination. Three broad theme clusters were established by the study: talent management practices as antecedents (blue cluster), employee retention as an outcome (red cluster), and organisational development as a mediator (green cluster). A solid conceptual framework to explain how positive cultures, interpersonal relationships, and intrinsic motivation achieve retention is a theoretical synthesis of SET-informed research, OCB, and SDT. In practice, the study determines that organisations should create comprehensive, wellness-focused talent systems in an effort to prevent employee turnover as well as improve employee engagement.

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PERCEIVED ACADEMIC STRESS AND COPING STRATEGIES: GENDER-BASED ANALYSIS OF MANAGEMENT UNDERGRADUATES OF A STATE UNIVERSITY IN SRI LANKA

M.M.N. Chathuranga¹, T.K.N.A. Thalpavila²

Abstract

Ensuring the mental health and psychological well-being of undergraduates has become a significant concern in higher education, with gender differences playing a vital role in the dynamics of stress perception and coping mechanisms. Therefore, this quantitative study aims to examine gender differences in perceived academic stress and the various gendered coping strategies employed to manage it. Data were collected through a structured questionnaire from 75 women and 75 men enrolled in management degree programs at a selected university in Sri Lanka. The overall mean scores reveal that academic stress is a common experience among students in the faculty, with students reporting relatively moderate to high levels of academic stress. Among the respondents, women reported experiencing more academic stress than men. Although both male and female students encounter academic stress, their experiences and coping strategies differ. Women, despite employing a wider range of coping strategies, both active and passive, still reported higher stress levels, suggesting that the strategies they use may not be sufficient to mitigate the intensity of academic stress. In contrast, men reported using fewer coping strategies, indicating either underreporting of stress or lower emotional engagement with academic stressors. The findings of the research emphasise how management undergraduates experience and manage their overwhelming academic stress. The gender-based differences in academic stress levels and coping mechanisms that were examined indicate that when universities are creating support services or interventions to help students manage academic stress, they should take their gender diversity into account.

Keywords: Academic stress, gender, stress coping

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Introduction

Academic stress and burnout have become major global mental health concerns and exert a significant impact on the quality of higher education. Numerous physiological, cognitive, emotional, and behavioural effects have been linked to overwhelming academic stress experienced by students (Lau et al., 2020). The physiological effects of academic stress include headaches, muscle tension, altered breathing patterns, increased heart rate, elevated blood pressure, and disturbed sleep patterns (Fuente et al., 2021). Additionally, as cognitive effects of academic stress, students frequently experience increased anxiety, excessive worry, a sense of helplessness, and persistent negative thoughts (Garett et al., 2017). Furthermore, stress causes emotional instability, fear, guilt, and irritability (Kumaraswamy, 2013; Masood et al., 2018). Moreover, aggressive behaviour, self-harming tendencies, frequent crying, or a dependence on drugs as a coping method are all behavioural manifestations of academic stress (Reddy et al., 2018). Therefore, beyond just causing immediate psychological distress, these detrimental effects of academic stress have a substantial impact on students' academic performance and general well-being.

In the Sri Lankan context, Gamage et al. (2024) exposed that both male and female undergraduates suffer from moderate to high perceived stress. As revealed by Liyanage et al. (2024) majority of medical students (69.2%) experienced some form of distress (depression, anxiety or stress), while 23% had distress in all three. Accordingly, this study aims to investigate whether there is a significant difference in academic stress levels experienced by men and women who are studying in a management faculty of a selected state university in Sri Lanka. Furthermore, this study reveals different coping strategies employed by men and women in terms of managing their stress levels. The curricula and academic programs offered by the selected management faculty are structured to cultivate competent professionals, preparing future managers and entrepreneurs to thrive in both local and international markets. Students engage in specialised study areas such as Accounting, Finance, Marketing, Operations, Human Resource Management, Information Technology, Economics, and General Management, enabling them to adapt to diverse business environments. The faculty serves large student populations with diverse first languages (usually Sinhala and Tamil) but shares English as the medium of instruction. By exploring gendered academic stress and coping mechanisms, this research aims to support student well-being, enhance academic outcomes, and guide university administrators and policymakers in implementing targeted, effective support strategies.

Recent research has extensively explored various dimensions of academic stress, including its influencing factors (e.g., Limone & Toto, 2021; Olivera et al., 2023), the coping strategies employed by university students (e.g., Awoke et al., 2021; Joseph et al., 2020), and the psychological and physiological consequences of stress (e.g., Alhamed, 2023; Gardani et al., 2022). Additionally, a number of studies have examined gender differences in perceived levels of academic stress (Graves et al., 2021) and the distinct coping mechanisms adopted by male and female students (Freire et al., 2016). In the local context, there are plenty of academic stress-related research covering areas like academic stressors (E.g., Gamage et al., 2024; Liyanage et al., 2024; Kithmini et al., 2024), academic stress symptoms and consequences of stress (E.g., Dahanayake, 2021; Thakshila & Suraweera, 2022), and stress coping strategies (E.g., Chandrasekara, 2023; Thakshila & Suraweera, 2024). However, despite these contributions, limited attention has been given to understanding how these gendered experiences and coping strategies play out among management undergraduates, particularly in a global south context where English is the medium of instruction but not the first language. This study addresses that gap by investigating gender-based differences in academic stress and coping mechanisms among management undergraduates.

This study is significant to understand the dynamics of gender-based differences in academic stress and coping strategies among university students. The findings of the study will support university administrators in designing targeted interventions to promote student well-being and reduce stress-related issues. Academic staff can use the insights to adopt more inclusive teaching and mentoring approaches. Furthermore, policymakers and higher education authorities can develop gender-sensitive support systems and mental health programs, ultimately fostering a healthier and more equitable learning environment for all students.

Accordingly, the objectives of this research are as follows:

RO1: To examine whether there is a significant difference between male and female undergraduates in their perception of academic stress within the Management Faculty of the selected state university.

RO2: To identify and compare the coping strategies used by male and female undergraduates to manage academic stress.

Literature Review

Academic stress

Stress is an inevitable part of everyday life, arising as a natural physiological and psychological response to situations that are perceived as difficult or threatening (World Health Organisation, 2023). It serves as a mechanism that motivates individuals to confront challenges and seek solutions (Córdova et al., 2023). However, research over the past few decades has highlighted the detrimental effects of prolonged or chronic stress. When stress persists over time, it can lead to serious mental health concerns such as anxiety, depression, and other psychological disorders (Pozos-Radillo et al., 2014; Towbes & Cohen, 1996). Long-term stress also impairs cognitive abilities, disrupts emotional balance, and reduces overall well-being and life satisfaction (O'Connor et al., 2021).

Academic stress has emerged as a pressing concern that demands attention within the university context (Alsultan et al., 2023). Academic stress encompasses the dual nature of stress, involving the challenges posed by academic demands and the individual's capacity to manage them (García-Martínez et al., 2021). Academic demands refer to the pressure students face due to exams, assignments, evaluations, and various other academic responsibilities (Emond et al., 2016). The capacity of the individual to manage stress is determined based on their resources, such as time, knowledge, or coping skills (García-Martínez et al., 2021). When these resources are insufficient to meet the demands placed upon the students, they get stressed overwhelmingly (García-Martínez et al., 2021).

A range of interrelated factors including perfectionism (Lau et al., 2020), feelings of isolation (Wang et al., 2023), uncertainty about career and professional pathways (Guzmán et al., 2023; Joseph et al., 2020), low self-efficacy (Lau et al., 2020; Olivera et al., 2023), academic performance pressure (Cokley et al., 2017), the challenge of balancing studies with income-generating activities (Lopes & Nihei, 2021; McCloud & Bann, 2019), social anxiety (Lau et al., 2020; Wang et al., 2023), excessive academic workload (Paudel et al., 2024; Satpathy et al., 2021), language barriers (Alam et al., 2024; Ali et al., 2020), and experiences of bullying and discrimination within the university setting (Limone & Toto, 2021) have been identified as the frequently experienced sources of academic stress among the university students. These stressors not only hinder students' academic performance and psychological well-being but also contribute to increased dropout rates and reduced overall engagement in the university learning environment (Ansari et al., 2014; Lee et al., 2011; Sinval et al., 2024). Consequently, ensuring students' well-being is a crucial task for their professional and personal success of the students since high levels of well-being lead to more effective learning, creativity, productivity, and social relationships (Ruggeri et al., 2020). Therefore, examining the dynamics of academic stress is crucial in developing effective interventions aimed at managing this significant issue and enhancing the overall quality of higher education.

Stress coping strategies

The way individuals cope with stress and regulate their emotions contributes to explaining students' adaptation to stress (Teixeira et al., 2021). Coping is generally regarded as a stabilising factor that assists an individual in adapting to various stressful events (Satpathy et al., 2021). Coping with academic stress can be defined as the collective interaction of cognitive, affective, and behavioural mechanisms students utilise to constructively manage the various demands and challenges they face in an academic environment (Kirikkanat & Soyer, 2016). Table 1 demonstrates the various classifications of academic stress coping strategies in contemporary literature.

Table 1
Classifications of academic stress coping strategies

Author/s	Classification of stress coping strategies	Meaning	Examples
Joseph et al., 2020; Lin & Chen, 2010	Active emotional coping strategies	Adopting the attitude of emotional adjustment when faced with academic stress	Positive thinking and self-encouragement
	Active problem coping strategies	Dealing with academic stress by focusing on the centre of the problem and finding a solution themselves by being calm and optimistic, or by searching for assistance from external sources	Seeking counsellors and discussing the stressful situation with lecturers and peers
	Passive emotional coping strategies	Managing stress by regulating emotions without directly addressing the stressor	Constraining emotions, self-accusation, getting angry, blaming others or God, or giving up.
	Passive problem coping strategies	Avoiding or delaying direct action to resolve the stressor	Procrastination, evasive behaviours, or going into alcohol or drug abuse
Sullivan, 2009	Approach coping strategies	Involve active efforts to change stressors	Creating a study schedule, seeking clarification from professors or tutors, and breaking down large assignments into manageable tasks
	Avoidant coping strategies	Include escaping or denying the problem.	Ignoring deadlines and procrastinating on assignments, engaging in excessive screen time

			(social media, gaming) to distract from stress, and avoiding attending lectures or discussions about difficult subjects
	Social support strategies	Rely on others for help or consultation in resolving the issue	Discussing academic challenges with friends or family, joining study groups, and seeking counselling services
Awoke et al., 2021	Humor	Reframe stressful academic situations in a more positive or lighthearted manner.	Joking about academic challenges, using self-deprecating humour, or engaging in humorous conversations with peers to relieve stress
	Religious strategies	provides emotional support, meaning, and a sense of control in stressful situations	prayer, meditation, faith in a higher power, attending religious gatherings, or seeking guidance from religious texts or leaders

(Source: Authors' compilation)

Gender differences in academic coping strategies have been the focus of numerous studies (Freire et al., 2016). For example, when it comes to coping with academic stress, men are more likely to use problem-focused coping and passive emotional coping (Joseph et al., 2020). In addition, women are more likely to use active problem coping strategies to deal with the stress of their studies. Similarly, Hefner and Eisenberg (2009) discovered that male students perceive social support less than female students do. Furthermore, emotion-focused coping strategies like self-distraction, seeking emotional support, and using instrumental support are more common among female students (Graves, 2021). These results show that compared to men, women frequently approach academic stress with higher emotional resilience and a more positive outlook on problems.

Gender difference and academic stress

According to recent studies on the gender dynamics of stress, women get more stressed than men (Doyle-Baker et al., 2018). This pattern is also seen in higher education, where female students report much higher levels of academic stress than their male counterparts (Asensio-Martínez et al., 2023; Graves et al., 2021; Iskandar et al., 2024). As claimed by Kumari and Singh (2022), female students are more impacted by academic stress than male students. According to the perceived academic stress scale presented by Barbayannis et al. (2022), women and non-binary students reported higher levels of academic stress than men. Furthermore, Kristensen et al. (2023) found that academic stress had a stronger psychological impact on female students, but that it was more strongly associated with interpersonal factors such as academic self-efficacy and social distress in male students. Accordingly, the hypothesis of the study can be stated as follows:

H0: *There is no significant difference between men and women in their perception of academic stress.*

H1: *There is a significant difference between men and women in their perception of academic stress.*

Research methods

This study adopts a quantitative research approach, grounded in positivist philosophy, which emphasises the discovery of objective reality. Utilising a survey strategy, the research aims to determine whether there is a significant difference between men and women in their perception of academic stress, as well as to examine gender-based differences in academic stress coping strategies, using statistical analysis of quantitative data.

For data collection, the researchers administered a structured questionnaire developed through Google Forms and disseminated it among the target population via WhatsApp using a convenience sampling technique. Researchers were unable to obtain access to the official repository of students' email addresses or contact numbers, which limited the possibility of conducting a probability-based sampling. Therefore, researchers adopted a convenience sampling approach by distributing the questionnaire through the official and informal WhatsApp groups of all faculty batches. As there was no verifiable evidence confirming that all students were members of these groups, researchers employed convenience sampling to ensure methodological transparency and accuracy in reporting. A total of 150 responses were obtained, 75 men and 75 women who are pursuing management degree programs from the selected faculty. The questionnaire included multiple-choice questions to gather demographic information such as gender, year of study, and area of specialisation. To measure academic stress, respondents rated their agreement with five statements on a 5-point Likert scale (ranging from Strongly Disagree to Strongly Agree). Academic stress was measured using five items adapted from the Academic Stress Scale developed by Bedewy and Gabriel (2015). The reliability of the data collection instrument was measured using Cronbach's Alpha value. The Alpha values of the academic stress variable were 0.874 (above 0.7), indicating that the internal consistency among the items in an acceptable level.

Data were analysed using SPSS version 2.0. Descriptive statistics, including frequencies, percentages, and means, were used to summarise and describe the data. Frequencies and percentages were employed to present demographic information, while mean analysis was conducted to assess the current levels of academic stress experienced by men and women. Additionally, frequencies were used to explore the gendered use of four types of coping strategies: active emotional coping, active problem coping, passive emotional coping, and passive problem coping. For hypothesis testing specifically, whether there is a significant difference between male and female students in their perception of academic stress, the researchers applied an independent samples t-test, assuming equal variances.

Ethical considerations were strictly adhered to ensure the study's credibility, confidentiality, and trustworthiness. Participation was entirely voluntary; no students were coerced or influenced to complete the questionnaire. Anonymity of responses was maintained, and the collected data will be used solely for academic purposes, not for any commercial or non-academic use.

Findings

In analysing the data, the researchers first tested for any missing values and outliers. Once the data cleaning and screening process was completed, descriptive analysis was conducted to summarise the sample demographics. Thereafter, a mean value analysis was performed for each item used to measure academic stress, and the overall average academic stress level was also calculated to assess the current level of academic stress experienced by the faculty students. Next, the researchers analysed how students from the two gender categories (men and women) utilised active and passive emotion-focused and problem-focused coping strategies in terms of frequency. Finally, using an independent samples t-test, the researchers examined whether there was a significant difference between male and female students in their perception of academic stress.

Descriptive analysis for demographic data

A frequency and percentage analysis was conducted to present the composition of respondents based on their demographic information. The researchers considered key demographic variables, including respondents' gender, degree year, and area of specialisation. In this context, all first-year students in the faculty are necessarily enrolled in the Management Common Program. From the second year onward, students pursue specialised areas in management as part of their degree program.

Table 2
Demographic information of respondents

Variable	Frequency	Percentage
Gender		
Men	75	50.0
Women	75	50.0
Degree Year		
Year 1	21	14.0
Year 2	34	22.7
Year 3	42	28.0
Year 4	53	35.3
Degree Specialization		
Accounting	15	10.0
Commerce	13	8.7
Business Administration	54	36.0
Economics	6	4.0
Entrepreneurship	2	1.3
Estate Management & Valuation	7	4.7
Finance	9	6.0
Human Resource Management	3	2.0
Information Technology	3	2.0
Marketing	7	4.7
Decision Sciences	7	4.7
Public Administration	3	2.0
Management Common Program	21	14.0

(Source: Survey data)

According to Table 2, the sample consisted of an equal representation of gender, with 75 male students (50.0%) and 75 female students (50.0%), ensuring a balanced gender distribution for analysis. Respondents participated across all four academic years of their degree programs. The largest proportion of students was in Year 4 ($n = 53$, 35.3%), followed by Year 3 ($n = 42$, 28.0%), Year 2 ($n = 31$, 20.7%), and Year 1 ($n = 24$, 16.0%). This indicates that most participants were senior undergraduates. In terms of degree specialisation, students represented a wide range of academic disciplines. The most common specialisation was Business Administration ($n = 54$, 36.0%), followed by Management Common Program ($n = 21$, 14.0%), and Accounting ($n = 15$, 10.0%). Other notable areas included Commerce (8.7%), Finance (6.0%), and Economics (4.0%). Smaller proportions of students specialised in Marketing, Decision Sciences, Estate Management & Valuation (each 4.7%), as well as Human Resource Management, Public Administration, and Information Technology (each 2.0%). Entrepreneurship was the least represented specialisation area, with only 2 students (1.3%). As per the demographic information presented in Table 2, the dataset reflects a diverse and balanced sample in terms of gender, academic year, and disciplinary background.

Mean value analysis

A mean value analysis was conducted on the items used to reveal how different dimensions contribute to overall academic stress. The overall average mean value of all the items was calculated to determine the current level of stress experienced by the faculty students.

Table 3
Mean value analysis of stress items

Items	Mean	Std. Deviation
I often feel overwhelmed because of the academic demands placed on me	4.03	.798
I experience physical symptoms (e.g., headaches, fatigue) due to academic stress	3.62	.974
The pressure of exams and coursework causes me emotional distress	3.79	.929
I struggle to cope with stress related to my academic responsibilities	3.79	.864
Academic stress negatively affects my motivation and well-being	3.52	.932
Mean Stress	3.75	.702

(Source: Survey data)

As per the results presented in Table 3, the analysis of the academic stress items reveals that students generally reported experiencing moderate to high levels of stress across different dimensions. The highest mean score was recorded for the item ‘I often feel overwhelmed because of the academic demands placed on me’ ($M = 4.03$, $SD = 0.798$), indicating that most students frequently feel overwhelmed by their academic workload. This suggests that academic pressure is a major source of stress for most participants. The items ‘The pressure of exams and coursework causes me emotional distress’ and ‘I struggle to cope with stress related to my academic responsibilities’ both had identical mean scores of 3.79, with standard deviations of 0.929 and 0.864, respectively. These findings reflect a common experience of emotional and coping-related challenges among students. Additionally, the item ‘I experience physical symptoms (e.g., headaches, fatigue) due to academic stress’ showed a slightly lower mean score of 3.62 ($SD = 0.974$). It suggests that physical manifestations of stress are present, but they may vary more widely among students.

The item ‘Academic stress negatively affects my motivation and well-being’ ($M = 3.52$, $SD = 0.932$) reported the lowest mean value, but it still indicates a moderate impact. The overall mean stress score across all items was 3.75 ($SD = 0.702$). It reflects a generally high level of perceived academic stress among the students surveyed. The relatively low standard deviation suggests that this perception of stress is shared consistently across the sample.

Gender and academic stress coping strategies

In this section, the researchers analysed the usage of different coping strategies employed by male and female students to manage the academic stress they experienced. In the questionnaire, respondents were asked to indicate whether they used each coping strategy by selecting “Yes” or “No.” Frequencies were analysed to determine the extent to which each coping strategy was used by male and female students.

Table 4
Gender and specific coping strategies

Coping strategies	Frequencies		
	Men	Women	Total
Active emotional coping strategies			
Talking to friends, family, or mentors about academic struggles	57	59	116
Engaging in relaxation techniques to reduce stress (E.g., meditation, mindfulness exercises)	12	23	35
Exercising, yoga, or going for a walk	12	9	21
Reframing academic challenges as opportunities for growth	32	23	55
Writing in a journal, engaging in creative activities, or talking to a counsellor	13	15	28

Active problem coping strategies			
Time Management & Prioritisation	54	51	105
Dividing coursework into smaller, achievable tasks	26	34	60
Consulting lecturers, tutors, or peers for a better understanding	16	25	41
Using active recall, mind mapping, or group studies to enhance learning	18	19	37
Establishing achievable academic targets to avoid unnecessary stress	26	24	50
Passive emotional coping strategies			
Watching movies or playing games, or any other entertainment activity	46	56	102
Sleeping or resting more	43	53	96
Eating comfort food	17	27	44
Mentally disconnecting from academic challenges	13	12	25
Ignoring conversations about academics to reduce stress	12	18	30
Using alcohol	4	1	5
Passive problem coping strategies			
Procrastination	18	33	51
Avoiding responsibilities	19	15	34
Blaming external factors	11	23	34
Relying on luck or fate	15	15	30
Withdrawing from academic activities	20	14	34

(Source: Survey data)

As illustrated in Table 4, the gender wise frequency analysis of coping strategies reveals differences in how men and women manage academic stress. In terms of active emotional coping strategies, both men (57) and women (59) showed a strong tendency to talk to friends, family, or mentors about academic struggles. A notable gender difference appears in the use of relaxation techniques such as meditation or mindfulness, where 23 women reported using these methods compared to only 12 men. However, exercise, yoga, or walking was slightly more common among men (12) than women (9). Positive reframing of academic challenges was reported more by men (32) than by women (23). In contrast, writing in a journal, engaging in creative activities, or seeking counselling was used by 15 women and 13 men.

Considering active problem coping strategies, time management and prioritisation were almost equally practised by men (54) and women (51). Dividing coursework into smaller, achievable tasks was more common among women (34) than men (26). Similarly, more women (25) than men (16) reported consulting lecturers, tutors, or peers to enhance their academic understanding. The use of active recall, mind mapping, or group studies was balanced, with 18 men and 19 women indicating this method. Establishing achievable academic targets was reported by 26 men and 24 women, again showing minimal gender difference.

For passive emotional coping strategies, women consistently reported higher usage than men. Watching movies, playing games, or engaging in other entertainment activities was used by 56 women compared to 46 men. Sleeping or resting more was also more common among women (53) than men (43). Eating comfort food followed a similar pattern, with 27 women and 17 men reporting this behaviour. Mental disconnection from academic challenges was reported by both genders in similar proportions: 13 men and 12 women. Ignoring academic conversations to delay stress was slightly more common among women (18) than men (12). Alcohol use as a coping strategy was reported by a small number overall, with 4 men and only 1 woman.

Under passive problem coping strategies, procrastination was significantly more common among women (33) than men (18). Avoiding responsibilities was more frequently reported by men (19) than women (15). Blaming external factors was reported by 23 women and 11 men, showing a noticeable gender difference. Relying on luck or fate showed no gender disparity, with 15 men and 15 women each indicating this strategy. Withdrawing from academic activities was more common among men (20) than women (14).

Table 5

Summary of gendered trends

Coping Type	More Used by Men	More Used by Women
Active Emotional	Positive reframing, physical activity	Relaxation, journaling, and mindfulness
Active Problem	Task setting, goal framing	Task division, academic help-seeking
Passive Emotional	Alcohol use, mental disconnection	Comfort food, sleep, and entertainment
Passive Problem	Withdrawal, responsibility avoidance	Procrastination, blame externalisation

(Source: Authors' work)

Testing hypothesis

An independent samples t-test was conducted to compare the mean stress levels between male and female participants.

Table 6

Group statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Mean_Stress	Male	75	3.6080	.67258	.07766
	Female	75	3.8933	.70545	.08146

(Source: Survey data)

The descriptive statistics presented in Table 6 show that the average stress level reported by females ($M = 3.8933$, $SD = 0.70545$) was higher than that reported by males ($M = 3.6080$, $SD = 0.67258$). Both groups consisted of 75 participants, and the standard deviations were relatively similar, indicating comparable variability in stress scores across the two groups.

Table 7

Independent samples t-test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Mean_Stress	Equal variances assumed	.483	.488	-2.535	148	.012	-.28533	.11255	-.50774	-.06293
	Equal variances not assumed.			-2.535	147.664	.012	-.28533	.11255	-.50775	-.06292

(Source: Survey data)

Table 7 demonstrates the results of the independent sample t-test used to test the hypothesis. Before interpreting the t-test results, the assumption of equal variances was assessed using Levene's Test for Equality of Variances. Levene's test result was not statistically significant ($F = 0.483$, $p = 0.488$), which suggests that the assumption of equal variances has not been violated. Therefore, the row labelled "Equal variances assumed" is used for interpreting the results of the t-test.

The t-test revealed a statistically significant difference in mean stress levels between males and females, $t(148) = -2.535$, $p = 0.012$. This result indicates that the observed difference in stress scores is unlikely to have occurred by chance. The mean difference in stress scores was -0.28533 , with a 95% confidence interval ranging from -0.50774 to -0.06293 . Since the confidence interval does not include zero, this further confirms that the difference is statistically significant. Therefore, the analysis provides evidence of a significant difference in stress levels between male and female participants. Females reported significantly higher levels of stress than males.

Discussion

The findings from the data analysis provide a comprehensive understanding of the dynamics of academic stress and related coping mechanisms among management undergraduates of the selected university. The mean value analysis of the academic stress items revealed a moderate to high level of stress experienced by students. This finding is consistent with numerous studies that revealed university students are experiencing higher levels of academic stress, especially in the global south context (E.g., Deng et al., 2022; Ebrahim et al., 2024; Koppenborg et al., 2022). The item with the highest mean value indicated that students often feel overwhelmed due to academic demands. This highlights that pressure from coursework, deadlines, and study commitments is a prominent concern for many students. Mir and Roy (2024) found that students experience higher levels of stress due to deadlines because of various factors, not practical knowledge gain, the teaching style of the teacher, the length of the assignment, time allocation, methods used in different programs of study, lack of interest in a course, demotivation, discouragement, and hard courses. According to Cahyadewi et al. (2024), decreased commitment to deadlines and procrastination tendencies can lead to academic burnout.

Many respondents of this study reported emotional distress and difficulty coping with academic responsibilities, showing that stress is not only present but also impacts students' ability to function and perform. Plenty of studies have exposed the effect of stress and anxiety on academic performance (E.g., Ahmad et al., 2022; Li et al., 2024). The physical symptoms of stress, although reported slightly less frequently, were still prevalent. The item on stress impacting motivation and well-being had the lowest mean score, though it still indicated moderate concern. It suggests that while students experience stress, they may find ways to maintain their sense of well-being despite stress (Terrell et al., 2022). The overall mean score of 3.75 further supports the argument that academic stress is a common experience among students in this faculty. Moreover, the relatively low standard deviation implies that the experience of stress is consistent across the sample, rather than being concentrated in subgroups.

Among active emotional coping strategies, both men and women showed a strong tendency to talk to friends, family, or mentors about their academic struggles, with nearly equal frequencies. However, women were more tended to engage in relaxation techniques such as meditation and mindfulness. It suggests that women have a greater reliance on calming and introspective practices (Sharma et al., 2022). Men were more likely to use positive reframing by viewing academic challenges as opportunities for growth. That indicates men's tendency toward cognitive restructuring in managing academic stress (Olorunfemi & Funmilayo, 2022). Slightly more men than women engaged in physical activity like exercise or walking to release emotional tension. Women were marginally more likely to journal, pursue creative endeavours, or seek counselling. Consequently, women exhibit a greater inclination towards expressive coping strategies in comparison to men (Wong & Phillips, 2022).

In terms of active problem coping strategies, both genders placed a high value on time management and prioritisation. Therefore, both men and women use time management as a common strategy to manage their academic demands (Babicka-Wirkus et al., 2021; Joseph et al., 2020). It was discovered that women break up their coursework into smaller, more manageable assignments and seek clarification from peers, instructors, or tutors. This finding demonstrates that women approach problem-solving in a more structured and socially supported manner (Milas et al., 2021). In the meantime, both gender groups employed strategies like creating realistic academic goals and employing active study methods like mind mapping or group projects nearly equally. Men exhibited a somewhat more independent approach (Cronqvist et al., 1997), employing techniques like goal-setting and organised study without necessarily seeking out academic assistance.

Women reported using passive emotional coping strategies more frequently, such as eating comfort food, sleeping or resting more, and watching movies or doing other entertainment-related activities. According to Sunindijo and Kamardeen (2017), these behaviours among women imply that they may tend to temporarily disengage from stressors and seek comfort to cope with the academic stress. Men used leisure and amusement as well. Additionally, men were more likely to report using alcohol as a coping mechanism, albeit to a lesser degree. Alcohol use is a significant gendered risk behaviour, despite being a rare academic coping strategy (Fernandez et al., 2021; Prowse et al., 2021). Furthermore, both men and women frequently avoided academic conversations and mentally disconnected from academics (Salimzadeh et al., 2021). This result illustrates a common tendency to temporarily disengage from academic stress.

When examining passive problem coping strategies, stark gender differences were found. Women were more likely to procrastinate and attribute their academic difficulties to outside causes. This result implies that women have a greater propensity to externalise stress and engage in avoidant behaviours (Efthim et al., 2001; Kassim et al., 2022). On the other hand, men were more likely to avoid responsibilities altogether and to distance themselves from academic pursuits. Equal dependence on fate or luck was reported by men and women, suggesting that some students share this belief in uncontrollable academic outcomes. According to these trends, women are still sufficiently engaged to blame their stress on outside factors, despite being more avoidant (Panayiotou et al., 2017), whereas men are more likely to disengage (Ovsyanik et al., 2022).

As a result, the analysis shows that women typically prefer emotion-focused, socially interactive coping strategies that are both maladaptive and productive (Theodoratou et al., 2023; Thoits, 1991). Communication, asking for help, engaging in structured academic behaviours, and engaging in comfort-seeking activities are characteristics of their coping mechanisms. Men, on the other hand, typically use more individualistic coping strategies, like cognitive reframing, exercise, and avoiding stressful situations (Monnier et al., 1998). Although both groups use a variety of coping mechanisms, women seem to be more socially conscious and emotionally expressive (Thoits, 1991; Wurtz, 2022). Self-reliance (Ishikawa et al., 2022) and disengagement (Ovsyanik et al., 2022) are more common in men. These gendered trends emphasise how crucial it is to modify mental health treatments and academic support services to accommodate men's and women's unique coping mechanisms.

Moreover, this study investigated whether men and women perceive academic stress differently. Accordingly, this advanced hypothesis was accepted. The independent samples t-test revealed that female students reported significantly higher stress levels compared to male students. This difference was statistically significant and unlikely to have occurred by chance. Numerous studies have consistently found that women experience more academic stress than men (E.g., Asensio-Martínez et al., 2023; Graves et al., 2021; Iskandar et al., 2024). This result aligns with the coping patterns observed earlier; greater use of passive emotional coping and a higher tendency toward procrastination and blame among female students may be contributing to their higher reported stress.

Conclusion

This study examined the gendered dynamics of academic stress and coping strategies among management undergraduates at a selected university in Sri Lanka. The findings indicate that students experience moderate to high levels of academic stress. Accordingly, women reported significantly higher stress levels than men. The stressors for this overwhelming stress include academic workload, deadlines, and performance expectations. Such stressors affect both the emotional well-being and academic functioning of the students. Furthermore, the results showed significant gender differences in coping strategies for academic stress. As per the results, women are more likely to use a greater variety of active and passive emotional strategies, including emotional expression, relaxation techniques, and social support seeking. Furthermore, women continue to report higher levels of stress in addition to using a variety of coping mechanisms. It implies that these methods might not be totally successful in reducing academic stress. Men, on the other hand, are more likely to employ independent strategies like cognitive reframing and exercise, but they also exhibit signs of disengagement and underreport stress.

Moreover, the analysis confirms that gender is a significant determinant of both stress perception and coping behaviour among undergraduates, with female students demonstrating higher vulnerability to academic pressure despite adopting more socially supportive coping methods. This suggests that current stress management practices within universities may inadequately address gender-specific needs, particularly the emotional and relational dimensions of coping used by female students. Hence, the study provides empirical evidence to inform university administrators and policymakers to design tailored mental health interventions, gender-responsive counselling services, and academic workload management programs. By aligning support systems with the coping tendencies identified in this study, higher education institutions can more effectively mitigate academic stress and enhance student well-being and performance.

Limitations and directions for future Studies

This study has several limitations that should be acknowledged. First, the use of a convenience sampling method limits the generalizability of the findings, as the sample may not fully represent all management undergraduates in Sri Lankan universities. Second, the reliance on self-reported data may have introduced response bias, as participants could have underreported or exaggerated their stress levels and coping behaviours. Third, the study adopted a cross-sectional design, which restricts the ability to establish causal relationships between gender, academic stress, and coping strategies. Future research could employ longitudinal or mixed-method approaches to capture changes in stress experiences over time and provide deeper qualitative insights into gendered coping mechanisms. Additionally, expanding the study to include students from diverse academic disciplines and institutions would allow for broader comparisons. Investigating the role of personality traits, social support systems, and cultural factors could also enrich understanding of academic stress and coping behaviours.

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BUSINESS TECHNOLOGY AND DIGITAL TRANSFORMATION (FINTECH, AI IN BUSINESS AND DATA SCIENCE)

THE MEDIATING ROLE OF GREEN BANKING PRACTICES ON THE RELATIONSHIP BETWEEN FINTECH ADOPTION AND BANKS' SUSTAINABILITY PERFORMANCE IN SRI LANKA

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Abstracts

This study attempts to examine how FinTech adoption impacts the sustainability performance of the banking sector in Sri Lanka, focusing on how green banking practices act as a mediator. The study fills a vacuum in the literature by integrating how the banking industry might support environmental sustainability through the incorporation of digital technologies. The study used a cross-sectional quantitative approach by collecting data from 342 managerial-level bank employees at systematically important banks in Sri Lanka. Hayes' PROCESS macro was used to explore the direct and indirect implications of FinTech Adoption, green banking practices, and sustainability performance. The results indicate that banks' sustainability performance and FinTech adoption are strongly and positively related. The study also highlights the importance of the mediating role that green banking practices play in this relationship. Banks may minimise their environmental impact while increasing operational efficiency and adhering to sustainability standards by adopting green banking practices and utilising digital technologies. By recognising FinTech and green banking practices as significant intangible resources for long-term competitive advantage, it also expands on the Resource-Based View (RBV) theory. The findings nevertheless provide practical insights for policymakers and bank managers in aligning digital transformation with sustainability objectives.

Keywords: Digital transformation, fintech adoption, green banking practices, resource-based view, sustainability performance in Sri Lanka

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DOI:

Introduction

Sustainability is one of the key concepts in the 21st century, as it addresses environmental challenges by balancing economic growth, environmental protection, and improving people's lives (Khushbu & Agarwal, 2024; Kumar & Prakash, 2018). The Finance sector, particularly banks, now focuses on green finance, ethical investments, and eco-friendly business practices (Chen et al., 2022). Financial technology redefines the financial sector's sustainability goals by breaking its traditional roles of financial services (Tian et al., 2023). Fintech institutions are rapidly adopting technology for a competitive edge by transforming banks with digital transformation, automated payments, Artificial Intelligence (AI) assistants, machine learning, peer-to-peer lending apps, and crowdfunding initiatives (Pizzi et al., 2021; Tian et al., 2023). This minimises paper-based transactions and branch visits. The Central Bank of Ceylon introduced the sustainable finance roadmap in 2019, and these guides led Sri Lankan commercial banks, including the Bank of Ceylon (BOC), Development Finance Corporation of Ceylon (DFCC), Commercial Bank of Ceylon (Com Bank), and Hatton National Bank (HNB). Green banking practices arise through FinTech capabilities, transforming traditional models and promoting eco-efficient operations (Chen et al., 2022). This transition is made more difficult by Sri Lanka's particular contextual issues. According to a recent nationwide poll, barely two out of five Sri Lankans are computer proficient, with glaring differences across the urban (47.3%), rural (34.5%), and estate (14.9%) sectors. Customers' and sometimes employees' ability to use FinTech tools effectively is restricted by such low and unequal digital literacy, which reduces the potential of digital banking to produce sustainability results. The significance of conducting an empirical investigation into whether green banking practices can enhance the correlation between FinTech adoption and sustainability performance in the Sri Lankan context is highlighted by these digital divides, the nation's recent economic volatility, and the disparities in regulatory enforcement. However, the industry's progress on sustainable performance remains in its early stages, requiring further research and policy support (Silva S, 2021). There remains a lack of knowledge about FinTech adoption, how it affects sustainable performance in Sri Lankan banks, and what mediating role green banking practices play in this relationship. This gap is particularly important considering Sri Lanka's structural challenges, including low computer literacy rates, weak enforcement of sustainability regulations, and the lingering effects of economic instability, all of which may limit how far FinTech adoption alone can drive sustainability.

This study addresses this gap by introducing green banking practices as a crucial mediating variable, focusing on the development or implementation of products, processes, or practices to reduce environmental harms (Wang et al., 2024). The potential of FinTech to promote sustainable behaviours has begun to be examined in the international literature (Siddik et al., 2023; Yan et al., 2022), but there is a lack in the Sri Lankan context (Rahman et al., 2024). Local research has primarily focused on individual green practices or the development of policies (Fernando & Fernando, 2017).

From an academic perspective, it extends the Resource-Based View (RBV) by positioning FinTech adoption and green banking practices as intangible Valuable, Rare, Inimitable, and Non-substitutable (VRIN) resources that jointly enhance banks' sustainability performance. From a practical perspective, the study responds to Sri Lanka's pressing challenges of low digital literacy, economic volatility, and uneven regulatory enforcement, which limit the independent impact of FinTech on sustainability outcomes. By highlighting the mediating role of green banking practices, the research offers actionable implications for policymakers and bank managers seeking to align digital transformation with sustainability objectives.

Addressing this gap, the current study investigates two key research objectives:

RO1: To investigate the impact of FinTech adoption on banks' sustainability performance in Sri Lanka.

RO2: To examine the mediating role of green banking practices in the relationship between FinTech. This study narrows its focus to two systemically important banks due to access constraints. While this scope allows for in-depth insights, it also limits generalizability, which is addressed in the discussion.

Literature Review

The word Sustainability, described as the capacity to maintain or enhance living standards, protect natural resources, and biodiversity for future generations while promoting economic and social development (Kumar & Prakash, 2018). According to Yan et al. (2022), sustainable performance refers to an organisation's ability to achieve long-term success while minimising negative environmental and societal impacts. It addresses environmental challenges such as biodiversity loss, resource depletion, and climate change. Bank sustainable performance refers to maintaining long-term financial stability while reducing environmental and social harm, achieved through the integration of Environmental Social Governance (ESG) principles into corporate strategy (Lokuwaduge & Heenetigala, 2017; Yan et al., 2022). Global frameworks, such as the United Nations (UN) Sustainable Development Goals, encourage actions like lowering carbon emissions, protecting ecosystems, shifting to renewable energy, and fostering circular economies (Green Finance for Sri Lankan Financial

Institutions, 2025). In Sri Lanka, sustainable banking practices are gaining traction, supported by regulatory initiatives including the BASEL Accords, which require consideration of climate-related risks in financial assessments (Oyetade et al., 2021). Banks such as Commercial Bank and Sampath Bank have already adopted climate risk evaluations for green financing (Silva S., n.d.), aligning with the Central Bank's sustainable finance roadmap. While digital banking, carbon credit finance, green bonds, and green loans are emerging as key areas, the integration of FinTech with green banking remains limited, presenting a crucial opportunity for further development in advancing sustainability objectives (Kumar & Prakash, 2018).

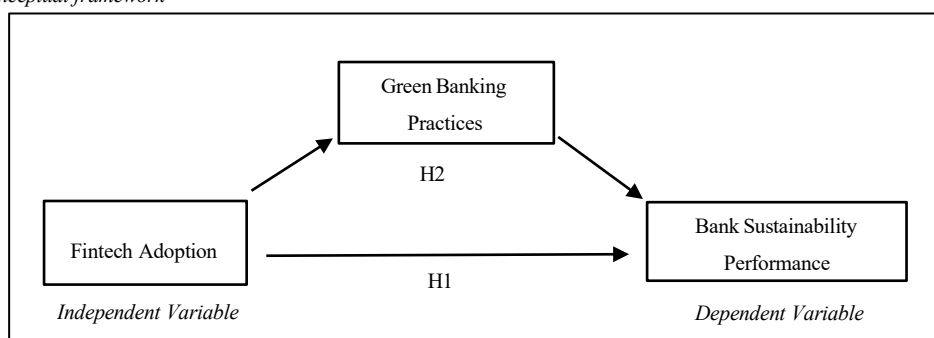
Digital adoption is crucial for sustainability performance and efficiency. It is making FinTech a fast-growing source of innovation across disciplines (Yan et al., 2022). When integrating technology and financial services, the term is FinTech. It enhances processes and enables new business models (Leong & Sung, 2018). Technological advances in smartphones, AI, blockchain, and big data have improved the security, efficiency, and personalisation of financial services. As part of Industry 4.0, FinTech supports Small and Medium Enterprises' (SMEs) shift toward sustainable models, notably by improving financing access (Pizzi et al., 2021; Sheng, 2021). Finance plays a key role in environmental sustainability (Anwar & Li, 2021). The term 'green banking,' introduced by Triodos Bank in the Netherlands in 1980, has since influenced global banking toward environmental sustainability (Kumar & Prakash, 2018). It involves integrating internal and external environmental considerations into banking operations for reasons such as Corporate Social Responsibility (CSR), environmental protection, financial benefits, and risk management. Practices include paperless banking, renewable energy projects, solar-powered Automated Tailor Machines (ATMs), and eco-friendly lending policies are examples of Green Banking Practices (GBP) (Fernando & Fernando, 2017).

In Sri Lanka, banks promote sustainability through initiatives like 'Go Green' and 'Clean Sri Lanka' and incorporate green banking into marketing strategies (Maheepala, 2025). By aligning operations with social and ecological goals, green banking reduces carbon footprints and supports sustainable economic growth (Rahman et al., 2023). The global concept of green banking practices is widely studied; however, research in Sri Lanka remains limited (Malsha et al., 2020; Silva S, 2021). More investigation is needed to assess their sustainability impact in developing nations (Aslam & Jawaaid, 2022). This study examines how FinTech adoption and green banking jointly drive sustainable bank performance.

Conceptualisation & hypothesis development

This study is based on RBV theory. Developing distinctive values is crucial for achieving a long-term competitive advantage. This entails creating a plan that no other competitor, current or potential, can simultaneously imitate or suggest, and making sure the plan is durable (Sajuyigbe et al., 2024). Based on past empirical studies and the hypothesis, the conceptual framework of the study is as follows:

Figure 1:
Conceptual framework



(Source: Developed by authors based on literature (2025))

FinTech adoption and banks' sustainability performance

FinTech with traditional institutions enhances sustainability performance by improving efficiency and transparency (Arner et al., 2020). Innovations such as digital banking, blockchain, and AI-driven services optimise energy use, minimise waste, and improve resource management. These advancements foster economic, social, and environmental sustainability. It promotes financial inclusion and expands access for disadvantaged groups (Ahmad et al., 2022).

H1: There is a significant positive impact of FinTech adoption on banks' sustainability performance.

Green banking practices as a mediator between fintech adoption and banks' sustainability performance

FinTech is considered a disruptive force. It drives innovation in the energy sector, enhancing ecological, social, and environmental benefits through investments in energy efficiency (Liu, 2021). By fostering automation and data analytics, it promotes renewable energy adoption and supports affordable green banking goals (Yang et al., 2023). In Sri Lanka, where high inflation pressures cost reduction, banks use energy-efficient technologies, renewable generation, and paperless operations to cut expenses and boost their socially responsible image. Such practices enable sustainable operations and long-term societal well-being (Thevanes & Arulrajah, 2020).

H2: Green banking practices mediate the relationship between FinTech adoption and Banks' sustainability performance.

Research Methods

Positivism is a research philosophy that emphasising factual knowledge from quantifiable and observable facts, assumes reality exists independently and can be objectively examined through empirical study (Sanders et al., 2019). This study employed a cross-sectional approach, collecting data through a survey using Likert-scale questions to ensure response consistency. Relationships among variables were tested using regression and process macro analyses. The population comprised managerial-level employees (junior, mid, senior, and top management) from systemically important banks identified under Banking Act Directions No. 10 of 2019 (Domestic Systemically Important Banks, 2025), namely Bank of Ceylon, People's Bank, Hatton National Bank, and Commercial Bank of Ceylon PLC. However, People's Bank and Commercial Bank declined participation due to confidentiality constraints, resulting in a final sample of 342 respondents. Participants were approached through the human resources (HR) departments of the participating banks, which coordinated with the HR departments to validate the survey scales and facilitate distribution of the online survey link to eligible employees. The data-collection window spanned April 2024 to June 2024. A convenience sampling method was employed. Inclusion criteria required participants to have practical experience in green banking practices, while those without sufficient exposure to sustainability initiatives were excluded. This study uses a perceptual approach, where responses from managerial-level employees reflect their understanding of their bank's practices. Although the main constructions, FinTech Adoption, Green Banking Practices, and Sustainability Performance are defined at the organisational level, managers were instructed to answer from their organisation's perspective. The questionnaire items were written in this way (for example, My bank offers...', 'My bank engages in...', 'My bank adopts...') to show the organisational focus. The questionnaire was adapted from prior studies: seven items on FinTech adoption (Tian et al., 2023), sixteen on green banking practices (Chen et al., 2022; Kumar & Prakash, 2018), and nine on sustainability performance (Kumar & Prakash, 2018; Malsha et al., 2020). Content validity was ensured through consultations with the sustainability heads of participating banks (Kumar & Prakash, 2018).

Data Analysis

This study analysed 342 survey responses using a quantitative approach to examine the relationship between Fintech Adoption and Banks' Sustainability Performance (BSP), focusing on the mediating role of Green Banking Practices. According to the selected sample, 57% of responses were from males and 43% were from females. Based on age distribution, most of the responses were from the 35-44 age group. When categorised by education level, most responses are from individuals holding a bachelor's degree, followed by those with a master's degree; the response rates correspondingly are 35.91% and 26.32% out of the total responses. Most respondents reported having over five years of work experience. Analysis was conducted using IBM SPSS. First, confirm that there are no missing values, outliers, and that the dataset is normally distributed (Hair et al., 2010). Harman's single-factor test showed 42.23%. It indicates minimal common method bias (Hair et al., 2010). Cronbach's alpha values of Fintech Adoption (0.873), GBP (0.903), and BSP (0.896). Those exceeded the 0.70 benchmark, confirming internal consistency. Sampling adequacy confirmed by Kaiser-Meyer-Olkin (KMO (0.948) and Bartlett's test ($p < 0.001$) (Joseph et al., 2023). All assumptions being satisfied, the dataset was deemed appropriate for hypothesis testing.

Table 1
Model summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.664 ^a	.441	.440	.43063

a. Predictors: (Constant), FA_Fi

(Source: Developed by authors based on literature (2025))

Table 2
Coefficient table

		Coefficients ^a						
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
Model		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.570	.153		10.273	.000		
	FA_Fi	.638	.039	.664	16.383	.000	1.000	1.00

a. Dependent Variable: BSP_Fi

(Source: Developed by authors based on literature (2025))

First, Pearson correlation analysis was conducted to analyse relationships among Fintech Adoption (FA_Fi), Green Banking Practices (GBP_Fi), and Banks' Sustainability Performance (BSP_Fi). According to results, output shows strong, positive, and statistically significant associations between FA_Fi with BSP_Fi ($r = 0.664$, $p < 0.01$), FA_Fi with GBP_Fi ($r = 0.601$, $p < 0.01$), and GBP_Fi with BSP_Fi ($r = 0.645$, $p < 0.01$). This supports the proposed conceptual links. The direct impact of Fintech Adoption on banks' sustainability performance (H1) was tested using a simple linear regression model that FA_Fi significantly predicted BSP_Fi ($F = 268.408$, $p < 0.001$), explaining 44.1% of the variance ($R^2 = 0.441$). The coefficient ($\beta = 0.638$, $t = 16.383$, $p < 0.001$) indicated a strong direct effect, confirming that FinTech adoption enhances sustainability performance in Sri Lankan banks (Joseph et al., 2023). To test Hypothesis H2, Hayes' PROCESS macro with 5,000 bootstrap samples assessed GBP_Fi as a mediator. FA_Fi significantly predicted GBP_Fi ($\beta = 0.549$, $t = 13.869$, $p < 0.001$), and both FA_Fi and GBP_Fi remained significant predictors of BSP_Fi when entered together. GBP_Fi had a strong positive effect ($\beta = 0.679$, $t = 17.552$, $p < 0.001$), while FA_Fi's direct effect decreased ($\beta = 0.265$, $t = 7.512$, $p < 0.001$). The indirect effect (0.372, 95% CI [0.308, 0.435]) was significant, indicating GBP_Fi partially mediates this relationship (Osei-Assibey Bonsu et al., 2025). This result confirms that green banking practices play a strong mediating role in the relationship between FinTech Adoption and Sustainability Performance.

Findings and Discussion

According to the analysis data, it was posited that FinTech adoption has a positive influence on bank sustainability performance, supporting H1. It reflects that FinTech adoption has a strong and positive effect on the sustainability outcomes of banks. In the Sri Lankan context, banks have highly adopted FinTech solutions, such as mobile banking, digital payment platforms like BOC Smart Pay and HNB SOLO, and AI-driven customer services like AI Assistant Services. Additionally, the BOC Flex app and HNB digital banking app offer other banking services, including opening fixed deposits, applying for loan facilities, and conducting government transactions. These technologies not only improve operational efficiency but also reduce paper consumption, minimise carbon emissions, and enhance accessibility, aligning with global sustainability objectives (Chueca Vergara & Ferruz Agudo, 2021). H2 posits that green banking practices serve as a mediating role between FinTech adoption and sustainability performance. According to the analysis data, it reflects green banking practices have a partial mediation effect between FinTech adoption and bank sustainability outcomes. A significant portion of this impact is realised when coupled with environmentally responsible practices. Green banking practices such as paperless operations, solar-powered branches, environmentally friendly products and services, employee sustainability training, and partnerships for green initiatives. These practices support strategic benefits such as cost efficiency, enhanced brand reputation, and stronger stakeholder engagement, consistent with prior research highlighting the organisational value of green initiatives (Malsha et al., 2020). In Sri Lanka's context, several banks implement green banking activities, including HNB and BOC. However, challenges such as limited digital literacy in rural regions, high upfront costs for green projects, and restricted access to capital have slowed progress for many banks, reflecting barriers identified in other emerging markets (Kumar & Prakash, 2018). These insights suggest that FinTech adoption, when integrated with green banking practices, can serve as a scalable and cost-effective pathway for sustainable transformation, benefiting not only banks but also customers, investors, regulators, and local communities (Khan et al., 2021). These insights lead to implications for strategic leadership in the banking sector. Bank managers and decision-makers must recognise that FinTech adoption is not a technological upgrade or a move toward digital convenience. When financial technology is aligned with green practices, such as paperless operations, or engages in green projects, banks can not only comply with regulatory expectations but also strengthen their brand reputation, attract eco-conscious investors, and build strong long-term stakeholder trust.

Theoretical implications

This study contributes to the expansion of RBV theory. It illustrates how the integration of FinTech adoption and green banking practices collectively reinterpret strategic resources, reinterpreting the way banking utilises strategic resources. FinTech tools, such as mobile platforms, blockchain, AI-driven systems, and digital lending services, are viewed as VRIN resources. Those directly led to a boost in productivity, cut expenses, and improved customer satisfaction. Because of their sophisticated digital infrastructure and data-driven nature, they are challenging to duplicate or replace. This provides banks with a long-term strategic advantage. The adoption of FinTech also demonstrates dynamic skills, enabling banks to remain innovative and flexible in response to market changes and regulatory updates. Additionally, this study introduces green banking practices as a mediating capability. It offers a new insight into how technological innovation translates into sustainability outcomes. This mediating role reflects that sustainability is not the only direct consequence of technology. Furthermore, this study underscores the strategic significance of intangible resources. These are becoming increasingly essential to gain competitive advantage, such as environmental knowledge, regulatory alignment, customer trust, and partnerships with FinTech startups focused on sustainability. These elements enhance agility, innovation, and collaborative capacity, key enablers of sustainable competitive advantage in today's digital-banking landscape.

Managerial implications

The findings of this study provide several practical insights for banking leaders, sustainability officers, and policymakers. First, it provides insight for bank managers to recognise that FinTech adoption is not just a matter of digital technologies. It is a strategic opportunity to include sustainability at the core of banking operations. Digital practices, such as AI-driven decision-making, mobile payment platforms, and digital loan processing, reduce the ecological burden of traditional banking. To support this shift, bank leaders must invest in staff training, research and development, and sustainable technologies. It is crucial to promote; however, this study provides insight into making better strategic decisions.

Limitations and future research directions

This study has several key limitations that provide directions for future research. This study is based on cross-sectional data collected from employees of two systemically important banks in Sri Lanka. This study focuses solely on the banking industry in Sri Lanka. Future studies could expand the sample size and include a broader range of financial institutions. This study focuses specifically on the impact of Fintech adoption, green banking practices, and banks' sustainability performance. Beyond Fintech adoption and green banking practices, some other factors, such as firm culture, leadership, and governance, may also significantly contribute to Bank Sustainability Performance. Therefore, we recommend that future researchers examine these additional factors to gain a more comprehensive understanding of what drives sustainability performance.

Conclusion

This study examines how the adoption of FinTech significantly enhances banks' sustainability performance in Sri Lanka, and it investigates how green banking practices play a mediating role in this relationship. This study suggests that FinTech alone is not sufficient; its sustainability potential is best realised when aligned with green initiatives. When banks engage digital tools for eco-friendly operations, banks can obtain different benefits, like enhancing their public image. However, this study is based on cross-sectional data collected from employees of two systemically important banks in Sri Lanka. This study focuses solely on the banking industry in Sri Lanka. Future studies could expand the sample size and include a broader range of financial institutions.

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THE EFFECT OF CUSTOMER-EXPERIENCE FEATURES AND DIGITAL-BANKING ADOPTION AMONG SRI LANKAN MILLENNIALS IN WESTERN PROVINCE, SRI LANKA

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Abstract

The banking industry plays a vital role in a country's economic growth by fostering personal and organisational development. With the rise of digital technology in service delivery, digital adoption in banking has become an essential way to improve customer experience. Therefore, this study focuses on the banking industry in Sri Lanka to identify the effect of customer experience features and digital banking adoption among millennials. The study adopted positivism following a deductive research approach; a survey-based quantitative study was conducted, involving a sample of 384 participants from the millennial customer group who were selected from the western province following a stratified random sampling method to identify the relationship between the features of customer experience and adoption of digital banking applications. Multiple linear regression is employed for analysis. Based on the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2/TAM) related literature, the self-administered questionnaire was developed using the 5-point Likert scale. The findings of User Interface/User Experience (UI/UX), Social Media integration is considered to have a highly significant positive relationship, while Mobile responsiveness depicted a significant positive while security features denoted a highly negative relationship. The personalisation and demographics were denoted as non-significant predictors. Further, it is recommended to adopt policy measures to enhance digital adoption, focus on user interface and design, community engagement and social media assistance, biometric authentication, two-factor authentication, and encryption technologies to increase customer experience in digital banking adoption.

Keywords: Digital banking adoption, mobile responsiveness, personalisation, security, Sri Lanka, UI/UX, UTAUT2/TAM

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DOI:

Introduction

The banking sector today has been transformed with the integration of digital solutions as a key trend shaping the financial industry. The recent decades have witnessed the emergence of digital banking to enhance customer experience. Bank customers increasingly expect customer experience improvements, and thus, the necessity for digital adoption has today become a prerequisite. The key demographic group of customers that faced such a digital shift is the millennials, those who moved from traditional forms to digital adoption (Elayan, 2022). As discussed by Lakmal (2024), the level of customer experience in digital banking is of research importance for delivering a high-quality banking experience in the context of Sri Lanka's evolving banking landscape. The key demographic group composed on the Sri Lankan population is the millennials, and as the working class who embrace technology and are considered to have unique consumer behaviours. Despite high levels of mobile and internet connectivity, it was observed that millennials in the western province of Sri Lanka were slow to adopt digital banking applications. This mismatch indicates that existing digital banking services may not have fully met the specific needs or expectations of this tech-savvy group. Features such as advanced user interfaces, personalised banking experiences, robust security measures, and effective social media integration are believed to significantly influence millennials' banking activity. However, empirical research also indicates that these experience features are largely lacking in Sri Lanka. Therefore, this study aims to explore how various customer experience features can influence digital banking usage among millennials in the western province of Sri Lanka. The significance of the study lies in the ability of digital banking adoption to create the need for bank app teams to simplify and secure User Interface/User Experience (UI/UX); the Central Bank and banking policy measures could also leverage this to streamline e- KYC and lead national digital literacy campaigns, while universities can incorporate these into their curriculum.

Research Objectives

RO1: UI/UX → PEOU → Adoption (H1)

RO2: Personalization → PU → Adoption (H2)

RO3: Security → Trust → Adoption (H3)

RO4: Mobile Responsiveness → PEOU → Adoption (H4)

RO5: Social-Media Integration → SN → Adoption (H5)

RO6: Demographics → Adoption (H6)

Literature Review

The global banking industry undergoes a rapid transformation, driven by the increasing adoption of digital banking technologies and competition from fintech disruptors. Alalwan (2017) reported that more than 75% of global banking customers now use digital services regularly, with mobile banking apps becoming the dominant transaction platform, highlighting the industry's fundamental shift. In the United States, roughly 73% of Americans regularly use online banking services, with 76% using mobile banking apps, demonstrating the widespread acceptance of digital banking platforms (Federal Reserve, 2021). Globally, the number of mobile banking users is expected to exceed 1.75 billion by 2024. Online banking transactions have also increased dramatically, with more than 85% of users transacting online (Pangarkar, 2025). This provided the need for banks to invest in strong cybersecurity infrastructure and user-friendly interfaces to increase customer confidence and satisfaction.

As the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) and the Technology Acceptance Model (TAM) are provided, there is a behavioural intent and actual technology use (Momani, 2020; Tamilmani et al., 2021). The theories have identified key criteria such as Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Performance Expectancy (PE), Effort Expectancy (EE) and Hedonic Motivation (HM). According to Bhardwaj et al (2016), modern customers, particularly millennials and Generation Z, want 24/7 access to financial services, user-friendly digital interfaces, and individualised financial guidance. In response, banks are leveraging Artificial Intelligence (AI) and big data analytics to provide tailored goods and services, making the banking experience more relevant to individual customer demands. This shift in focus enables banks to preserve their position as critical service providers in a quickly evolving digital economy. In 2019, Sri Lanka's bank assets amounted to 76.59% of the country's Gross Domestic Product (GDP), reflecting a significant portion of the nation's financial infrastructure being tied to the banking sector (Yapabandara and Nagendrakumar, 2022). The study examined several important variables that have a significant impact on customer adoption of digital banking Applications, including User Interface (UI) design and personalisation.

The ease of navigation of a mobile application for banking is crucial, as complicated interfaces are one of the main reasons for site abandonment, so improved interfaces create a positive environment for digital banking Raza et al,2020). According to Kachhawa and Tiwari (2021), intuitive design helps to improve user satisfaction by

simplifying navigation and interaction within digital banking platforms, emphasising the relevance of User Interface/User Experience (UI/UX) in making digital banking services more accessible and user-friendly. A study by Bouhlel and Mzoughi (2024) showed that users want immediate access to the data in their accounts, and any lag affects performance and satisfaction. Accordingly, it is argued that banking applications must load very quickly, perform transactions rapidly, and be almost consistently available since this enhances user reliance or commitment. As Goldman (2019) explained that social media can bridge the information gap by providing the latest information to potential users, hence achieving a high likelihood of adoption. Lee et al (2020) highlight the possibility that younger individuals are more likely to use technologies, including digital banking applications, because of their higher level of technology usage and receptiveness to innovation. Although previous studies have discussed the significance of the technological adoption based on the theoretical underpinning, an existing research gap was identified where the UI/UX, mobile responsiveness, personalization, security, and social media integration, though considered as drivers of good customer experience identified through the literature review, a proper operationalization of such variables that directly feed the module construct has not been provided previously. Further, there is a lack of research specifically examining demographics and their adoption of digital banking, though its significance in digital adoption in banking has been emphasised.

Methodology

The research study analyses ‘The Effect of Customer-Experience Features and Digital-Banking Adoption among Sri Lankan Millennials in Western Province, Sri Lanka.’ The study used positivism as the philosophy, following a deductive approach. As a result, a quantitative study was undertaken following a survey strategy to conduct a cross-sectional analysis using a self-administered questionnaire. A diversified sampling strategy was employed to guarantee that the sample was representative of the diverse millennial population in Western Province. Participants were chosen at random from each subgroup that met the segmentation requirements, guaranteeing that the study's conclusions were accurate and representative of the whole target population. The quantitative study employed a survey with scales adapted from technology adoption literature (Momani, 2020; Tamilmani et al., 2021; Venkatesh et al., 2012) and measured all latent constructs using a 5-point Likert scale (1=Strongly Disagree, 5=Strongly Agree). Nonresponse bias was ruled out by comparing early and late respondent characteristics, and the sample's representativeness was confirmed before analysis.

To enhance the research ethics, the respondents were taken with informed consent on their voluntary participation. All information is kept confidential, and data collection has refrained from collecting sensory information.

Data Analysis and Discussion

The detailed analysis of the collected research data to reveal the impact of six independent variables that have been selected for the research: UI/UX design, personalisation, security features, mobile responsiveness, social media integration, and demographic variables on digital banking adoption. The study conducts a reliability test, correlation, and chi-square test to identify the level of relationship and Multiple linear regression. This analysis is vital when it comes to identifying the forces that have informed the millennials' uptake of digital banking services and when it comes to strategising on how banks can enhance their digital service delivery in a manner that truly meets the needs of this generation.

Table 1
Descriptive statistics

Descriptive Statistics Sample Composition (N= 384)			
Gender	Age band	Education	District
Male – 44% Female-56%	29-36 -68% 37-44 -32%	Secondary School- 14% High School – 41% Bachelor's Degree- 33% Post-graduate Degree- 12%	Western Province- 100%

(Source: Authors, based on survey results)

The sample consists of males (44%) and females (56%) within the Millennials group, age band 68%, 29-36 age range and 32%, 37-44 age range. Based on education level 41% have completed high school, 33% Bachelor's degree holders, 14% secondary school, and 12% post-graduates. The whole sample was taken from the Western Province. The exclusion criteria are for those from any other age range.

Reliability test

Table 2
Reliability test

Type	Variable	Cronbach's Alpha	No of items	Conclusion

Independent Variable	User Interface (UI/UX) Design	0.782	4	High
	Personalization	0.845	4	High
	Security Features	0.796	4	High
	Mobile Responsiveness	0.911	4	High
	Social Media Integration	0.902	4	High
	All independent variables	0.937	24	High

(Source: Authors, based on survey results)

The Cronbach's Alpha coefficients for all the independent variables used in this study range from 0.60 and 0.911. It is seen to be sufficient to be high, thus implying that the measures used are reliable. This reliability ensures that all the variables in the study are well calibrated to measure what they were intended to measure and therefore provides a good base for statistical analysis and the interpretation of the relationships between these variables and the use of the digital banking applications by the millennials in the Western Province of Sri Lanka.

Inferential statistics

Correlation and chi-square analyses

Table 3

Correlation and chi-square test

Independent Variable	Pearson Correlation	Remarks	Chi-Square	Alternative Hypothesis Remark	Rank
User Interface (UI/UX) Design	0.847	Strong	0.000	Accepted	2
Personalization	0.699	Strong	0.000	Accepted	4
Security Features	0.750	Strong	0.000	Accepted	3
Mobile Responsiveness	0.929	Strong	0.000	Accepted	1
Social Media Integration	0.406	Moderate	0.000	Accepted	5
Demographic	0.350	Moderate	0.000	Accepted	6

$1 < |r| < .3$ - Small / Weak correlation $.3 < |r| < .5$ - Medium / Moderate correlation $.5 < |r|$ - Large / Strong correlation.

(Source: Authors, based on survey results)

The Pearson correlation coefficient of 0.847 indicates a substantial positive relationship between the quality of the UI/UX and the adoption of digital banking applications. This suggests that improvements in UI/UX are highly associated with better levels of app adoption, mirroring previous research that emphasises the importance of seamless design in digital banking (Deloitte, 2021). The chi-square value of 0.000 demonstrates a statistically significant association between UI/UX aspects and digital banking adoption, demonstrating the relevance of UI/UX in shaping user behaviour.

Regression analysis

Table 4

Regression analysis

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.927	.194		4.767	.000
	UI UX	.392	.040	.432	9.850	.000
	Personalization	-.209	.170	-.229	-1.231	.219
	SecurityFeatures	-.156	.047	-.159	-3.345	.001
	MobileResponsiveness	.134	.062	.114	2.145	.033
	SocialMediaIntegration	.552	.173	.615	3.187	.002
	Demographics	.035	.039	.043	.886	.376

a. Dependent Variable: Adoption Digitalbanking

(Source: Authors, based on survey results)

The Regression analysis conducted indicated that the analysis yielded a strong model fit with an R value of 0.706 and R^2 of 0.499, and the overall model was significant ($F = 652,490$, $p < 0.001$). Both Social Media Integration ($\beta = 0.615$, $p = 0.002$) and UI_ UX ($\beta = 0.432$, $p < 0.001$) are highly significant positive drivers of adoption. Mobile Responsiveness ($\beta = 0.114$, $p = 0.033$) positively influenced adoption, while Security Features ($\beta = -0.159$, $p = 0.001$) demonstrated a significant negative relationship. Both Personalisation and Demographics have no statistically significant effect on adoption of digital banking.

Conclusion

In Sri Lankan contexts, where technology adoption and financial literacy are greatly variable between different this research fills the gap in local literature by providing a broad-based understanding related to digital banking. Results emphasise that digital banking solutions need to be targeted toward millennial customers' needs, ensuring ease of access, customisation, and strong security features to engender confidence. The finding is particularly important for banks interested in capturing the millennial market segment, who are expected to become the main driver of the digital banking growth in Sri Lanka and other developing economies. This study concludes that this research contributes to the academic world in terms of knowledge contribution on key customer experience features to focus on and to the banking industry by offering practical recommendations.

As key recommendations, the financial institutions will have the opportunity to refine their digital banking platforms through personalisation, mobile responsiveness, and security since these factors directly drive user satisfaction and adoption. The broader implication of such research is that, with such nuanced insights into the millennials' preferences, banks would be able to carve out a more effective digital strategy that holds immense potential for capturing and retaining tech-savvy customers in the competitive digital space focused on customer experience.

Limitations and recommendations for future research

- Cross-sectional data collection - As a remedial attempt, it is essential to conduct a longitudinal study to capture temporal dynamics.
- Single-province sample- The generalizability of findings is limited to a specific province. It is important to go for a multi-region sample to enhance validity.
- Common-method bias - A common-method bias in self-report surveys on both variables can inflate and deflate the observed results. As a remedial attempt, it is important to follow the temporal separation of methods or use different sources of data collection.

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SYSTEMATIC LITERATURE REVIEW ON DIGITAL TWIN-ENABLED PROCESS OPTIMISATION IN LARGE-SCALE APPAREL MANUFACTURING: FRAMEWORKS, FACTORS, AND APPLICATIONS IN DEVELOPING ECONOMIES

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Abstract

The transformation of manufacturing towards digital twin (DT) enabled systems has reshaped production process optimisation, especially within large-scale apparel industries. This study conducts a systematic literature review (SLR) to critically evaluate frameworks, influencing factors, and applications of DT-driven process optimisation with a focus on developing-economy contexts. Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol, 30 peer-reviewed articles published between 2018 and 2025 were examined from the database, Google Scholar. Each paper was assessed through quality screening and thematic categorisation. The analysis identified four major readiness domains: technological, organisational, human capital, and external/environmental factors that influence DT implementation for process optimisation. Findings reveal that DT enhances manufacturing efficiency through real-time monitoring, predictive simulation, and data-driven optimisation, yet adoption barriers persist in developing contexts due to infrastructure limitations, financial constraints, and workforce capability gaps. The review also synthesises recent frameworks integrating DT with Lean and Artificial Intelligence (AI) based optimisation models, presenting their relevance to operational excellence. This paper contributes to bridging the research gap by providing a consolidated perspective on DT readiness and optimisation frameworks applicable to Sri Lanka's apparel sector and similar economies. It further suggests developing context-specific maturity models and hybrid frameworks that integrate DT into continuous improvement and sustainability strategies.

Keywords: Apparel Manufacturing, developing economies, digital twin, operational excellence, process optimisation

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DOI:

Introduction

The global manufacturing sector is undergoing a significant paradigm shift driven by the convergence of digital transformation and data-centric process optimisation. Within this transformation, the Digital Twin (DT), a dynamic virtual model that mirrors physical systems, has become a cornerstone of Industry 4.0 for enabling real-time simulation, predictive analytics, and decision-making (Karkaria et al. 2025). At the same time, the apparel manufacturing sector, a critical contributor to the economies of developing countries such as Sri Lanka, continues to face challenges of low productivity, high operational costs, and limited technological integration (Anthonypillailionel, 2024).

Digital Twin technology offers a novel approach to addressing these inefficiencies by integrating data-driven process visualisation, machine learning, and optimisation algorithms to enhance production control and responsiveness. Studies such as Lee and Yang, (2023) and Trauer et al., (2021) Have shown that DT frameworks significantly improve manufacturing decision-making by enabling simulation-based optimisation, fault prediction, and performance monitoring. However, in developing countries, organisational and infrastructural constraints limit the effective adoption of such technologies (Keenavinna and Wickramarachchi 2024).

In parallel, process-improvement philosophies such as Lean and Six Sigma have long been applied to reduce waste and variation within manufacturing systems. Recent research trends suggest that integrating DT technology with these continuous-improvement frameworks can lead to predictive optimisation, a proactive approach that combines virtual simulations with process analytics to achieve operational excellence (Clark et al., 2025; Mihai et al. 2022).

Despite global attention to DT applications, there remains a limited understanding of how DT-based process optimisation frameworks are conceptualised, implemented, and adapted in the context of apparel manufacturing industries in developing economies. The lack of a consolidated body of literature has created a critical research gap in identifying readiness factors, barriers, and implementation frameworks suitable for these contexts.

Hence, this study aims to conduct a Systematic Literature Review (SLR) guided by the PRISMA protocol to analyse and synthesise global research on DT-enabled process optimisation frameworks, with particular attention to apparel manufacturing industries. The review focuses on understanding the frameworks and approaches employed in DT-based optimisation, the key factors and enablers influencing DT adoption, and the applicability and implications of these frameworks for developing economies such as Sri Lanka.

By consolidating the evidence across peer-reviewed research, this paper contributes to advancing theoretical understanding and practical readiness towards DT-driven operational excellence. The insights derived from this study are expected to support policymakers, researchers, and industrial leaders in designing context-specific digital transformation strategies for sustainable manufacturing growth.

Literature Review and Theoretical Background

The concept of Digital Twin has evolved from a simulation-based engineering tool to a comprehensive framework for intelligent manufacturing and predictive optimisation. Defined as a dynamic virtual representation of physical assets and processes, a DT enables bidirectional data flow between the digital and physical worlds, allowing real-time monitoring, prediction, and optimisation (Karkaria et al. 2025). According to Zami et al. (2025), DT systems facilitate integration across industrial networks through data sharing, offloading, and real-time decision-making. Similarly, Lee and Yang (2023) demonstrate how DT-driven factories transform operational management by synchronising Internet of Things (IoT) sensor data, AI analytics, and simulation layers.

The architecture of DT frameworks typically includes five core components: the physical system, digital model, data integration layer, analytics engine, and service interface (Mihai et al. 2022). These interconnected elements allow for continuous synchronisation between cyber and physical entities, making DTs essential for high-precision process control. In manufacturing applications, DTs are frequently employed for predictive maintenance, fault detection, and simulation-based scheduling (Clark et al. 2025; Trauer et al. 2021).

Digital twin applications in manufacturing optimisation

Recent studies highlight that the application of DTs in manufacturing extends beyond equipment monitoring to include process-level optimisation and decision support. Lee and Yang (2023) proposed a simulation-enabled DT model that integrates multi-agent systems to improve production throughput, while Mihai et al. (2022) demonstrated the role of optimisation algorithms in DT frameworks to balance quality, cost, and production speed. These applications confirm that DTs serve as decision-support tools by improving responsiveness and reducing system downtime.

In a study focused on small and medium-sized enterprises (SMEs), Lee and Yang (2023) reported that only 2% of SMEs had implemented DT or Artificial Intelligence (AI) technologies due to resource constraints, indicating that readiness remains a major concern in developing regions. Meanwhile, Clark et al. (2025) emphasised real-time decision-making as a key capability of DT-driven operational management systems. Such frameworks enable predictive scheduling, resource allocation, and cost optimisation by integrating IoT sensor networks and AI-driven control systems.

Factors influencing digital twin implementation and readiness

The successful deployment of DT technologies depends on a range of internal and external factors. Synthesising findings from recent literature, four critical domains emerge: (Anthonypillailionel, 2024; Karkaria et al. 2025; Keenavinna & Wickramarachchi, 2024).

Table 1

Key factors influencing digital twin readiness

Domain	Key Factors Identified	Representative Sources
Technological Readiness	Infrastructure availability, IoT integration, interoperability, and cybersecurity	(Lee and Yang, 2023; Zami et al., 2025)
Organizational Readiness	Leadership commitment, process standardisation, and financial capacity	(Anthonypillailionel, 2024; Clark et al., 2025)
Human Capital Readiness	Workforce digital literacy, technical training, innovation culture	(Keenavinna and Wickramarachchi, 2024)
External / Environmental Factors	Market competitiveness, government policy, and global supply chain collaboration	(Karkaria et al., 2025; Zami et al., 2025)

(Source: Developed by authors based on literature (2025))

This classification aligns with prior readiness-assessment frameworks developed for Industry 4.0 and 5.0 transformations, highlighting that technological infrastructure and human capital are the most decisive factors in DT adoption within developing economies.

Conceptual linkages between digital twin frameworks and process optimisation

A recurring theme in the reviewed literature is the integration of DTs with optimisation frameworks such as Lean, Six Sigma, and AI-based control systems to achieve predictive and adaptive process management. Karkaria et al. (2025) emphasised that optimisation-centric DTs employ both offline and online algorithms to fine-tune production performance and resource efficiency. Likewise, Trauer et al. (2021) illustrated that DTs integrated with anomaly-detection algorithms can identify production defects in real time, leading to cost savings and energy efficiency.

In developing contexts such as Sri Lanka's apparel industry, the potential of DT-enabled optimisation is substantial yet underutilised. Anthonypillailionel (2024) identified a readiness gap caused by limited digital infrastructure and insufficient management awareness. This highlights the need for hybrid DT frameworks that combine simulation, predictive analytics, and process-improvement methodologies for localised industrial applications.

Summary of literature gaps

Despite a growing body of research, the following gaps persist:

1. Lack of integrated frameworks combining DT and optimisation tools for apparel manufacturing in developing economies.
2. Limited empirical evidence on organisational and workforce readiness for DT adoption.
3. Insufficient focus on contextual adaptation of global DT models to local industrial constraints.

Addressing these gaps requires developing readiness-based DT frameworks that align technological capability with human and organisational maturity, ensuring sustainable digital transformation.

Methodology

Research Design

This study adopts a Systematic Literature Review approach to examine the frameworks, factors, and applications of DT- enabled process optimisation within large-scale apparel manufacturing industries, focusing on developing-economy contexts. The review follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure a transparent, structured, and replicable process.

The SLR method was chosen due to its ability to synthesise dispersed evidence, evaluate research progress, and identify conceptual and practical gaps within a defined field. The review protocol was developed in alignment with the PRISMA framework, comprising four main stages: identification, screening, eligibility, and inclusion.

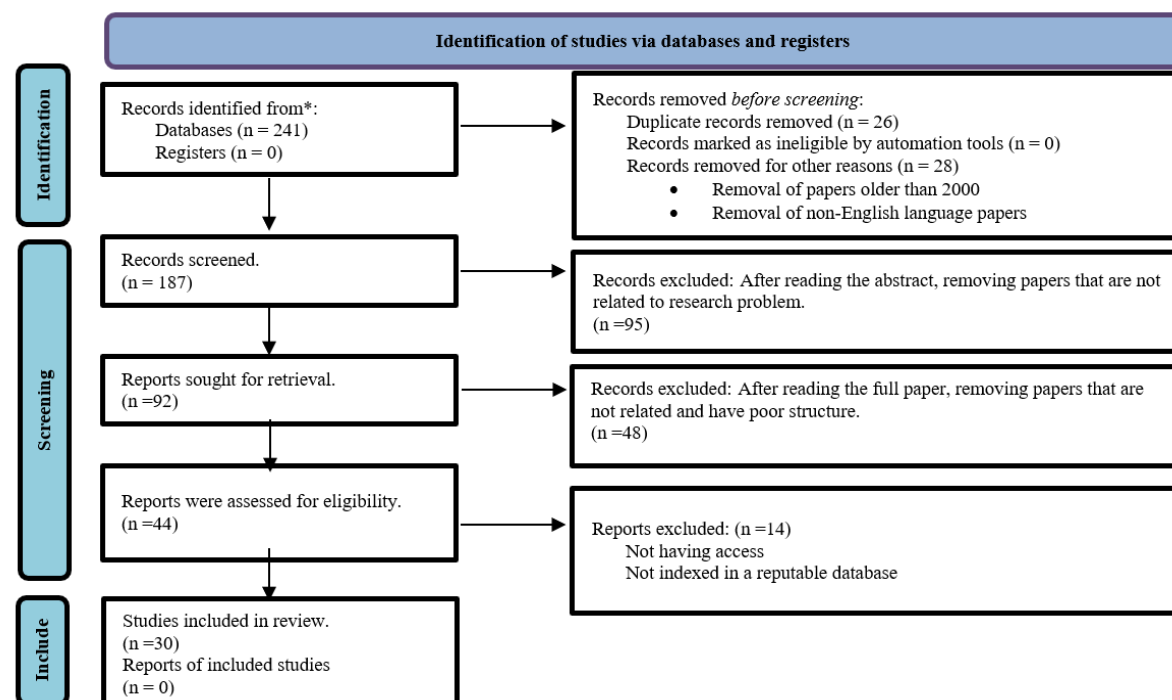
Data sources and search strategy

This study employed a systematic literature review approach adhering to PRISMA framework principles to ensure methodological transparency and academic rigour. The literature search was conducted using Google Scholar with a comprehensive Boolean search strategy combining keywords: ('Digital Twin' OR 'DT' OR 'Industry 4.0') AND ('production optimization' OR 'process optimization' OR 'manufacturing efficiency') AND ('Sri Lanka' OR 'developing country' OR 'emerging economy') AND ('apparel' OR 'textile' OR 'garment' OR 'fashion manufacturing') AND ('adoption' OR 'readiness' OR 'implementation').

The initial search identified 241 records. Following duplicate removal (26 records) and exclusion of pre-2000 or non-English publications (28 records), 187 articles remained for screening. Title and abstract screening excluded 95 papers lacking alignment with the research problem, leaving 92 papers for full-text assessment. During full-text review, 48 papers were excluded for insufficient relevance or methodological quality, and 14 additional papers were excluded due to access limitations or indexing issues. A final set of 30 high-quality, contextually relevant studies was included, representing diverse methodological approaches including conceptual frameworks, empirical case studies, and systematic reviews.

Figure 1

PRISMA flow diagram



(Source: Developed by authors based on literature (2025))

Quality assessment

To ensure reliability, the selected studies were evaluated using a three-level quality assessment framework, adapted from Kitchenham and Charters (2007). Each paper was assessed against the following criteria:

1. Scientific Rigour – clarity of research objectives, theoretical grounding, and methodological soundness.

2. Relevance – alignment with DT-based optimisation, readiness, or apparel-industry applications.
3. Contribution – empirical or conceptual advancement to DT implementation and operational excellence.

Each study was rated on a three-point Likert scale (High = 3, Moderate = 2, Low = 1). Only studies with a cumulative score ≥ 6 out of 9 were retained for synthesis.

Limitations of the review process

Although every effort was made to ensure comprehensiveness, this review is limited by the availability of open-access resources and the exclusion of non-English studies. In addition, the rapidly evolving nature of DT research may have led to the omission of very recent publications still in press. Nevertheless, the selected studies provide a robust representation of current research trends and conceptual frameworks relevant to DT-driven optimisation in the apparel industries of developing economies.

Results and Discussion

The extracted findings were categorised into four dominant readiness domains: technological, organisational, human-capital, and external/environmental.

Table 2

Key findings and insights of readiness factors

Readiness Domain	Key Findings and Insights	Supporting Sources
Technological Factors	There is widespread consensus that DT readiness depends on IoT infrastructure, sensor interoperability, and cybersecurity mechanisms. Cloud-based integration and real-time data analytics are critical for achieving continuous optimisation.	(Zami et al., 2025; Lee and Yang, 2023; Huang et al., 2022)
Organizational Factors	Managerial commitment, financial investment, and process standardisation strongly influence DT adoption success. Integration with Lean and Six Sigma frameworks enhances process predictability.	(Clark et al., 2025; Karkaria et al., 2025)
Human-Capital Factors	Digital literacy, multidisciplinary collaboration, and employee readiness remain barriers in developing economies. Workforce training programs are highlighted as critical enablers.	(Anthonypillailionel., 2024; Keenavinna and Wickramarachchi, 2024)
External Factors	Market competitiveness and policy incentives are key external drivers. Lack of government support and poor inter-firm collaboration slow DT transformation.	(Karkaria et al., 2025; Zami et al., 2025)

(Source: Developed by authors based on literature (2025))

The results confirm that technological infrastructure and organisational leadership act as primary readiness enablers, while workforce capability and policy support remain the main constraints in emerging economies.

Frameworks and approaches for digital twin-enabled optimisation

A critical insight emerging from the review is that DT adoption rarely occurs as a standalone technology; instead, it is often integrated within optimisation frameworks such as Lean, Six Sigma, and AI-based predictive control.

Karkaria et al. (2025) proposed an optimisation-centric DT model combining multi-objective algorithms and machine-learning-driven control to enhance process adaptability.

Trauer et al. (2021) demonstrated an anomaly-detection-based DT system for real-time defect identification in aluminium extrusion, showing measurable gains in energy efficiency and cost reduction.

Clark et al. (2025) presented a DT-driven operational management framework for smart factories using edge computing and real-time IoT analytics, enabling predictive scheduling and reduced downtime.

Collectively, these studies reveal a strong trend towards hybrid integration, where DTs serve as virtual enablers of optimisation cycles rather than as isolated tools.

Comparative discussion with prior research

Compared with early DT adoption studies, contemporary frameworks place greater emphasis on predictive analytics, AI integration, and sustainability alignment. Early works (Trauer et al., 2021) mainly focused on single-machine optimisation, while recent approaches (Karkaria et al., 2025; Zami et al., 2025) extend the scope to enterprise-wide and networked DT ecosystems.

In developing economies, however, adoption remains fragmented. Anthonypillailionel (2024) noted that Sri Lankan apparel manufacturers exhibit low technological readiness and limited awareness of DT's long-term benefits. Similarly, Keenavinna and Wickramarachchi (2024) identified financial constraints and inadequate training as barriers to Industry 5.0 readiness. These findings align with Lee and Yang (2023), who emphasise that smaller manufacturers lack the capital to invest in real-time data systems.

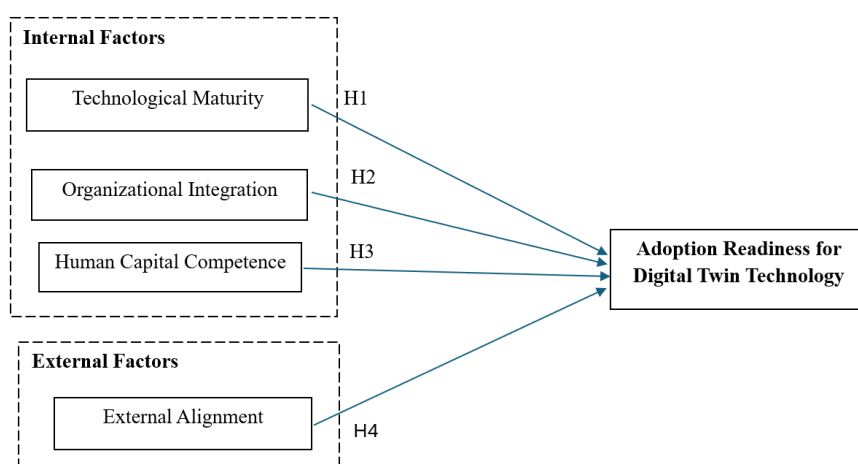
Thus, while developed nations advance towards interconnected DT ecosystems, developing countries remain constrained by resource availability and policy frameworks. Bridging this divide requires developing localised readiness models that balance cost, capability, and strategic alignment.

Integration of findings into the conceptual framework

Based on the thematic synthesis, a conceptual framework was developed to explain how the identified readiness domains collectively support DT-enabled process optimisation. The framework, depicted in *Figure 2*, illustrates interconnections between technological infrastructure, organisational support, human-capital development, and external environmental influence.

Figure 2

Conceptual framework for Digital Twin-enabled process optimisation readiness.



(Source: Developed by authors based on literature (2025))

The framework emphasises that successful DT adoption requires:

1. Technological maturity – availability of IoT architecture, data management, and simulation capabilities.
2. Organisational integration – leadership commitment, financial investment, and process governance.
3. Human-Capital competence – digital-skills development and change management.
4. External alignment – supportive policy environment and industrial collaboration.

These components interact dynamically, forming a cyclical readiness model that drives continuous improvement and predictive optimisation in apparel manufacturing.

Discussion summary

The results collectively confirm that DT technologies deliver substantial benefits in efficiency, cost, and decision accuracy, yet their success depends on multi-dimensional readiness. Further supports the argument that DT adoption in developing countries requires not only technological upgrades but also organisational transformation and policy-level support.

In the Sri Lankan context, the synthesis provides evidence that DT implementation can significantly contribute to learner production, quality consistency, and sustainable competitiveness if supported by targeted training, cross-sector collaboration, and national-level digital infrastructure development.

Conclusion and future research directions

This study systematically reviewed the integration of Digital Twin technology within process-optimisation frameworks, with a specific focus on applications and readiness in large-scale apparel manufacturing industries in developing economies. Guided by the PRISMA methodology, the review consolidated evidence from 30 peer-reviewed studies published between 2018 and 2025.

The synthesis revealed that DT technologies significantly enhance operational efficiency, process reliability, and decision-making accuracy through real-time data exchange, simulation-based optimisation, and predictive analytics. However, the adoption of DT systems remains constrained by multi-dimensional readiness challenges that encompass technological, organisational, human-capital, and external environmental factors.

From a technological perspective, inadequate data infrastructure, limited IoT connectivity, and low interoperability hinder real-time analytics and continuous improvement. Organizationally, a lack of strategic vision, leadership support, and financial investment weakens digital transformation initiatives. Human-capital barriers, particularly digital-skills shortages and low innovation culture, further slow implementation. Externally, weak policy frameworks and limited cross-industry collaboration exacerbate these limitations.

The review highlights that integrating DT with Lean and Six Sigma frameworks supports predictive optimisation by combining continuous improvement with simulation-based insight. This alignment can drive measurable gains in productivity and sustainability, especially within resource-constrained manufacturing sectors such as Sri Lanka's apparel industry.

Theoretical and practical implications

Theoretically, this paper contributes to the growing body of knowledge on DT readiness by consolidating fragmented literature into a unified conceptual model. It positions DT-enabled process optimisation as a cross-disciplinary paradigm that blends cyber-physical system design, organisational behaviour, and continuous-improvement theory.

Practically, the findings provide a roadmap for policymakers, industrial managers, and technology strategists in developing economies. The proposed conceptual framework can guide investment prioritisation, capacity-building, and policy formulation to support phased DT implementation. By addressing the identified readiness dimensions, apparel manufacturers can progress towards sustainable and data-driven operational excellence.

Study limitations and future research

This review is limited to English-language publications between 2018 and 2025 and relies solely on secondary data. Future reviews may benefit from expanding coverage to additional languages, databases, and grey literature to capture emerging empirical evidence.

Based on the observed gaps and limitations, several key avenues for future research are proposed:

1. Context-Specific Readiness Models – Develop and validate DT readiness-assessment frameworks tailored to developing-country manufacturing environments.
2. Hybrid Framework Development - Design integrated DT–Lean–AI optimisation architectures that can be empirically tested in apparel or other discrete manufacturing sectors.
3. Empirical Case Studies - Conduct longitudinal and multi-site investigations to assess the tangible performance impacts of DT adoption in production and supply-chain environments.
4. Human-Machine Collaboration Research - Explore socio-technical and behavioural aspects of workforce adaptation to DT systems, particularly in low-technology settings.
5. Policy and Sustainability Integration - Evaluate how national digital-transformation policies and sustainability regulations influence DT diffusion and industrial competitiveness.

By addressing these areas, future scholars and practitioners can accelerate the transition from conceptual understanding to measurable, context-aligned digital-twin implementation, strengthening both industrial productivity and economic resilience in emerging economies.

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ARTIFICIAL INTELLIGENCE ATTRIBUTES INFLUENCING THE BEHAVIOURAL INTENTION TO USE CHATBOTS IN SRI LANKAN SYSTEMATICALLY IMPORTANT BANKS

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Abstract

The study investigates the influence of artificial intelligence attributes (perceived anthropomorphism, perceived intelligence, perceived animacy) and investigates the mediating role of technology trust on the behavioural intention to use chatbots in systematically important banks in Sri Lanka. Adopting a positivist paradigm and a deductive approach was used to collect cross-sectional data through a structured survey questionnaire and analysed using SPSS and SmartPLS. The findings revealed that Artificial Intelligence (AI) attributes were significant positive predictors of chatbot adoption. The research demonstrates that technology trust acts as a mediator between AI attributes and the behavioural intention to use Chatbots. Grounded in the Computers Are Social Actors (CASA) paradigm, Technology Acceptance Model (TAM), and Unified Theory of Acceptance and Use of Technology (UTAUT), the study enhances understanding of Chatbot adoption in the banking sector. The findings have implications for developers and banks to develop more anthropomorphic, intelligent, and trustworthy chatbots that drive customer uptake and enable digitalisation in banking.

Keywords: Behavioural intention to use chatbots, perceived animacy, perceived anthropomorphism, perceived intelligence, technological trust

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DOI:

Introduction

The banking sector has fundamentally shifted in recent years due to the adoption of Artificial Intelligence (AI) technologies, which drive customer service automation, increase operational efficiency, and reduce fraud. AI chatbots have become a core mechanism for enhancing customer interaction. A total of 63.1% of banks around the world use chatbots, but less than 40% are leveraging their full capacity (Argyriou, 2024). In Sri Lanka, there are some systemically important banks that are needed for the stability of the national banking system, encouraging AI-based chatbots. People's Bank (People's Bank), Commercial Bank (Commercial Bank), and BOC Smart Assist (Bank of Ceylon) (CBSL, 2025). However, most of the chatbots are relatively low-key, performing only some limited tasks and having no advanced-level capabilities to undertake complex financial operations. This limitation can have a negative effect on customers' satisfaction and customers' behaviour (CBSL, 2025). For example, People's Bank has launched a multilingual chatbot supporting natural language understanding (NLU) for English, Sinhala, and Tamil, while Commercial Bank offers banking services via WhatsApp, enabling basic account transactions (People's Bank, 2023). From a theoretical perspective, understanding behavioural intention to use chatbots can be framed through the Computers Are Social Actors (CASA) theory, combined with the Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT). Such frameworks explain how attitudes, perceptions, and beliefs govern the acceptance of AI-based services among end-users. Few studies have examined how technological trust mediates the relationship between AI attributes and behavioural intention to use chatbots, especially among Sri Lankan Internet Banking Users (SIB users). Although several worldwide research studies have examined AI and chatbot adoption across various service sectors, there has been limited empirical research on the effects of AI-specific properties, such as perceived anthropomorphism, animacy, and intelligence, on user adoption in banking environments. All the above studies have primarily adopted TAM or UTAUT models and emphasised perceived ease of use and perceived usefulness, but never used these constructs, particularly pertaining to AI or explored their interaction effect through the mediating variable of technological trust. This study fills this crucial gap by focusing on Sri Lanka's systemically important banks, a context underrepresented in the world AI adoption research literature, thereby contributing new insights to the effect of AI-enabled human-like features on behavioural intention in a trust-based service environment. The primary aim of this paper is to investigate the determinants of behavioural intention to use AI chatbots by Sri Lanka's systemically important banks. Specifically, the study examines how AI-related characteristics interact with technological trust in shaping chatbot adoption. By addressing this gap, the research contributes to both theory and practice by providing insights into digital banking adoption, enhancing financial inclusion, and supporting the effective deployment of AI in banking (Moussawi & Koufaris, 2019).

Research questions

RQ1: Is there a significant relationship between artificial intelligence attributes (PAT, PI, PA) and behavioural intention to use Chatbots?

RQ2: Does technological trust mediate the relationship between AI attributes (PAT, PI, PA) and behavioural intention to use Chatbots?

Research objectives

RO1: To investigate the relationship between artificial intelligence attributes (PAT, PI, PA) and behavioural intention to use chatbots.

RO2: To investigate the mediating role played by technological trust in the relationship between artificial intelligence attributes & behavioural intention to use chatbots.

Literature Review

The literature review aims to establish a reasonable chain from the general concept of chatbot adoption to the specific AI-related features studied in this study. Building on CASA theory, the Technology Acceptance Model, and Unified Theory of Acceptance and Use of Technology, this chapter critically analyses the impact of perceived anthropomorphism, animacy, and intelligence on user trust and behavioural intention. These constructs were selected because of their theory and evidence relevance to human-AI interaction, particularly in digital banking environments where trust and perceived social presence play key roles in adoption.

Behavioural intention to use chatbots (BIUC)

These days, chatbots are essential tools that financial institutions utilise all around the world, particularly in poor countries. The authors point out that chatbots, via text or voice, fulfil a range of important needs of bank customers, and that many banks are now using conversational banking as a tool for this (Priya & Sharma, 2023). These technologies are used by banks to reduce waiting times and operating expenses by automating customer support tasks (such as loan assistance, financial advising, transaction alerts, personalised banking, and balance queries). Additionally, chatbots facilitate 24/7 conversational banking by managing routine inquiries using AI-driven interfaces, freeing up human agents to focus on more complex issues (Alrawad et al., 2025a). The study indicates that customers prefer successful, outcome-oriented chatbot interactions in banking and that the main factor influencing adoption intention is functional utility (usefulness) (Ramos et al., 2025). show how AI-based chatbots are commonly used to support customer service procedures, interact with clients, and provide tailored assistance (Jiang et al., 2025a).

Perceived anthropomorphism (PAT)

Perceived anthropomorphism is the practice of attributing human characteristics to non-human actors, such as chatbots. To improve user interaction and perception, particularly for bank services, organisations choose to add such attributes by naming them, creating avatars, and employing speech patterns, emoticons, and conversations that sound human. Users react to human-like computers according to social norms, despite knowing they are artificial, according to the CASA model (Priya & Sharma, 2023). The current study shows that users also anthropomorphise text-based chatbots based on interaction style and conversational tone, even though early anthropomorphism research focused on robots (Laban, 2021). The integration of these characteristics promotes trust in AI-driven customer service, emotional attachment, and resistance deflection (Jiang et al., 2025a). It has been discovered that human-like design cues (visual appearance, tone, and gender) improve user pleasure and perceived social presence (Dinh & Park, 2023). These anthropomorphically targeted cues, particularly those with vocabulary aimed at fostering social interaction, remind people of empathy and personalisation (Nawaz et al., 2024).

H1: There is a significant relationship between Perceived Anthropomorphism and Behavioural intention to use Chatbots.

Perceived animacy (PA)

Perceived animacy shows how users feel their chatbots are like people or emotional. A chatbot can emulate such characteristics as a human, and this can only be inferred based on voice as opposed to a real image. This is unlike the robots who, through facial expression and movement, express animacy (Laban, 2021). Because users feel that their chatbot acts deliberately and responds to them, they are strengthened by the chatbot design, which causes them to experience positive emotional states. Applying the theory of Piaget, the animacy can be defined as the movement, which in chatbots is implemented in the form of simulated interactivity and language-mediated communication (Jin & Youn, 2023). Finally, the sense of animacy is the most important user experience design concept because, especially in fields such as banking, where emotional comfort and the quality of relationships are also important, it evokes more humane behaviour of interaction (Laban, 2021).

H2: There is a significant relationship between Perceived Animacy and Behavioural intention to use Chatbots.

Perceived intelligence (PI)

Perceived intelligence is the quantification of competence, knowledge, and common sense of the chatbot in the perception of competent, knowledgeable, and sensible users. It also entails the ability of the system to interpret natural language, give valid and pertinent answers and do things well. The view of chatbots as smart will play a large role in the utilitarian beliefs of the users and will increase their reason for using the technology, especially amongst users who would want the technology to interact with them like humans (Ma et al., 2025). The chatbot will be considered competent enough to produce correct and trustworthy data to enter the financial service world; developers are supposed to make it more cognitively responsive and able to understand natural language (Ma et al., 2025). Piaget's cognitive theory states that the ability of the brain to learn and reason is perceived as intelligence in AI (Jin & Youn, 2023). Besides, chatbot design features like the signals of emotional messages and anthropomorphic directions have a positive impact on the degree of expectation of intelligent users regarding the system (Jin & Youn, 2023).

H3: There is a significant relationship between Perceived Intelligence and Behavioural intention to use Chatbots.

Technological trust as a mediator (TT)

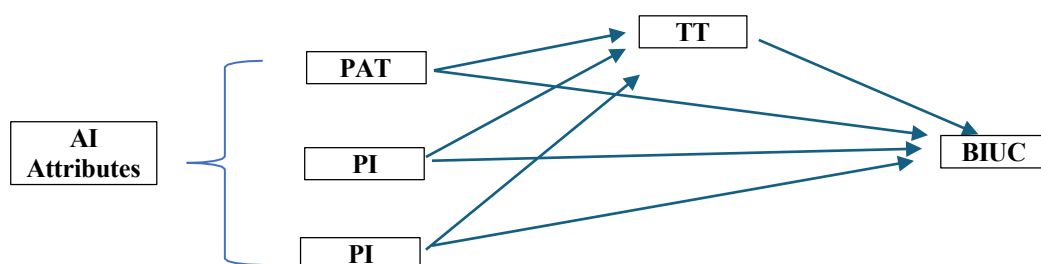
The study reveals that technological trust plays a crucial role in influencing user sentiment towards chatbots, despite social presence not directly affecting attitude. Trust contributes to the translation of perceived human-like traits into favourable user evaluations, highlighting the importance of technological trust in overall acceptance models (Alrawad et al., 2025b). It showed that the way chatbot attributes influence the usage of chatbots is mediated by trust (Choudhury & Shamszare, 2023). Adoption was only impacted by humanity and interactivity once users gained confidence in technology. This shows how trust serves as the link between behavioural results and design elements (Ding & Najaf, 2024). The article reveals that trust in AI technology significantly influences Behavioural intention to use Chatbots, as it is mediated by human-like characteristics and emotional awareness. Recognising user emotions and responding emotionally improves customer satisfaction, leading to the use of AI chatbots in the financial sector. (Jiang et al., 2025).

H4: Technological trust mediates the relationship between perceived anthropomorphism & the behavioural intention to use Chatbots.

H5: Technological trust mediates the relationship between perceived animacy & the behavioural intention to use Chatbots.

H6: Technological trust mediates the relationship between perceived intelligence & the behavioural intention to use Chatbots.

Figure 1
Conceptual framework



(Source: Developed by authors based on literature (2025))

Methodology

Population, sample, measures

The study focused on individual customers of Sri Lanka's five systemically important banks, Bank of Ceylon, Commercial Bank of Ceylon, People's Bank, Hatton National Bank, and Sampath Bank PLC, which comprise the primary population since they are leaders in adopting chatbot technologies (CBSL, 2025). The survey reached the right people with relevant experience utilising the snowball sampling method and acquired 403 usable responses, exceeding the minimum number statistically suggested at 385 (Krejcie & Morgan, 1970). An online questionnaire was administered via email and social media to collect the data. The independent variables were Perceived Anthropomorphism, Perceived Animacy, and Perceived Intelligence, and usage of chatbots was the dependent variable. All the constructs were measured with standardised five-point Likert scales, 1 (Strongly Disagree) to 5 (Strongly Agree), and internal reliability was set with Cronbach's Alpha levels of greater than 0.70, which indicates sufficient reliability (Priya & Sharma, 2023). Snowball sampling was used in this study to guarantee that all the participants were volunteer participants. Participants gave informed consent as soon as they were informed of the study purpose, procedures, and right to withdraw at any point in time without charge. Personal information was anonymised to provide confidentiality, and it was kept personal. All the data were kept safe and used only for study. Before data collection, ethical approval was received from the concerned institutional review board, and the study adhered to the principles of transparency, integrity, and minimisation of harm.

Table 1

Assessment of reliability & validity and HTMT ratio of correlations

Variable	Mean	SD	Cronbach α	AVE	PA	PAT	PI	TT	BIUC
PA	3.785	0.621	0.762	0.511					
PAT	3.662	0.625	0.774	0.527	0.914				
PI	3.861	0.607	0.801	0.557	0.973	0.950			
TT	3.693	0.628	0.786	0.537	0.826	0.929	0.916		
BIUC	3.686	0.763	0.775	0.689	0.845	0.859	0.921	0.925	

(Source: Authors, based on survey results)

Data Analysis and Results

The study's reliability and validity measurements showed moderate to high agreement among respondents on the measured items, with significant variability in responses. All constructs produced cronbach's alpha values greater than 0.7, confirming reliability. Average variance extracted (AVE) scores mostly exceeded the minimum threshold of 0.5, with the highest AVE (0.689) for behavioral intention to use Chatbots usage, indicating high common variance between items. The model uses the Heterotrait-Monotrait Correlation Ratio (HTMT) to measure discriminator validity between constructs. Values below 0.90 indicate construct differences, ensuring discriminant validity (Henseler et al., 2015).

Table 2

Assessment of the structural model

Hypothesis	Relationship	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T Statistics (O/STDEV)	P values	Decision
H1	PAT > BIUC	0.163	0.164	0.074	2.209	0.027	Supported
H2	PA -> BIUC	0.208	0.209	0.068	3.062	0.002	Supported
H3	PI -> BIUC	0.356	0.355	0.085	4.174	0.000	Supported
H4	PAT -> TT	0.374	0.374	0.056	6.742	0.000	Supported
H5	PA -> TT	0.120	0.122	0.058	2.065	0.039	Supported
H6	PI -> TT	0.328	0.330	0.062	5.291	0.000	Supported

(Source: Authors, based on survey results)

The study confirms the reliability of the proposed model, with all main hypotheses showing a significant effect on technological trust. The relationships are positive, with acceptable path coefficients and p-values less than 0.05. Perceived anthropomorphism, perceived liveliness, and Perceived Intelligence have a positive and significant effect on technological trust. Chatbot features significantly influence behavioural intention to use chatbots, with path values greater than 0.15 and p-values less than 0.05.

Table 3

Regression results

	R-square	R-square adjusted
TT	0.542	0.538
BIUC	0.607	0.603

(Source: Authors, based on survey results)

The study reveals that the R-squared values for technical load TT and behavioural intention to use chatbots are 0.542 and 0.607, respectively, indicating that the independent variables account for 54.2% and 60.7% of the variance in TT and BIUC, respectively. These high values suggest excellent explanatory power and strong support for hypothesised relationships.

Discussion, Implication, Limitation, and Conclusion

The results of the present research paint a vivid image of the determinants underlying Sri Lankan bank customers' use or avoidance of chatbots. The results show that AI attributes affect Behavioural Intention. Building trust, emphasising differentiation benefits, and marketing sophisticated AI and chatbot features need to be on the managers' agenda. Banks can facilitate behavioural intention to use technology, build technology trust, and achieve higher user adoption and usage in a competitive digital economy by delivering reliability, security, and user-friendly experiences. This study is limited due to its cross-sectional nature, limited generalizability to other banks, and limited sociopsychological variables examined. Future studies should include customers from different banks, use longitudinal designs, and use qualitative designs to obtain more detailed insights. Variables such as age, income, and digital literacy can be used to obtain more detailed information. This study shows AI attributes are critical in determining the behavioural intention to use chatbot technologies among the customers of the systemically important banks in Sri Lanka. All three of the hypotheses were maintained as customers are more positively predisposed toward chatbots that are personal, empathetic, and competent, mirroring as they do what they would seek in human bank staff. These results are consistent with dominant theories such as the CASA model, which explains that users impose social characteristics on technology, and TAM and UTAUT, which consider perceived usefulness and social cues as paramount in technology adoption. In the Sri Lankan banking context, where relationship and trust are the most important, human-like simulated chatbots not only reduce users' lack of trust but also build rapport and familiarity. Therefore, successful adoption of chatbots depends not just on technological capability, but on designing systems consciously to be intelligent, emotionally perceptive, and human. Banks looking to promote customer satisfaction and interaction should make these features top priorities in their chatbot design initiatives.

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EXPLORING THE IMPACT OF COLLABORATIVE AI ON EMERGING SKILL SETS IN DESIGN JOBS: A QUALITATIVE INVESTIGATION

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Abstract

Artificial intelligence (AI) is reshaping design practice by automating production and augmenting creative decision-making. This study examines how collaborative AI tools influence designers' workflows, skills, and creative control. Twenty-one semi-structured interviews were conducted with designers, art directors, and AI developers. AI supports idea generation and low-risk experimentation, while designers remain essential for contextual, cultural, and aesthetic judgment. Three emerging competencies define effective collaboration: prompt formulation, evaluative discernment, and orchestration across tools and stages. Human–AI partnerships enhance efficiency without replacing creative authorship. Findings contribute to understanding evolving skill sets and highlight the need for AI literacy and ethical awareness in design education and industry training.

Keywords: Artificial intelligence, collaboration, creative industries, design skills, skill development

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DOI:

Introduction

Artificial Intelligence (AI) is automating production workflows, accelerating ideation and experimentation in design. Its value is greatest when used as a collaborator rather than a replacement, augmenting designer capability and creative direction. Generative tools rapidly produce layout variations and prototypes but still struggle with context, nuance, and brand coherence. This shift moves design from simple tool use toward ‘teammate orchestration,’ requiring designers to guide, critique, and integrate AI outputs.

Industry adoption of AI in design is widespread, with over 70% of professionals now experimenting with generative tools (Adobe, 2023; Precedence Research, 2024). However, academic understanding lags these changes. Research has mainly examined automation and efficiency, providing limited insight into how AI transforms human expertise, collaboration, and creative identity. This study addresses that gap by examining AI as a collaborator in creative work rather than a technical tool.

Drawing on insights from twenty-one design professionals, this study investigates how collaborative AI reshapes roles, workflows, and skill requirements. Specifically, this study explores three key questions:

RQ1: What new skills are essential for effective human–AI collaboration in design?

RQ2: Where do AI tools add value, and where do they fall short in complex creative tasks?

RQ3: How are design responsibilities and workflows being reconfigured through AI integration?

The findings reveal that productivity gains coexist with new demands on designers' competencies, particularly in prompt formulation, critical evaluation, and managing human-AI collaboration. The study makes both theoretical and practical contributions. It advances the understanding of skill transformation in human-AI collaboration and offers actionable guidance for educators and design teams to sustain creativity while integrating AI tools responsibly.

Literature Review

AI is transforming how designers conceptualise and produce visual content in creative industries. Prior research shows that AI accelerates ideation and repetitive processes, allowing designers to test multiple variations quickly (Holm & Lorenz, 2022; Matthews et al., 2023). Yet, creative outcomes still depend on human capacity for contextual and aesthetic judgment (Seeber et al., 2020). The designer's role is shifting from execution to orchestration, managing human–AI collaboration.

Studies highlight that AI's value in design goes beyond automation. Designers act as interpreters, translating creative vision into effective prompts and refining outputs through iterative critique. This aligns with the emerging notion of AI literacy. Bérubé and Béland (2021) define AI literacy as a combination of technical fluency, ethical reasoning, and contextual decision-making required for responsible AI integration into professional workflows.

Despite these developments, few empirical studies examine how these competencies are applied in real-world design practice. Existing literature is largely conceptual, focusing on tool capabilities or ethical speculation, and the professional skill dimension remains underexplored. To address this gap, this study examines how designers adopt and adapt collaborative AI systems in their everyday work.

Guiding Propositions

Building on the literature, three propositions inform this study:

P1: Collaborative AI transforms the designer's role from technical execution to orchestration; this shift requires metacognitive and managerial skills.

P2: Effective human-AI collaboration depends on designers' ability to frame prompts and evaluate AI outputs, ensuring alignment with creative intent.

P3: Emerging AI literacy, encompassing ethical awareness, contextual interpretation, and adaptability, defines future-ready design competencies.

These propositions provide the analytical foundation for the study, shaping its focus and interpretation.

Research Methods

Research design

This study adopts a qualitative, interpretivist design to explore how collaborative AI influences design practice. Guided by Creswell (2013), the interpretivist approach enables an in-depth understanding of participant experiences. Action-research principles were applied to bridge design practice and theory, enabling reflective iteration.

Data collection

Data was collected through twenty-one semi-structured interviews with professionals across agencies, freelance, and in-house contexts. Participants were recruited using purposive and snowball sampling (Patton, 2002) to ensure diverse roles, experience levels, and settings. Interviews were conducted online (with consent), recorded, and transcribed verbatim, each lasting 45-60 minutes.

Ethical considerations

Ethical approval was obtained before data collection, and all participants provided informed consent with confidentiality assured. Identifying details were removed, and pseudonyms were used to maintain confidentiality.

Data analysis

Transcripts were coded and analysed thematically (Braun & Clarke, 2006). Initial coding captured recurring patterns of AI use, collaboration, and evolving competencies, which were then refined into higher-order themes. Patterns were examined across the four guiding propositions (P1–P4) established in the literature review. Lincoln and Guba (1985) criteria of credibility, dependability, and confirmability guided the assessment of qualitative rigor. Reflexive memoing and an audit trail documented analytical decisions, strengthening transparency.

Data transparency and limitations

Representative anonymised excerpts are included in the findings to illustrate perspectives; complete transcripts are securely stored and available upon request. While the sample size limits generalizability, the study provides transferable insights relevant to professional design contexts. Regional concentration may also influence perspectives, contextual limitations.

Findings and Discussion

Experience with AI tools

Sixteen of 21 participants (76%) reported occasional use of AI tools in their workflows. Most cited significant time savings and increased productivity in early design stages. Junior designers described AI as a creative accelerator, particularly for idea generation and layout exploration. As one junior designer noted, *'If I'm doing it manually, it takes me almost three hours to make a storyboard, but using Adobe Firefly, it takes only 30 minutes'* (JGD4). Another participant explained, *'It's like having a brainstorming partner that never gets tired; it pushes me to explore new visual ideas'* (SGD2).

Usage patterns varied by role: junior designers experienced the greatest time savings, while senior designers were more selective, typically applying AI for repetitive or exploratory tasks. Art directors and developers emphasised governance, workflow integration, and the need for oversight. These findings align with Seeber et al. (2020), who argue that outcomes in human-AI collaboration depend on both technological familiarity and creative autonomy. Grounded in participants' lived experiences, this study extends that work by showing how creative professionals integrate AI tools into real-world design workflows.

Impact on design work

Participants widely agreed that AI enhanced speed and variety, especially during early design phases such as prototyping and background manipulation. Time savings, particularly in ideation and asset generation, were cited as the most immediate benefit by 14 of 21 participants (67%). However, many emphasised that AI outputs often lacked originality, emotional tone, and sensitivity to brand context. As a creative director noted, *'AI gives me drafts, but I still decide what feels right for the brand; it can't read emotion or tone'* (CD1). A senior designer added, *'Sometimes it gives too many options, and that's another kind of overload we need to manage'* (SD2).

While AI accelerated workflows, participants emphasised the need for human oversight in client-facing or culturally sensitive projects. They viewed AI as most effective in low-risk, exploratory phases, where volume and variation are advantageous, but consistently reinforced the importance of human judgment in refining outputs for

brand alignment and narrative nuance. These findings complement earlier concerns raised by Kaiser (2019) and Kelly (2018) about AI's lack of contextual awareness and limited creative judgment.

Collaboration, skills, and project complexity

Perceptions of AI's usefulness varied strongly with project type (Table 1). A large majority (17 of 21; 81%) found AI tools most valuable in low-stakes or exploratory tasks such as rapid prototyping and internal mock-ups. In contrast, nearly all participants (18 of 21; 86%) emphasised the necessity of human oversight in brand-sensitive or high-visibility projects. These findings highlight project complexity as a moderating factor: AI is embraced when risks are minimal, but constrained where originality, cultural nuance, or reputational stakes are high.

Participants identified emerging competencies required for effective AI collaboration across different project contexts. Prompt engineering was consistently cited as a foundational skill (12 of 21; 57%). It enables designers to frame problems and guide AI toward outputs that align with their creative intent. Evaluative judgment was emphasised by an even larger share of participants (15 of 21; 71%). Respondents noted that AI-generated outputs often required refinement to achieve contextual accuracy, brand alignment, and cultural sensitivity. Some participants described orchestration as a 'meta-skill' involving the sequencing of tasks across multiple tools and determining where human oversight is essential. One AI developer remarked, *'Good prompting feels like negotiation, you have to guide the model to get what you really want'* (AID1). A senior designer echoed, *'You can't just press a button; you have to decide what's usable and what feels human'* (SGD3).

These competencies are illustrated in Table 1, which maps design tasks to typical tools used, their value, and identified risks. Table 1 shows that AI accelerates ideation, layout variations, and background manipulation, but is less effective for tasks requiring brand coherence or narrative flow. Designers, therefore, operate less as isolated creators and more as curators and integrators of AI-assisted content, ensuring efficiency gains do not compromise originality or reputational integrity. This theme directly responds to RQ3, aligning with Holm and Lorenz (2022) and Matthews et al. (2023), who highlighted prompt formulation and evaluative judgment as emerging design competencies. The present study substantiates those claims empirically, demonstrating that these skills, along with orchestration, define the evolving role of designers as 'process architects' in AI-mediated creative production.

Table 1:

Where collaborative AI helps and where human oversight dominates

Task/phase	Tools typically used	Perceived value	Typical use cases	Primary risks/limits	Oversight needed
Ideation & rapid variants	Midjourney, Firefly, DALL·E	High	Mood boards, campaign mock-ups	Generic style, originality concerns	Human curation for brand fit
Layout/options & prototyping	Image + text models	Medium–High	Alternatives, quick prototypes	Inconsistent hierarchy/context	Designer sets constraints
Background manipulation	Image models	High	Product shots, composites	Edge artefacts, tone mismatch	Visual QA
Storyboarding	Image + text models	Medium	Early sequences	Narrative coherence	Human sequencing
UI testing/low-risk trials	Assistive tools	Medium	Speed checks, variants	Over-reliance	Designer sign-off
Brand-sensitive identity work	—	Low (AI assist only)	Core identity, cultural messaging	Nuance/originality	Human-led throughout

(Source: Author's compilation) Note: Competencies were derived from thematic analysis of participant interviews.

Taken together, these findings underline that collaborative AI is not replacing designers but reconfiguring their role. Where projects are low-risk, AI offers speed and variety; where the stakes are higher, human oversight and judgment remain central. The emerging competencies of prompting, evaluation, and orchestration suggest that designers are evolving into process architects who integrate machine capabilities without compromising creative integrity. This naturally extends to a broader question of how such redefined roles will shape the future trajectory of human-AI collaboration in design, which is explored in the next section.

A central assumption in both industry discourse and early scholarship is that Artificial Intelligence will eventually replace human designers or diminish the value of human creativity. This study's findings directly challenge that notion. Across all interview categories, participants described AI as an enabler rather than a substitute, a collaborator that expands ideation breadth but depends on human judgment for contextual and cultural sensitivity. The evidence shows that rather than eliminating creative labour, AI is redistributing it, shifting designers' focus from production tasks toward higher-order orchestration and critical evaluation. This reconfiguration of work challenges the replacement narrative and underscores the significance of developing frameworks that position AI

as a collaborative partner in creativity rather than a threat to it. These findings not only clarify how AI is reshaping creative work but also reveal broader implications for theory, education, and professional practice.

Implications

These findings have several important implications for both theory and practice. Theoretically, these findings extend models of creative collaboration by explicitly including AI as an active collaborator whose contributions still require human orchestration and ethical oversight. This shift moves beyond the automation paradigm toward co-agency and implies that future design theory should account for shared authorship between humans and AI systems.

In practice, our results highlight the need for organisational strategies and educational curricula to prepare designers to work effectively in mixed human-AI environments. For industry, this means upskilling practitioners in prompt engineering, evaluative judgment, and workflow orchestration. It also requires establishing clear boundaries for human oversight in brand-sensitive projects and ethical decision-making. For design education, integrating AI literacy and ethical reflection into curricula will ensure that future professionals approach AI as a creative partner, not a threat.

Practical, managerial, and policy implications

Beyond individual competencies, the findings suggest several actionable strategies for organisations and policymakers. For example, design firms and in-house teams should develop structured training programs that build AI literacy and encourage critical engagement with AI-generated outputs instead of passive adoption. Additionally, managers should establish clear internal policies specifying when AI-generated content can be used and when human sign-off is required, as well as how credit and accountability are shared between humans and machines. At the policy level, professional associations and educational institutions could collaborate to establish ethical frameworks and accreditation standards for AI use in the creative industries. Such measures would help ensure that AI integration enhances, rather than erodes, creative integrity, transparency, and trust across the design ecosystem.

Limitations

This study has several limitations. The sample of 21 professionals (sufficient for qualitative saturation) limits the generalizability of the findings beyond similar creative industries. Since most participants came from the Middle East, South Asia, and Southeast Asia, regional cultural and organisational factors may have influenced their perspectives. Because the data relies on self-reported experiences rather than direct observation, participants' responses may reflect biases or memory errors. Finally, the study captures a single moment in a rapidly evolving technological landscape. Longitudinal or comparative studies could provide deeper insights into how designer-AI collaboration evolves. Despite these limitations, the study provides credible insights into emerging practices and competencies in professional design settings.

Conclusion

This study explores how collaborative AI reshapes skill requirements in design jobs, based on interviews with 21 design and related professionals. The findings indicate that although AI enhances productivity, ideation, and prototyping efficiency, its benefits depend on the project's complexity. Low-risk, exploratory tasks benefit most from automation. In contrast, brand-sensitive, high-stakes projects still require human oversight to preserve originality, cultural nuance, and reputational integrity.

Three competencies are central to effective collaboration: prompt engineering (enabling designers to frame and direct AI outputs), evaluative judgment (ensuring contextual accuracy and brand fit), and orchestration (sequencing tasks between humans and AI while maintaining quality). These competencies illustrate a shift from viewing designers as sole creators to seeing them as process architects who integrate computational tools with human-led creative judgment.

Several limitations must be acknowledged. The study relied on a purposive qualitative sample of 21 participants, which restricts generalizability. The geographic scope was narrow, and the cross-sectional design did not capture how competencies evolve.

Future work should build on these findings through larger and more diverse samples, quantitative measures of adoption and skill transformation, and longitudinal research to track how collaboration practices mature. Comparative studies across industries and cultural settings would also add depth, particularly in clarifying how ethical and creative norms shape sustainable human-AI collaboration. Overall, this research offers an empirical

perspective that reframes AI not as a replacement for human creativity but as a catalyst redefining designers' competencies and collaborative practices.

Future research

This study opens several avenues for further investigation. Future research could employ longitudinal designs to examine how designers' skills and attitudes evolve as AI tools mature and become embedded in everyday workflows. Quantitative or mixed-method studies could test the relationships identified here, such as the link between AI literacy, evaluative judgment, and creative performance across larger and more diverse samples. Cross-disciplinary comparisons between design, architecture, and engineering fields would also clarify whether the collaborative competencies identified in this study are universal or discipline-specific. Finally, experimental work could explore how training interventions in prompt engineering or ethical reasoning affect creative outcomes and team dynamics in human-AI collaboration.

Overall contribution

In summary, this study contributes a nuanced and empirically grounded understanding of how collaborative AI is transforming creative work into design. By reframing AI as a collaborative actor rather than a substitute for human creativity, it advances theoretical discussions on co-agency and provides actionable insights for professional practice and education. The integration of qualitative evidence, cross-role perspectives, and literature-grounded analysis ensures both academic rigour and real-world relevance. Collectively, the revisions have strengthened the paper's coherence, depth, and significance within the emerging discourse on human-AI collaboration.

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INTEGRATING SPATIAL CLUSTERING AND WEIGHTED DID FOR RETAIL INTERVENTION ASSESSMENT: A FRAMEWORK FOR SPILLOVER CONTROL AND STRATEGIC RISK EVALUATION

Banani Mohapatra¹, Bhavnish Walia²

Abstract

Quantifying the causal impact of spatial treatments such as retail pricing changes, logistics incentives, or geo-promotions is challenging due to spatial interference, spillovers, and non-random treatment assignment. This paper develops a geo-based causal inference framework consisting of unsupervised clustering, spatial buffering, and econometric estimation for such challenges. Using hybrid PCA-based K-Means and DBSCAN clustering, covariate-balanced treatment-control spatial contiguous pairs are created using Haversine distance buffers for spillover control. The framework is illustrated on a large-scale retail intervention for which a national retailer removed pickup fees for store pickup orders. Analysis integrates store metadata and transaction data across several regions, encompassing over 10,000 retail outlets. Treatment impacts are estimated based on an Inverse Propensity Weighting (IPW) weighted Difference-in-Differences (DiD) model controlling time-invariant confounders. We find a 3.79% lift in sales, corroborating significant post-intervention gains and robust parallel trends. The paper contributes a spatial causal inference framework with a scalable framework for marketing, strategy, strategic risk, and policy evaluation, with accompanying spatial spillover management and market risk management insights for localised retail decision-making.

Keywords: Difference-in-Differences, hybrid clustering, inverse propensity weighting, spatial causal inference, treatment spillover mitigation

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DOI:

Introduction

Background and motivation

For organisations operating geographically distributed services such as omni-channel retail chains, logistics networks, advertising platforms, or public infrastructure systems, localised programs are a strategic lever for driving revenue growth, customer loyalty, and competitive differentiation. For example, a large U.S.-based omni-retailer recently waived store pickup fees on online orders picked up in-store, with the intent to increase order frequency and bias customer preference toward low-cost fulfilment channels. Operationally simple, it is challenging and directly financially consequential for pricing, promotions, and supply chain planning to causally estimate the true effect of such initiatives. In practice, business leaders must confront difficulties stemming from spatial interference, market heterogeneity, as well as the absence of randomised treatment assignment (Reich et al., 2021; Rubin, 1974; Keele & Titiunik, 2015). For example, waiving pickup fees at select stores can shift demand not only at treated locations but also at nearby untreated stores-attracting spillover effects that violate the Stable Unit Treatment Value Assumption (SUTVA) (Card & Krueger, 1994). This contamination renders classical estimators such as Difference-in-Differences (DiD) or Inverse Propensity Weighting (IPW) (Pollmann, 2024; Rosenbaum & Rubin, 1983). While the literature has addressed spatially adjusted matching, hierarchical spatial models, and clustering-based methods, existing methodologies often lack built-in spillover prevention measures, i.e., adaptive geographic buffers, to ensure business insights remain uncontaminated and actionable (Anselin, 1988; Gibbons, 2022; Sinnott, 1984). This work closes a prominent gap in spatial causal inference with the development of an applied, large-scale framework for estimating localised treatment effects within real-world retailing environments, such as those in which spillovers, spatial dependencies invalidate traditional estimators.

Scope, objectives, and research questions

This study proposes a generalised geo-based causal inference framework that integrates hybrid clustering, adaptive haversine buffering, and IPW-weighted DiD estimation, supported by diagnostics such as standardised mean differences, placebo tests, and event studies. The research addresses four key questions:

RQ1: How can hybrid clustering improve covariate balance and spatial coherence?

RQ2: Can dynamic geographic buffers effectively reduce spillover contamination?

RQ3: Does IPW-adjusted DiD enhance robustness against confounding?

RQ4: How well do diagnostics validate assumptions and strengthen stakeholder confidence?

Literature Review

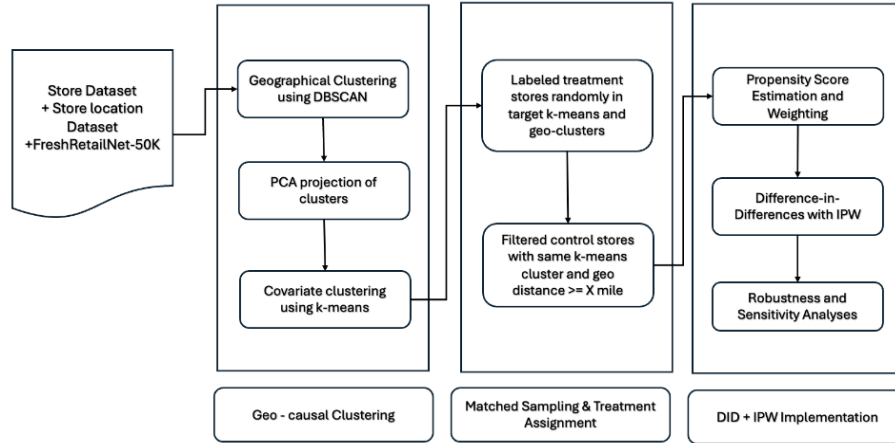
It is difficult to evaluate geographically targeted interventions due to spatial dependence, spillovers, and heterogeneity. Early econometric work tackled spatial correlation (Anselin, 1988; Cliff & Ord, 1981), which was then augmented using Bayesian and machine learning-oriented spatial models (Lee & Yu, 2022; Lesage & Pace, 2009; Zhang et al., 2024). Rubin's propensity score framework enhanced covariate balance (Rosenbaum & Rubin, 1983) and motivated interference-aware matching methods (Kondo, 2023; Papadogeorgou et al., 2020). Nevertheless, traditional matching does not behave well under spatial interdependence when units on the boundary between treatment and control regions interfere with one another (Eckles et al., 2023; Hudgens & Halloran, 2008). Spatial extensions for DiD have incorporated distance and spillover effects (Arefin et al., 2023; Conley, 1999; Gibbons et al., 2019; Lee et al., 2022), whereas automatic causal pipelines more frequently incorporate distance-based buffers for controlling interference (Chen & Mueller, 2023). Non-parametric clipping methods like PCA + K-Means clustering and DBSCAN increase spatial coherence and treatment-control balancing (Ester et al., 1996; Han et al., 2022; Jolliffe & Cadima, 2016;). Furthermore, adding IPW (Inverse Propensity Weighting) to DiD makes the approach more robust against confounding (Abadie, 2005; Forastiere et al., 2021; Hirano et al., 2003; Imai & Ratkovic, 2014; Robins et al., 2000). While there have been such advancements, many spatial DiD applications remain based on fixed spatial assumptions or constrained interference modelling. Classic constructions (Conley, 1999; Gibbons et al., 2019) cover geographic proximity but have no adaptive spillover adjustment, whereas hierarchical or Bayesian constructions (Lee & Yu, 2022; Lesage & Pace, 2009) estimate dependence without tractable scalability for large, realistic datasets. The presented hybrid framework combines unsupervised spatial clipping, adaptive buffering at a geographically adapted distance, and IP-weighted DiD within a common design, all at once gaining dynamic spillover adjustment, covariate balancing, and robust causal estimation.

To our knowledge, our paper is the first to combine such pieces of work within a scalable framework for geographically localised, non-randomised assessment of interventions. The techniques, when employed

collectively, handle the primary spatial assessment problems, covariate imbalance, interference, and unobserved heterogeneity, yielding credible numbers that have a clear application in high-stakes business decisions for the practitioner. While demonstrated here for an omni-retail fee waiver, the framework extends to logistics, advertising, and healthcare, providing researchers and decision-makers a generalizable, flexible spatial policy evaluation tool.

Methodology

Figure 1
Step-by-Step Execution of Methodology



(Source: Developed by authors based on literature (2025))

This study estimates the causal impact of pricing interventions on store-level sales. The methodology, as described in Figure 1, consists of the following steps.

Data sources and preprocessing

We merge two large public datasets at scale to guarantee both context richness and transactional accuracy. The Store Dataset allows for store-level metadata and covariates like store_size, foot_traffic, and inventory_level for all outlets within the retailing network, which gives robust structural information necessary for comparison at baseline. The FreshRetailNet-50K dataset fills out this information by recording fine-grained, daily-level transactional sales and inventory movement, enabling accurate time-wise tracking of treatment impact. The study duration is from January 2024 through August 2024, a period that reflects enough pre- and post-intervention variation to create plausible counterfactual trends.

After pooling the inventory and sale data at store_id × day level, we create a treatment date t_0= {2024-05-10} and treat all the observations as post-treatment or pre-treatment, respectively

$$\text{period}_{i,t} = \begin{cases} \text{pre} & \text{if } t < t_0 \\ \text{post} & \text{if } t > t_0 \end{cases} \dots\dots\dots (1)$$

Equation (1) simply indicates that all records before the intervention are labelled as ‘pre-treatment’ and those after the intervention as ‘post-treatment’.

The data preparation included cleaning of transaction anomalies, harmonisation of store metadata using store_id merges, truncation of incomplete daily observations (<95% coverage), and winsorizing of extreme values (top and bottom 1%) for reduction of bias. This step provided for temporal validity, stability of covariates, and robust identification of treatment exposure across stores.

Clustering for Spatial and Covariate Balance

Geographic Clustering: We apply DBSCAN with Haversine distance for unsupervised clustering of stores using latitude and longitude. The Haversine distance between two coordinates is given by:

$$d_{ij} = 2r \cdot \arcsin\left(\sqrt{\sin^2\left(\frac{D_j}{2}\right) + \cos(j_i)\cos(j_j)\sin^2\left(\frac{D_i}{2}\right)}\right) \dots\dots\dots (2)$$

where $r = 3959$ miles is the Earth's radius.

Cluster validity was judged based on the silhouette measure of spatial cohesion and separation. Generally, less than 0.1 signifies poor clustering, 0.1- 0.25 signifies moderate, but understandable structure, while greater than 0.25 signifies strong, separated clusters. This range reflects plausible spatial structure for retail catchments, for which moderate overlap is desired for geographic contiguity.

Covariate Clustering: Thirteen normalised covariates (e.g., store size, inventory level, online sales share) are reduced via Principal Component Analysis (PCA), retaining components that explain at least 90% of variance. K-Means clustering is then applied, with the optimal $k = 4$ selected using the Elbow Method, where the sum of squared errors (SSE) is given by:

$$SSE_k = \sum_{i=1}^N ||x_i - \mu_k||^2 \dots\dots\dots (3)$$

where μ_k denotes the centroid assigned to the observation.

It addresses RQ1 by gauging how hybrid spatial and covariate clustering facilitates both covariate balance and geographic coherence across retail outlets.

Matched sampling and treatment assignment

For validation, 50% of stores were pseudo-randomly assigned to treatment. Each treated store was matched to a control based on: (1) behavioural similarity via PCA-based K-Means clustering (cluster difference ≤ 1) and (2) geographic spillover mitigation using a dynamically chosen Haversine-based buffer within the same DBSCAN cluster. Buffers from 0–50 miles (5-mile increments) were tested, assessing matched pairs, standardised mean differences (SMDs), and control duplication rates. A 25-mile buffer achieved strong covariate balance (all SMDs < 0.1), minimised control reuse, and ensured complete coverage, producing geographically coherent matches while reducing contamination risk from proximity spillovers.

For verification, 50% of the stores were pseudo-randomly designated for treatment. A control was matched with a treated store on: (1) behavioural similarity based on PCA-based K-Means clustering (differing clusters ≤ 1) and (2) adjustment for geographic spillover using a dynamically chosen Haversine-based buffer within the same DBSCAN cluster. We checked buffers 0-50 miles apart (in 5-mile increments), testing on matched pairs, standardised mean differences, and rates of duplication for controls.

The adaptive buffer approach balances empirical optimisation with theoretical reasoning grounded in retail catchment dynamics and spatial decay principles, where customer influence typically declines sharply beyond 20-30 miles. Within this range, proximity captures local market effects without introducing spillovers from adjacent territories. The 25-mile buffer thus represents a stable equilibrium, wide enough to ensure sufficient control availability yet narrow enough to maintain treatment isolation. This configuration achieved strong covariate balance (all SMDs < 0.1), minimised control reuse, and ensured complete geographic coverage.

It addresses RQ2 through exploration of the capacity of adaptive geographic buffers in spillover reduction across space without compromising on effective treatment-control matching.

Propensity score estimation and weighting

To account for residual imbalances of covariates, we estimate propensity scores $e(x_i)$ using logistic regression

$$e(x_i) = P(T_i = 1|x_i) \dots\dots\dots (4)$$

Weights are then defined as:

$$w_i = \begin{cases} \frac{1}{e(x_i)} & \text{if } T_i = 1 \\ \frac{1}{1-e(x_i)} & \text{if } T_i = 0 \end{cases} \dots\dots\dots (5)$$

Difference-in-Differences with IPW: We fit a weighted linear model with interaction terms:

$$Y_{it} = \alpha + b_1 * Treated_i + b_2 * Post_t + \tau * b_2 * Treated_i * Post_t + e_{it} \dots \dots \dots (6)$$

where τ is the Average Treatment Effect (ATE) estimated using IPW + DiD with cluster-robust standard errors.

The modelling framework for RQ3 evaluates if IPW-adjusted DiD provides robustness against confounding under spatially heterogeneous scenarios.

Robustness and Sensitivity Analyses: Robustness checks guarantee that treatment effects estimated are not due to modelling assumptions, confounding, or data errors. We employ three diagnostics. (1) Standardised Mean Differences: Computed for important covariates to verify post-matching balance. (2) Placebo Test: Treatment date moved 10 days earlier; an insignificant effect corroborates validity by eliminating anticipation or unmeasured trends. (3) Event Study: Estimates treatment impacts at various pre- and post-intervention periods to check for parallel trends, anticipatory behaviour, and effect duration. Collectively, these tests adhere to applied econometrics best practices, increasing the credibility and interpretability of causal estimates in spatial policy analysis.

This validation method does RQ4 by determining how diagnostic tests justify the reliability of causal assumptions and strengthen stakeholder confidence in the results.

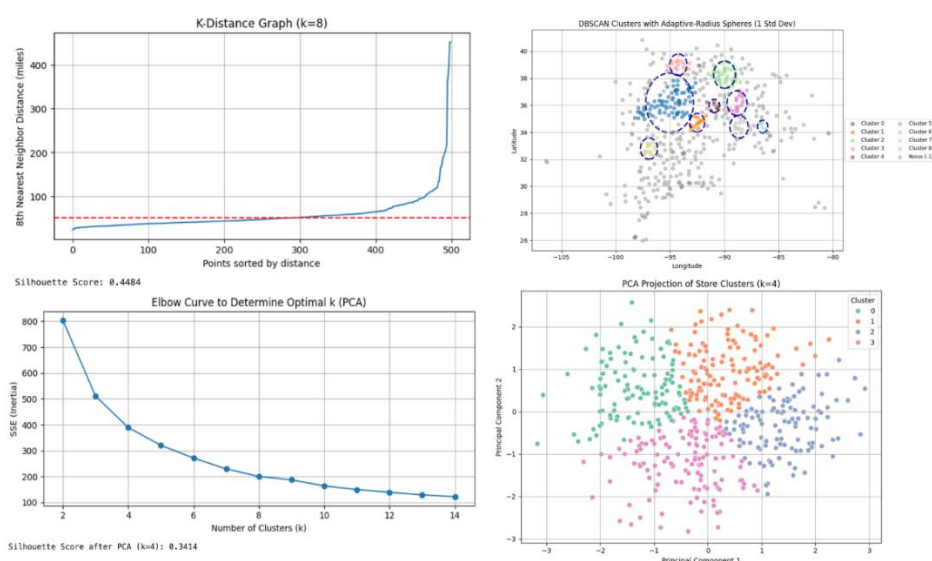
Results and Discussion

Matching quality and covariate balance (RQ1)

We matched 250 treated stores with 250 control stores using a two-stage clustering process. First, PCA-based K-Means clustering grouped stores into four clusters based on sales-relevant features such as size, demographics, and inventory. Next, DBSCAN clustering introduced a spatial dimension by grouping stores according to geolocation, tolerating noise and irregular shapes, and producing eight clusters. The `min_samples` parameter for DBSCAN was set to 8 after analysing the k-distance graph, which remained relatively flat until approximately 60-70 miles before sharply increasing - indicating the optimal neighbourhood size for identifying dense store clusters. Using this setting and an epsilon value near the elbow point, DBSCAN generated eight valid spatial clusters with a silhouette score of 0.18, consistent with the moderate separation expected in real-world retail geographies where store catchments often overlap. The results are also consistent with prior comparisons of spatial retails, which highlight the necessity for moderate spatial overlap for plausible causal comparisons (Gibbons et al., 2019). This supports RQ1, which demonstrates that covariate balance is enhanced, with the implemented retail interventions' geographic realism being maintained.

Figure 2

Clustering diagnostics and outputs: (Top left) K-distance graph for DBSCAN (k=8) showing optimal ϵ threshold; (Bottom Left) Elbow curve from PCA-transformed data to determine optimal k for K-means; (Top right) DBSCAN clusters with adaptive-radius spheres (± 1 standard deviation) over geographic coordinates; (Bottom right) PCA projection of K-means store clusters (k=4) showing covariate separation.



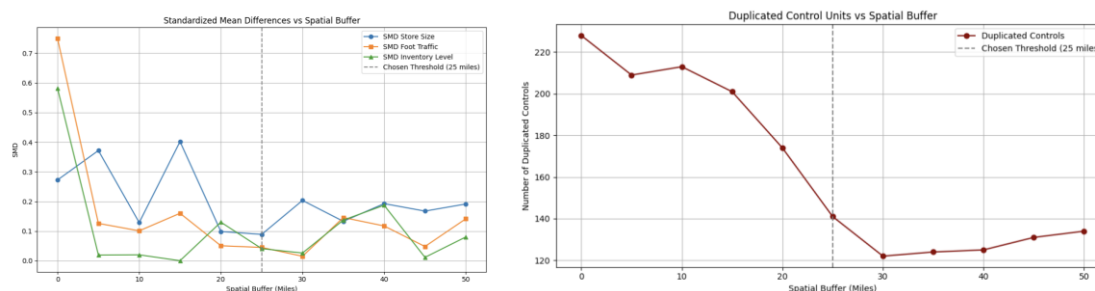
(Source: Developed by authors based on literature (2025))

Spatial spillover mitigation (RQ2)

To mitigate geographic interference and ensure clean causal estimation, we systematically evaluated spatial buffers from 0 to 50 miles in 5-mile increments using Haversine distance. For each setting, we matched treated and control stores based on behavioural (KMeans) and geographic (DBSCAN) clusters, assessing covariate balance via standardised mean differences and monitoring control duplication. The best buffer achieved successful covariate balancing (all SMDs < 0.1) with limited spatial contamination, also congruent with spatial causal literature findings, emphasising localised buffers for managing interference control (Forastiere et al., 2021). This addresses RQ2, confirming that adaptive geographic buffers manage spillovers effectively while maintaining unbiased causal contrasts.

Figure 3

SMD variation by 3 attributes and the Number of duplicated controls with a spatial buffer



(Source: Developed by authors based on literature (2025))

Treatment effect estimates

Figure 4

Output of the DiD regression

DiD + IPW Regression Summary (Clustered SE):

WLS Regression Results						
Dep. Variable:	sales	R-squared:	0.160			
Model:	WLS	Adj. R-squared:	0.158			
Method:	Least Squares	F-statistic:	1.851e+04			
Date:	Tue, 29 Jul 2025	Prob (F-statistic):	0.00			
Time:	01:47:36	Log-Likelihood:	-5354.1			
No. Observations:	1000	AIC:	1.072e+04			
Df Residuals:	996	BIC:	1.074e+04			
Df Model:	3					
Covariance Type:	cluster					
	coef	std err	z	P> z	[0.025	0.975]
Intercept	1001.1958	3.692	271.180	0.000	993.960	1008.432
treated	-2.2217	4.945	-0.449	0.653	-11.913	7.470
post	17.1799	0.315	54.464	0.000	16.562	17.798
treated:post	37.9263	0.412	92.023	0.000	37.119	38.734
Omnibus:	27.096		Durbin-Watson:	2.007		
Prob(Omnibus):	0.000		Jarque-Bera (JB):	40.763		
Skew:	0.250		Prob(JB):	1.41e-09		
Kurtosis:	3.854		Cond. No.	6.88		

Notes:
[1] Standard Errors are robust to cluster correlation (cluster)

Estimated ATE (IPW + DiD): 37.9263
95% CI: [37.1185, 38.7341]

(Source: Developed by authors based on literature (2025))

The figure above reports the regression output from the IPW-adjusted DiD model. The interaction term between the treatment indicator and the post-intervention period is statistically significant at the 1% level.

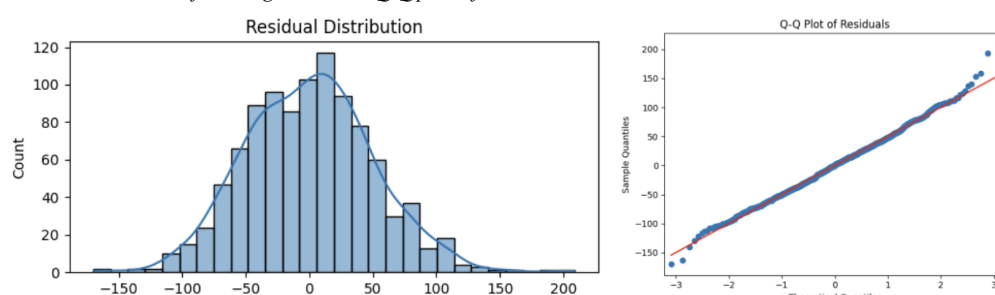
- Estimated ATE (treated × post): 37.93
- Standard Error: 0.41
- 95% CI: [37.12, 38.73]
- p-value: < 0.001

After adjusting for covariate imbalance and time-invariant store-level effects, the intervention - wherein the omniretail company eliminated pickup fees for online orders collected in-store - was associated with a statistically significant 3.79% increase in average daily sales for treated stores relative to matched controls. It is also in alignment with earlier findings showing that eliminating transactional friction has the potential to spur conversion and retention across omnichannel retailing (Brynjolfsson et al., 2020). The findings have practical implications for retailers through the revenue effects of localised fee-waiver programs quantified in them.

Residual behaviour

Figure 5 presents the residual diagnostics. The residual histogram shows a symmetric distribution about zero, and the Q-Q plot shows approximate normality. There is no evidence of heavy skewness or kurtosis, indicating a good fit and valid inference under the Gaussian approximation.

Figure 5
Residual distribution of DID regression and Q-Q plots of residuals



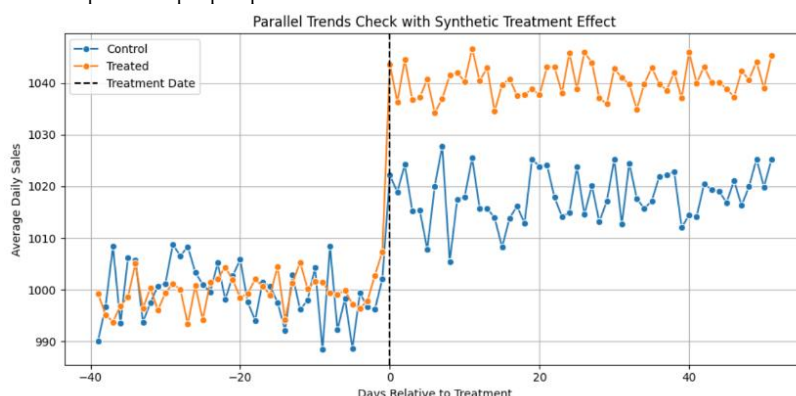
(Source: Developed by authors based on literature (2025))

Covariate adjustment robustness (RQ3)

Including store-level covariates such as store size, customer age, and foot traffic in a sensitivity regression did not materially change the magnitude or significance of the treatment effect. The coefficient for treated $\times$ post remained statistically significant and stable ($\beta = 37.9$, $p < 0.001$), indicating that confounding factors were appropriately accounted for. This finding provides a response for RQ3, confirming IPW-adjusted DiD provides robust estimates with residual confounding, which is consistent with robustness criteria established by Imai and Ratkovic (2014).

Validating assumptions: parallel trends (RQ4)

Figure 6
Visual inspection of pre-post parallel trend



(Source: Developed by authors based on literature (2025))

Pre-intervention, treated and control groups exhibit virtually identical sales trends, justifying the parallel trends assumption. After the treatment date, there is a clear divergence: the treated group experiences a strong and sustained sales boost in average daily sales, plateauing at about 1040 units, while the control group experiences only a modest rise, drifting below 1020. This graphical trend confirms the estimated Average Treatment Effect of +37.93, or a ~3.79% increase in sales, and supports the result that the intervention had a statistically and practically significant positive impact on treated stores. Such results help stakeholders to decide appropriate policy interventions. The event study exhibits no discernible effects during the pre-intervention period, as

expected under the parallel trends assumption and verified by placebo tests obtaining null effects. After the intervention, effects jumped up by +2 to +5 units on most days, with many intervals completely above zero, suggesting statistical significance. This persistent uplift, combined with diminishing uncertainty, aligns with the positive ATE of the DiD + IPW model, in support of a causal interpretation of the intervention effect. This resolves RQ4 through causal assumptions verification, demonstration of long-term performance impacts, thus providing the stakeholders with confidence in the measurable policy impact.

Limitations

The paper further displays some limitations from a methodological research standpoint. First, while the hybrid form for adaptive buffering and clustering permits balancing on spatial regions and covariates, results are case invariant for the retailing supply chain investigated for other geographies or industries, which need additional estimation steps for generalizability across them. Second, estimation uses observational data, which, despite IPW adjustment and DiD correction, cannot rule out unobserved confounding or dynamic spillovers outside the buffers constructed. Third, aggregating over a day may dampen short-run fluctuations or effects within a day. Finally, estimating fixed treatment effects, there are opportunities for future study to generalise the form for panel-based or hierarchical specifications for estimating evolving spatial dynamics. These limitations create opportunities for cross-domain validation and methodological refinement for future study.

Future research

Future work can be expanded along several axes. Extensions of the approach to dynamic or stagewise interventions could include time-varying effects and policy change rollouts. Integration of spillover models based on structural network relationships could enable peer or inter-store effects, more generally than local geographic ones. Integration of Bayesian causal inference might increase uncertainty quantification for small- sample or high-variability cases. Extensions into real-time tracking instruments for policy could enable adaptive experiments and mid-course correction, responding to rapidly changing scenarios for operations.

Conclusion

Applied to a pickup-in-store fee waiver for omni-retail, the framework achieved strong covariate balance, controlled for spatial spillovers, and provided statistically significant and economically relevant estimates 3.79% increase in average daily sales-that were substantiated using placebo and event study diagnostics. These findings have direct managerial relevance, demonstrating that fine-tuning intervention form using alignment across spatial and covariate dimensions permits measurable revenue increments while controlling for spillover effects, as well as cannibalisation effects. For operational managers, the framework provides a data-driven toolkit for geographically specific initiatives design and testing-informing retail and operations executives on evidence- based decisions for retailing, pricing, promotion targeting, and store expansion decisions. Apart from this, the framework provides a transferable analytical template for logistics, health, advertising, and mobility applications, where local precision for interventions must be balanced for scalability considerations. Through linking spatial design decisions with quantitative diagnostics, the approach links analytical rigour with decision support for operations, enabling organisations to conduct localised policies with confidence, both on statistical legitimacy and commercial effects.

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FACTORS AFFECTING ADOPTION OF AI-POWERED FINTECH SERVICES IN OMAN

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Abstract

The rapid advancements in financial technology have revolutionised the financial services industry, with artificial intelligence playing a crucial role in shaping the future of this sector. Oman, as a part of the Middle East and North Africa region, has not been immune to these transformations, and the adoption of Artificial Intelligence (AI)-driven fintech solutions has become a topic of growing interest and importance. The integration of AI into the financial industry offers numerous benefits, including improved customer experience, enhanced decision-making processes, and increased operational efficiency. As Oman continues to diversify its economy and strive for financial inclusion, understanding the determinants of consumer attitudes and adoption of these innovative fintech solutions becomes essential for policymakers, financial institutions, and technology providers. The current study is based on the Technology Acceptance Model proposed to identify the factors which influence attitudes towards AI-powered fintech services and whether attitude has a statistically significant impact on the adoption of AI-powered fintech services. The study adopted quantitative research methods. Primary data was collected from three hundred and seventy-five fintech users from the Sultanate of Oman using a purposive and snowball sampling technique. The proposed model and hypothesis were tested using Partial Least Squares-based Structural Equation Modelling. The hypothesis results show that attitude towards AI has a statistically significant effect on fintech adoption intention. Perceived ease of use of AI, perceived trust, and technological Readiness were statistically significant predictors of attitude towards AI. Partial mediation paths were inferred from Perceived Use of AI, Perceived Trust and Technological Readiness to Fintech Adoption Intention. Perceived Usefulness had not statistically significant direct or indirect effect on Fintech adoption Intention.

Keywords: Fintech adoption intention, Oman, technology adoption model

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Introduction

The rapid advancements in financial technology have revolutionised the financial services industry, with artificial intelligence playing a crucial role in shaping the future of this sector. Oman, as a part of the Middle East and North Africa region, has not been immune to these transformations, and the adoption of AI-driven fintech solutions has become a topic of growing interest and importance. The integration of AI into the financial industry offers numerous benefits, including improved customer experiences, enhanced decision-making processes, and increased operational efficiency (Al-Saedi et al., 2020). As Oman continues to diversify its economy and strive for financial inclusion, understanding the determinants of consumer attitudes and adoption of these innovative fintech solutions becomes essential for policymakers, financial institutions, and technology providers. The global fintech landscape has witnessed a remarkable surge in investment, with the value of global fintech investment reaching \$24 billion in the first half of 2025 (Innovate Finance, 2025). This growth has been driven by a combination of factors, such as the expansion of social networks, the availability of financial information, and the changing preferences of financial users. In the Middle East and North America (MENA) region, the prospects of fintech growth include employment opportunities, decentralisation, cost-effectiveness, financial outreach, networking, and the breaking of traditional financial biases. (Naz et al., 2022). While developed economies have an advantage in harnessing emerging technologies, resource-constrained economies like Oman may face challenges due to a lack of necessary skills and infrastructure. This highlights the importance of understanding the factors that influence consumer attitudes and adoption of AI-driven fintech solutions in the Omani context.

The current study is based on the Technology Acceptance Model (Davis, 1989). This model identifies two factors, 'Perceived Usefulness' and 'Perceived Ease of Use', which affect the adoption of technology-enabled services. Perceived Usefulness can be defined as the intention to use a technology as it helps them to complete their task faster and at a lower cost. Davis (1989) defines perceived ease of use as the willingness/unwillingness to adopt useful technology if they consider it too easy /difficult. Along with these factors, the current study extends the Technology Acceptance Model (TAM) model by including Perceived Trust in Artificial Intelligence (PTAI) and Technological Readiness (TR) as important factors influencing attitude towards AI-powered fintech services.

The authors seek to examine the factors affecting the adoption of AI-powered fintech services in Oman. Specifically, the objectives of the study are: firstly, to identify the factors which influence attitudes towards AI-powered fintech services in Oman, secondly, to examine if attitude has a statistically significant impact on the adoption of AI-powered fintech services and finally whether attitude mediates the relation between perceived use of powered fintech services, Perceived Usefulness of powered fintech services, perceived trust in powered fintech services, technological readiness and adoption of AI-powered fintech services.

Literature Review

A range of literature was reviewed to report the studies related to the factors, determinants and the usage of Fin Tech in various countries among different variables and identified the research gap for the present study.

Al Ghunaimi et al. (2025) studied the adoption of fintech services by small and medium enterprises in Oman. Findings, based on secondary data from the Central Bank of Oman, reveal the need to strengthen the digital infrastructure and improve user experience. In a qualitative study by Rengasamy et al. (2025) found that Islamic banks in Oman use AI-based customer services to speed up transactions and automate financial services. Al Rubaiai & Pria (2022) found that behavioural intention has a positive relation with fintech adoption.

Xiang et al. (2021) examined fintech adoption in family businesses and state-owned enterprises in China and found that family business has a significant impact on fintech finance, and state-owned enterprises have better access to credit in state-owned banks. Naz et al. 2022 investigated Fintech flourishing using a Multiple Regression approach in MENA zone countries for the years 2011 to 2014 and 2017 and found that there is strong evidence for the essential role of the digital platform and government effectiveness's negative impact on the freedom of opinion and expression.

Zarrouk et al (2021) investigated the determinants of the United Arabi Emirates (UAE) based on thirty-two fintech founder ventures, and the data were collected through the semi-structured questionnaire and analysed through an ordered logistic regression model and found that the availability of resources through venture capital is crucial for the accomplishment and existence of fintech as micro businesses. Yoshino et al. 2020 investigated the financial literacy and the factors which contribute to the adoption of fintech services in Japan. Data of 25K individuals, which were surveyed by the Bank of Japan, were used to analyse the relationship for the usage of Fintech services and found that there is a positive association between higher financial literacy using fintech services and a negative correlation with holding crypto assets.

Al-Nawayseh (2020) examined the factors affecting the 500 citizens of Jordan during the COVID-19 Pandemic. SEM-PLS were used to test the hypotheses and found that there is a significant effect on the perceived benefits and social norms on the intention to use Fin Tech applications, and no significant effect is seen among the perceived technological risks on the use of fintech applications. Okoli & Tewari (2020) measured fintech's usefulness, its

growth, and identified the determinants in 3 emerging panels and 24 frontiers and 5 fragile African markets from 2004 to 2018. The results from the generalised method of moments estimation technique showed that, on average in Africa, fintech usefulness is a heterogeneous process, and the growth of usage of Automated Teller Machine (ATM), mobile banking and Internet banking is greater than its average in the year 2018, when compared with the year 2004.

Analysed the determinants that contributed to the newly set up business models of the financial institution industry among three hundred various age groups in Malaysia for the espousal of Convergent technologies, which affect the usage of financial technology, and the results revealed the significant and positive relationship among the various factors for the intention to adopt fintech. Analysed and evaluated one thousand twenty hundred and thirty- six respondents to investigate the designated determinants of using the innovative Fintech services by Millennials in Poland aged between 25 – 40. A logistic regression model was used, and the results revealed that young men with high net income are not driven by low costs of financial services. Among three hundred and twelve millennials who have not used fintech. Ninety-seven respondents anticipated using fintech services within 6 months, and one hundred and one respondents showed their intention to use FinTech services in future.

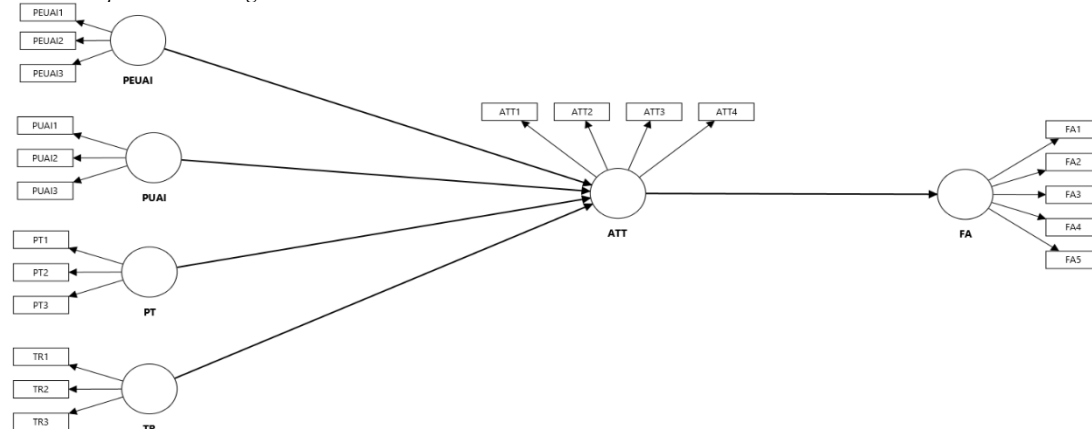
Tamanna and Khatun (2020) examined the factors which influence the espousal of Fintech in the financial institutions of Bangladesh. Structural equation modelling was used to analyse the data from 265 employees, and the results revealed that perceived reliability, social influence, effort expectancy, and facilitating condition have a positive influence on the intention to adopt Fintech, and the age of the respondents showed a significant positive influence on all the factors of Fintech adoption.

Conceptual framework and proposed hypothesis

Based on the Technology Adoption Model and literature review the study proposes that Perceived usefulness of AI (PUAI) powered fintech services, Perceived Ease of Use of AI (PEUAI) powered fintech services, Perceived Trust in AI powered fintech services (PT) and Technological Readiness have a statistically significant positive relation with Attitude towards AI powered fintech services (ATT) and Attitude has a statistically significant impact on the behavioral intention to adopt AI based fintech services.

Figure 1

Structural Equation Modelling



(Source: Authors based on survey result)

Proposed hypothesis

- H1: ATT has a statistically significant relationship with FA
- H2: PEUAI has a statistically significant relationship with ATT
- H3: PUAI has a statistically significant relationship with ATT
- H4: PT has a statistically significant relationship with ATT
- H5: TR has a statistically significant relationship with ATT
- H6: ATT mediates the relation between PEUAI, PUAI, PT, TR and FA

Methodology

The study adopted a quantitative research method. Primary data was collected from three hundred and seventy- five fintech users from the Sultanate of Oman using a purposive and snowball sampling technique. The sample size was consistent with previous studies and considered sufficient for a statistical power of $\geq 80\%$ for a medium effect size (Cohen's $f^2=0.15$) at 5% significance level (Alalwan et al, 2017; Cohen, 1992). Purposive sampling ensured that the participants were fintech users, and snowball sampling helped in reaching a larger number of users. As the participants were digitally literate, the survey instrument was emailed and shared on social media platforms as a Google Docs form. Online data collection ensured the anonymity of the participants and facilitated rapid data collection. The constructions are Perceived Usefulness of AI-powered fintech services, Perceived Ease of Use of AI-

powered fintech services, Attitude towards AI-powered fintech services and behavioural intention to adopt AI-based fintech services. Technological Readiness and Perceived trust were measured through scales proposed by Laukkanen et al (2007). The items were measured on a five-point Likert scale with 5 denoting strongly agreed and 1 strongly disagree.

Table 1
Variable description

Variable	Number of items	Reflective/Formative	Definition
Fintech Adoption	5	Reflective	Intention to use AI-powered Fintech services
Intention	4	Reflective	Optimism towards the use of AI-powered Fintech services
Perceived Ease of Use	3	Reflective	Belief that AI-powered Fintech services are easy to use
Perceived Usefulness	3	Reflective	Belief that AI-powered Fintech services are useful
Perceived Trust	3	Reflective	Belief that AI-powered Fintech services are secure and trustworthy
Technological Readiness	3	Reflective	Access to technological infrastructure

(Source: Authors, based on survey results)

The data was screened for normality and unengaged responses. The presence of common method bias was tested through the Variance Inflation Factor. According to Kock (2015), VIF values lower than 3.3 suggest the absence of common method bias. As shown in the following table, all VIF values are below the threshold limit of 3.3. In the current study, the VIF values were below 3.3, indicating the absence of common method bias. Common method bias was also tested using Harman's single-factor test. The single factor explained 27.02% of the total variance.

The proposed model and hypothesis were tested using Partial Least Squares-based Structural Equation Modelling. The analysis took place in two stages: in the first stage, the measurement model was tested for construct reliability and validity, and in the second stage, the structural model was assessed to test the proposed hypothesis. The following section presents the study's results.

Results

The sample consisted of 371 respondents. Most of the respondents were male (76%), graduates (56%) and in the age group of 26-35 years (63%).

Table 2
Demographic results

		Frequency	Percent
Attribute			
Gender	Male	283	76.3
	Female	88	23.7
Nationality	Omani	340	91.6
	Expatriate	31	8.4
Education	Undergraduate	123	33.2
	Graduate	206	55.5
	Masters Degree	42	11.3
Age	18-25	62	16.7
	26-35	235	63.3
	36-45	24	6.5
	More than 46	50	13.5

(Source: Authors, based on survey results)

The following section presents the results of the measurement and structural model analysis:

Measurement model

Reliability and convergent validity were assessed through Cronbach's alpha and average variance extracted. Cronbach's alpha and composite reliability statistics are above 0.7, and the average variance extracted is greater than 0.5, implying the constructs possessed reliability and convergent validity (Hair et al, 2018).

Discriminant Validity was assessed through the Heterotrait-monotrait ratio (HTMT) and the Fornell-Larcker criterion. As presented in the following tables, the constructs passed both the tests for Discriminant Validity.

Table 3

Construct reliability and convergent validity

Construct	Items	Outer Loadings	Cronbach's alpha	rho_a	rho_c	AVE
Attitude	ATT1	0.68	0.838	0.852	0.893	0.677
	ATT2	0.86				
	ATT3	0.88				
	ATT4	0.86				
FA	FA1	0.87	0.885	0.888	0.916	0.686
	FA2	0.86				
	FA3	0.78				
	FA4	0.82				
	FA5	0.81				
PEUAI	PEUAI1	0.80	0.815	0.839	0.889	0.729
	PEUAI2	0.90				
	PEUAI3	0.86				
PT	PT1	0.83	0.802	0.803	0.883	0.716
	PT2	0.88				
	PT3	0.83				
PUAI	PUAI1	0.89	0.813	0.831	0.888	0.726
	PUAI2	0.85				
	PUAI3	0.81				
TR	TR1	0.84	0.851	0.869	0.909	0.768
	TR2	0.89				
	TR3	0.90				

(Source: Authors, based on survey results)

Discriminant validity was assessed through the Heterotrait-monotrait ratio (HTMT) and the Fornell-Larcker criterion. As presented in the following tables, the constructs passed both the tests for Discriminant Validity.

Table 4

Discriminate validity

Heterotrait-monotrait ratio (HTMT)

ATT					
FA	0.546				
PEUAI	0.316	0.425			
PT	0.223	0.135	0.038		
PUAI	0.311	0.300	0.735	0.053	
TR	0.340	0.451	0.297	0.284	0.379

Fornell-Larcker criterion

	ATT	FA	PEUAI	PT	PUAI
ATT	0.823				
FA	0.470	0.828			
PEUAI	0.264	0.364	0.854		
PT	0.186	0.099	-0.012	0.846	
PUAI	0.260	0.265	0.611	0.028	0.852
TR	0.301	0.391	0.249	0.234	0.323

(Source: Authors, based on survey results)

FA: Fintech Adoption Intention; PEUAI: Perceived Ease of Use of AI; PT: Perceived Trust; PUAI: Perceived Usefulness of AI, TR: Technological Readiness

Structural model

The structural model was assessed based on the coefficient of determination and the statistical significance of the path coefficients. Each of these measures is discussed in the following paragraphs.

Before assessing the structural relationships, the study ensured that collinearity among the constructs was absent. Variance Inflation Factor (VIF). As can be seen from the following table, the VIF values are below 5, indicating a low probability of collinearity among the constructs.

Table 5
Variance inflation factor

Items	VIF	Items	VIF
ATT1	1.378	PT1	1.600
ATT2	2.210	PT2	2.040
ATT3	2.701	PT3	1.740
ATT4	2.269	PUAI1	2.426
FA1	2.648	PUAI2	1.664
FA2	2.563	PUAI3	1.870
FA3	1.837	TR1	2.030
FA4	2.106	TR2	1.964
FA5	2.056	TR3	2.421
PEUAI1	1.597		
PEUAI2	2.020		
PEUAI3	1.944		

(Source: Authors, based on survey results)

Table 6
Results of explanatory and predictive analysis

	R-square	R-square adjusted	Q ² predict
Attitude	0.152	0.143	0.119
Fintech Adoption Intention	0.221	0.219	0.122

(Source: Authors, based on survey results)

From the above table, it can be inferred that 15percent and 22 per cent of the model's variation was explained by the independent variables. The predictive relevance of the model was established through Q-Square. As the Q2 values are greater than zero, predictive relevance is established.

Table 7
Hypothesis Testing

Hypothesis	β	t-statistic	p- values	Inference
ATT -> FA	0.470	10.357	0.000	Supported
PEUAI -> ATT	0.158	2.288	0.022	Supported
PT -> ATT	0.138	2.359	0.018	Supported
PUAI -> ATT	0.096	1.321	0.187	Not Supported
TR -> ATT	0.199	3.172	0.002	Supported
PEUAI -> ATT -> FA	0.074	2.101	0.036	Partial Mediation
PT -> ATT -> FA	0.065	2.229	0.026	Partial Mediation
PUAI -> ATT -> FA	0.045	1.312	0.189	Not Supported
TR -> ATT -> FA	0.093	2.798	0.005	Supported

(Source: Authors, based on survey results)

FA: Fintech Adoption Intention; PEUAI: Perceived Ease of Use of AI; PT: Perceived Trust; PUAI: Perceived Usefulness of AI, TR: Technological Readiness

Bootstrapping was performed on five thousand sub-samples. The hypothesis results show that attitude towards AI has a statistically significant effect on Fintech Adoption Intention. Perceived Ease of Use of AI, Perceived Trust and Technological Readiness were statistically significant predictors of attitude towards AI. Partial mediation paths were inferred from Perceived Use of AI, Perceived Trust and Technological Readiness to Fintech Adoption Intention. Perceived Usefulness had not statistically significant direct or indirect effect on Fintech Adoption Intention.

Research implications

The present study presents the conditions that have developed and contributed to the fast growth of the usage of Artificial Intelligence in the use of financial services. It provides empirical data to determine the vital success constituents and alternative growth drives for fintech services. The findings of this research give critical input to decision-makers so that they may design a plan to realise the goal of managing the challenge of inclusive financial development. The research finds that Perceived Ease of Use of AI, Perceived Trust in AI, and Technological Readiness are predictors of attitude towards AI in Oman.

The Sultanate should invest in developing user-friendly AI interfaces, such as Human-Computer Interaction. Fintech Service providers should educate the prospective and current users on the ease, accessibility and simplicity of use of AI. Regulatory authorities should emphasise data protection and security. The Sultanate should invest in cybersecurity to increase trust. The Sultanate should invest in digital literacy programs and encourage educational institutions to impart STEM skills. Internet access should be provided at reasonable prices. Fintech Service providers should emphasise consumer experience, take regular feedback and strive towards making AI- powered Fintech services easy to use. Trust should be enhanced through stringent data protection and privacy rules. The findings showed that perceived usefulness had no significant impact on attitude towards AI adoption. This finding highlights the need to emphasise other social and cultural factors which resonate with Omani culture.

The extended TAM model can further be expanded by including additional constructions such as perceived risk and regulatory awareness. The cross-sectional findings are limited to the Sultanate of Oman.

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ANALYSIS OF GLOBALISATION IN SHAPING ANTI-MONEY LAUNDERING AND COUNTER-TERRORIST FINANCING STRATEGIES IN SRI LANKA'S BANKING SECTOR

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Abstract

This study focuses on the relationship between the anti-money laundering (AML) and counter-terrorism financing (CTF) measures and the minimisation of Money Laundering (ML) and Terrorism financing (TF) risks in licensed commercial banks (LCBs) in Sri Lanka. Perceiving the increasing risk of illicit financial flows to financial stability, particularly with the emerging economies in mind, the research covers a crucial gap in empirical research on the influence of globalisation on AML/CTF effectiveness. With a positivist, quantitative, cross-sectional design, data were collected using structured questionnaires using purposive and snowball sampling of AML/CTF professionals in Sri Lankan LCBs. The outcomes reveal that there is a strong desire for internal commitment to AML/CTF compliance on the part of the banking professionals and a mostly favourable attitude of practitioners to the existing frameworks. Nevertheless, difficulties are still present in handling the complexities brought about by cross-border financial activity. Importantly, Transaction Monitoring Systems (TMS) and Training and Awareness (TA) turned out to be statistically significant predictors of the ML/TF risk reduction. In addition, globalisation showed a rather small but consistent moderating effect, especially amplifying the effects of TMS and TA. The results emphasise the need to invest in strategic monitoring systems, which are up to global standards, and continuous training of staff. Moreover, attention should be focused on compliance with procedure to risk-based approaches (RBA), enhanced due diligence (EDD), and regulatory compliance (RC), result-oriented application. All in all, the study is of significant value for the Sri Lankan policymakers and regulators who realise the need for further international cooperation and a flexible approach to the adaptation of AML/CTF frameworks to the circumstances of the globalised financial environment. It also addresses one of the most important empirical and theoretical gaps, providing practical recommendations for building up AML/CTF systems in developing economies.

Keywords: Anti-money laundering, banking regulation, counter-terrorism financing, globalisation, risk-based approach

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Proceedings of the 16th International Conference on Business and Information - ICBI 2025 © 2025 by The Faculty of Commerce and Management Studies, University of Kelaniya, Sri Lanka is licensed under CC BY-SA 4.0.

DOI:

Introduction

Background and context

In an era where financial systems are increasingly shaped by globalisation, the ability of commercial banks to mitigate money laundering (ML) and terrorist financing (TF) risks has become both more vital and more complex. Sri Lanka's licensed commercial banks operate in a dynamic landscape influenced by international financial standards, transnational capital flows, and evolving compliance expectations. While globalisation enhances technological integration and cross-border cooperation, it simultaneously introduces challenges to risk oversight and regulatory enforcement (Shavshukov & Zhuravleva, 2023). ML and TF must be managed for the purpose of maintaining global financial stability (IMF, 2025). According to the United Nations Office on Drugs and Crime (2009), annual global GDP consists of 2-5% of money laundering funds. As a result, the Financial Action Task Force developed standards through the 40 Recommendations to direct worldwide AML/CTF regime establishment (FATF, 1990). Yet, Ruda & Kraus (2024) debate globalisation through financial integration, technological development and market interconnectivity, providing transnational criminals with fresh prospects despite weakening existing regulatory systems.

Sri Lanka stands as an emerging economy which remains connected to worldwide financial institutions, yet encounters major ML/TF threats that primarily affect its licensed commercial banking operations. Sri Lankan banks use AML/CTF measures which match international requirements, but globalisation creates difficulties because of cross-border operations and digital financial development and correspondent banking regulations (McKinsey Global Institute, 2017). The increasing global financial system dependencies generate both new threats and new avenues for fighting financial crimes (ACAMS, 2025). The rapid technological progress enabled by globalisation helps criminals spread ML and TF activities because it makes it harder for investigators to trace illicit transactions (Akartuna et al., 2024). The complicated nature represents a major worry for Sri Lanka's licensed commercial banks because these banks are the first line of defence, which encounters greater potential risks. Yet, modern discourse fails to examine what specific impacts globalisation creates on AML/CTF effectiveness in these environments, which requires knowledge to build robust financial security systems. Therefore, this study is to explore how globalisation moderates anti-money laundering and counter-terrorist financing in mitigating money laundering in Sri Lanka's banking sector.

In terms of fostering the above objective this study focused on ML and TF that threaten financial stability together with institutional integrity and national security within developing economies, especially Sri Lanka (IMF, 2023). The implementation of AML/CTF international frameworks has not solved the risks faced by licensed commercial banks (LCBs) as globalisation intensifies their challenges. The research field lacks evidence-based knowledge about how globalisation affects the implementation of AML/CTF measures across Sri Lanka's strategic financial sector.

Research today does not adequately address the problems banks encounter when they strive to meet regulatory requirements without compromising operational efficiency because new technologies and decentralised financial systems generate additional security risks (BIS, 2023). The deficiency of enforcement, combined with inadequate oversight, creates additional challenges while policymakers, along with regulators, are left without critical data-based analytical methods for creating effective protection mechanisms. Sri Lanka still faces difficulties in identifying, mitigating, and reacting to money laundering and terrorist funding activities despite legal frameworks and international commitments. Gaps in compliance, poor technology integration, and uneven enforcement among financial institutions all make these problems worse. The issue is determining whether the strategies in place are strong enough, compliant with international norms, and flexible enough to respond to new challenges. The lack of targeted evidence-based research on globalisation and anti-money laundering/countering the financing of terrorism efficacy in Sri Lanka leads to increased financial instability alongside lowered investor confidence and Financial Action Task Force (FATF) greylisting risks.

Theoretical understanding

(Korejo et al., 2021) contend that the core principle of money laundering is the process of making criminal funds that are illegitimate seem legitimate. The transformation of criminal proceeds from criminal enterprises like drug trafficking, bribery, corruption or fraud constitutes money laundering in Sri Lanka, where the main threats stem from unlawful activities (Korejo et al., 2021). Also, Hellvig & Blanmaru (2023) correspond that the global financial system, made complex by globalisation, allows criminals to move criminal funds by using international transactions and complex financial tools and taking advantage of different national regulatory requirements. Thus, ML activities create destabilising financial movements that endanger the global financial systems because of their international nature.

The process of TF requires obtaining money from legal and illegal sources with the purpose of funding terrorist operations and supporting terrorist groups (U.S. Department of Treasury, 2024). Through the Routine Activity Theory, it is necessary to identify motivated offenders, suitable targets and incapable guardians to study financial criminal activities associated with money laundering and terrorist financing in Sri Lanka. In line with Buckley et al. (2024), globalised technology has unintentionally grown the number of criminal offenders because it has expanded possibilities for illegal financial operations that span international borders. Whereas Levi & Reuter (2006) explains that individuals and criminal organisations pursue money laundering because substantial illegal profits meet their financial goals and the global financial system provides them with privacy. Besides Therefore, RAT says that motivated offenders are those who have the ability and motivation to commit crimes, which corresponds well with the features of financially sophisticated individuals. Accordingly, five factors were identified, namely Risk-Based Approach (RBA), Enhanced Customer Due Diligence (EDD), Regulatory Compliance (RC), Transaction Monitoring Systems (TMS), and Training and Awareness (TA), as factors contributing to mitigating ML/TF risk.

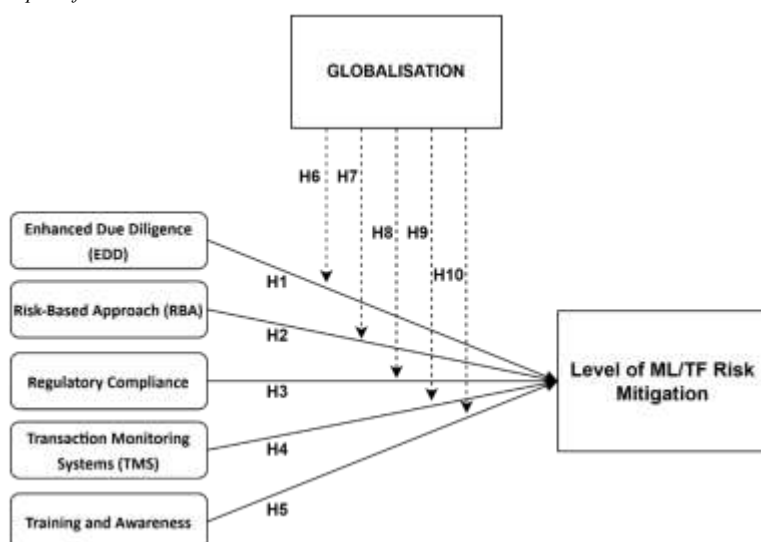
Materials and Methods

This study employed quantitative, cross-sectional research design. The justification for this design rests on its capacity to efficiently capture a snapshot of the relationship between globalisation variables and AML/CTF effectiveness across numerous licensed commercial banks in Sri Lanka at a specific point in time. The research design fits well into the deductive positivist framework because it allows researchers to collect standardised numerical survey data through structured instruments which support objective measurement and statistical hypothesis testing. The research requires a cross-sectional design for its present correlation investigation and quantitative analysis of sector-wide effects, while a longitudinal method is less suitable because it tracks time-based changes. Creswell (2014) states that it provides the necessary breadth to identify patterns and test relationships between variables efficiently, offering a robust framework for generating empirically grounded and potentially generalisable findings within the defined scope. In the interim, Saunders, Lewis & Thornhill (2007) introduced the research onion to clearly identify and process the stages which belong to the research strategy.

Conceptual framework

This research's conceptual framework is designed to investigate how globalisation influences the relationship between the enforcement of Anti-Money Laundering (AML) and Counter-Terrorism Financing (CTF) measures and the reduction of ML and TF risks in licensed commercial banks in Sri Lanka. Accordingly, the following conceptual frame was developed.

Figure 1
Conceptual framework



(Source: Developed by authors based on literature (2025))

Population and sampling

This research focuses on the AML/CTF and risk management staff of Sri Lankan licensed commercial banks. The 24 institutions listed at the Central Bank of Sri Lanka form a specific finite group that serves as the study foundation. LCBs operate under the authority of Banking Act No. 30 of 1988, as they function as the primary channels for international financial transactions related to globalisation. The banks themselves do not become the unit of analysis since the study is concerned with staff members who carry out AML/CTF and risk management tasks. A proposal is made for a multi-stage sampling strategy: in the first place, LCBs could have been stratified according to the size category or the type of ownership.

Subsequently, a sample of 150 individuals will be selected using purposive and snowball sampling from personnel across these strata. The large sample population (N=150) of banking institutions meets the essential standards required for the projected moderation analysis. The examination of moderation interaction effects requires larger statistical power, achieved through increased sample size, beyond what is needed to study main effects independently. Thus, N=150 is considered a practical number to obtain sufficient power to detect perhaps medium-sized moderation effects while accommodating analytic strength and data constructability among various institutions.

Data collection methods

Taherdoost (2021) reports two methodologies for data collection that scholars apply. Primarily. According to Kothari (1985), the data collected for the first time is hence primary data. On the other hand, Lee et al. (2013) defined secondary data as information collected for purposes other than study objectives. The questionnaire is built using validated items from existing literature, frameworks, and regulatory requirements, with the FATF guidelines and the Financial Transactions Reporting Act (FTRA) included. The questionnaire includes closed questions and five-point Likert scales to measure the respondents' perception, the implementation of AML/CTF and the exposure to globalisation-related financial activities. The instrument was pre-tested by ten experts in the select group in order to determine the clarity, reliability and relevance of the items. Moreover, maintaining control over common method bias was taken into consideration in this research to ensure the validity and reliability of findings. This study implemented procedural remedies such as varying data sources, separating measurement times, or using different response formats, as well as statistical techniques to detect and control for bias.

Ethical considerations

Researchers prioritised informed consent, guaranteeing that participants are fully aware of the study's purpose, procedures, risks, and benefits before agreeing to take part. Protecting participants' privacy and confidentiality was equally treated, securing data handling and anonymisation where appropriate. Researchers avoided any form of deception unless justified by the study design and approved by an ethics committee. Moreover, study was designed to minimise harm and discomfort, with special care taken when working with vulnerable populations. Transparency in reporting, avoiding plagiarism, and acknowledging conflicts of interest are also upheld in academic honesty. Ultimately, ethical rigour not only safeguarded participants but also strengthened participant trust.

Results and discussion

This chapter adopts a systematic analysis of the data obtained by structured questionnaires, in line with the positivist research philosophy and deductive research method of the study. The investigation aims to understand the degree to which globalisation moderates the relationship between mitigating money laundering and terrorist financing (ML/TF) risks in licensed commercial banks in Sri Lanka. Out of the 225 responses obtained, 160 of the respondents reported being employed in LCBs, while 65 reported being employed in non-LCB institutions. These 65 responses are excluded from the analysis for methodological and conceptual reasons.

Reliability test

The reliability analysis undertaken on the 23 items across six constructs, i.e., Risk-Based Approach, Enhanced Due Diligence, Regulatory Compliance, Transaction Monitoring Systems, Training and Awareness, and Mitigating ML/TF Risk, shows a high internal consistency with Cronbach's Alpha values ranging from 0.875 to 0.919 and an overall alpha of 0.961. These values are above the acceptable level of 0.70, which shows that the questionnaire items are very reliable and consistent in measuring the AML/CTF constructs to be measured.

Table 1
Reliability analysis

Variable	No. of Items	Cronbach's Alpha	Validity
Risk-Based Approach (RBA)	4	0.876	0.000
Enhanced Due Diligence (EDD)	3	0.875	
Regulatory Compliance (RC)	4	0.919	
Transaction Monitoring Systems (TMS)	4	0.909	
Training and Awareness	4	0.908	
Mitigating ML/TF Risk	4	0.904	
Overall	23	0.961	

(Source: Authors, based on survey results)

The relationship between factors affecting the mitigation of money laundering

Pearson correlation analysis was used to examine the relationships between the five independent variables and the dependent variable. All correlation coefficients were positive, statistically significant ($p < .01$), and moderately strong, suggesting a substantive linear relationship between AML/CTF control measures and their perceived effectiveness in reducing the risk of money laundering and terrorist financing. Transaction monitoring was the highest correlated with MLTF ($r = 0.601$), followed by training ($r = 0.589$), EDD ($r = 0.544$), regulatory compliance ($r = 0.541$) and risk-based approach ($r = 0.504$). These results are theoretically aligned with the risk-based ethos discussed in the literature. According to FATF (2014) and AUSTRAC (2025), the RBA is a bedrock component in tailoring EDD, refining TMS, and distributing resources for compliance, with an alliance supported by significant correlations in this research between RBA and MLTF predictors. However, research by Levi, (2024) and Dharmawati et al. (2024) reveals ambiguities and implementation problems in RBA practices that may render its practical benefits mere compliance, surfacing the issues apparent in correlations but vital to understanding causal factors. Furthermore, high inter-construct correlations between EDD and regulatory compliance ($r=0.762$) and between regulatory compliance and transaction monitoring ($r=0.740$) express interdependence and synergistic operation of AML control pillars. According to Kyriazos & Poga (2023), this multicollinearity can be handled within exploratory factor analysis, which may require caution in regression modelling to avoid having predictive power confounded by overlapping variance. Also, these empirical findings align with the interdependent structure of AML/CTF components discussed in the literature; closely linked TA with all other variables demonstrates the crucial role of training that is confirmed by Thomson Reuters (2025), who emphasise the need for worldwide flexible training so that one could grasp TMS alerts and engage in successful EDD. A high correlation between these constructs suggests the interdependence of AML functions, but previous work highlights that errors in any one of the constructs, in particular TMS or training, may compromise overall effectiveness. Therefore, although these results exhibit integrated effectiveness by means of correlation, they have to be viewed within the context of the greater problems of operational complexity and fragmented international rules.

Table 2:
Correlation analysis

	RBA	EDD	RC	TMS	TA	ML/TF
RBA	1	0.701	0.652	0.608	0.545	0.504
EDD	0.701	1	0.762	0.694	0.692	0.544
RC	0.652	0.762	1	0.740	0.703	0.541
TMS	0.608	0.694	0.740	1	0.610	0.601
TA	0.545	0.692	0.703	0.610	1	0.589
ML/TF	0.504	0.544	0.541	0.601	0.589	1

(Source: Authors, based on survey results)

Assessing the role of AML framework components in mitigating money laundering vulnerabilities

To determine the predictability of the identified independent variables, namely Risk-Based Approach, Regulatory Compliance, Transaction Monitoring, Training and Enhanced Due Diligence, to the dependent variable, Money Laundering and Terrorist Financing effectiveness, a multiple linear regression analysis was done. The model summary provided a moderate to strong correlation ($R = 0.671$) between the independent and MLTF effectiveness and an R^2 value of 0.450. This means that 45% of the variation in the effectiveness of MLTF is attributable to the cumulative impact of the five AML-related predictors. The adjusted R^2 value (0.433) that is adjusted for the number of predictors further supports this model's generalisability outside the sample. Such a degree of explanatory power is deemed to be significant in behavioural, financial, and compliance research areas where human-centred variables frequently incur unexplained variance.

Table 3
Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.671 ^a	.450	.433	.45612	1.834

a. Predictors: (Constant), EDDAMEND, Training, Risk-Based Approach, Transaction Monitoring, Regulatory Compliance

b. Dependent Variable: MLTF

(Source: Authors, based on survey results)

The Durbin-Watson statistic 1.834 falls within the low autocorrelation region 1.5 - 2.5, so we can say that there is no significant autocorrelation between residuals, and therefore, the independence assumption is reasonably satisfied, provided that the regression coefficients are valid.

The ANOVA findings confirm the general statistical significance of the model ($F = 25.242$, $p < .001$) and that the independent variables as a group have a statistically significant effect on the dependent variable. This is consistent with the rejection of the null hypothesis that no predictor has an impact on MLTF effectiveness. However, a low residual mean square of 0.208 points due to insignificant measurement errors was noted, too.

Table 4
ANOVA test

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	26.258	5	5.252	25.242	.000 ^b
Residual	32.039	154	.208		
Total	58.296	159			

a. Dependent Variable: MLTF

b. Predictors: (Constant), EDDAMEND, Training, Risk-Based Approach, Transaction Monitoring, Regulatory Compliance

(Source: Authors, based on survey results)

Important conclusions can be drawn from an examination of a multiple regression model that was developed to identify the primary contributors to MLTF risk reduction. The results of the statistical analysis indicate that the roles played by Transaction Monitoring Systems ($B = 0.294$, $p = 0.001$) and Training and Awareness ($B = 0.309$, $p < 0.001$) in ML are significant. This emphasises the possibility of improving transaction monitoring and staff training to dramatically reduce ML/TF risks, which is consistent with previous findings by Alabi et al. (2025). According to Liu's (2024) analysis, accurate detection systems, as well as competent human resources, are considered important features of risky activity identification and management.

Table 1
Coefficient statistics

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B		Beta			Tolerance	VIF
(Constant)	1.237			4.552	.000		
Risk-Based Approach	.119		.132	1.515	.132	.466	2.144
Regulatory Compliance	-.034		-.039	-.352	.725	.294	3.397
Transaction Monitoring	.294		.335	3.544	.001	.400	2.499
Training	.309		.322	3.587	.000	.443	2.255
EDDAMEND	.022		.026	.238	.812	.304	3.289

(Source: Authors, based on survey results)

The statistical analysis shows that transaction monitoring ($p = .001$) and training ($p = .000$) are influential predictors of the coefficients ($\beta = .335$ for transaction monitoring and $\beta = .322$ for training), showing strong positive effects, indicating that comprehensive transaction monitoring and well-organised training have a major role in strengthening institutions' ML/TF risk management

Risk-Based Approach, in contrast, while positively linked ($B = 0.119$), did not reach statistical significance ($p = 0.132$), indicating difficulties in RBA's practical implementation, much like criticisms of (Levi, 2024; Dharmawati et al., 2024). Analogously, Regulatory Compliance (with a coefficient $B = -0.034$ and p -value = 0.725), as well as Enhanced Due Diligence (coefficient $B = 0.022$ and p -value = 0.812) In line with the contributions of Jayasekara (2020), who emphasised that a focus on technical compliance often lacks the operational depth needed to influence MLTF outcomes.

Another explanation could be that it is a statistical artefact of multicollinearity, and this is at least partially supported by VIF values, specifically, regulatory compliance ($VIF = 3.397$) and EDD ($VIF = 3.289$), which are approaching the cautionary threshold of 4. Although not alarming, these values suggest possible overlaps between these predictors, requiring close interpretation and possible tweaking in future modelling using variable reduction or interaction testing. Nevertheless, these results support the integrated association of AML elements, as emphasised in the current research, but their practical worth is enhanced by robust systems and competent personnel (FATF, 2014).

Moderation impact of globalisation on mitigating ML/TF risks

Regression model summaries present a moderation analysis where globalisation is a moderating variable between the five core AML/CTF constructs. The introduction of globalisation as an additional variable in these models adds a small amount to the R , R^2 and adjusted R^2 in all instances. Even if the R^2 increase is modest (spanning from 0.011 to 0.025), it demonstrates that globalisation applies a small yet consistent moderating effect on this relationship between these constructs and MLTF risks.

The largest improvements are made in models of Transaction Monitoring (R^2 changed from .361 to .372) and Training and Awareness (R^2 changed from .347 to .360), thus emphasising that globalisation has a more crucial role in AML processes that require cross-border intelligence, adaptive compliance systems, and cultural alignment in AML practices. This finding is in line with previous research, which has argued that globalisation necessitates firms to shift from domestic controls to more globally integrated compliance frameworks (Levi, 2020).

Additionally, the concept drawn from the general contingency theory of organisational design emphasises the importance of both institutional practices and extrinsic environmental determinants and offers a theoretical foundation for the observed outcomes (Levi, 2020). Although there is a relatively small improvement in model fit, globalisation is not a major contributor to the improvement of AML/CTF effectiveness; instead, it is a contextual factor that complements the role of internal controls. Globally, therefore, evidence shows that globalisation has a slow but lasting effect, which emphasises the need for harmonised global policies and robust institutional reactions in tackling ML/TF issues. Clearly, AML measures should combine local interests with global best practices, as evidenced by the study.

Table 5
Moderation analysis

Variable	Model	R	R ²	Adjusted R ²	Error of the Estimate	Change in R ²
Risk Based Approach	1	0.504	0.254	0.249	0.8664	-
	2	0.528	0.279	0.269	0.8547	0.025
Enhanced Due Diligence	1	0.56	0.313	0.309	0.8313	-
	2	0.573	0.329	0.320	0.8245	0.016
Regulatory Compliance	1	0.541	0.293	0.288	0.8435	-
	2	0.552	0.305	0.296	0.839	0.012
Transaction Monitoring	1	0.601	0.361	0.357	0.8019	-
	2	0.61	0.372	0.364	0.7974	0.011
Training and Awareness	1	0.589	0.347	0.343	0.8108	-
	2	0.600	0.360	0.352	0.8049	0.013

(Source: Authors, based on survey results)

Conclusion and Recommendations

The performance of Sri Lankan licensed commercial banks on the AML/CTF measures, when the world is growing in globalisation, was critically unravelled in the study. Factor analysis affirmed the reliability and uniqueness of the primary constructs, including transaction monitoring, risk-based approach, enhanced due diligence, regulatory compliance, and training. Moreover, the fact that the survey items properly represented the diverse nature of AML/CTF practices. Further, the distinct component separation and excellent internal consistency supported the measurement model's empirical robustness.

From the results of descriptive analysis, there was a clear perception of successful internal AML/CTF implementation among banking professionals, which implies confidence in institutions in their compliance practices. However, the responses were more conservative about the banks' capacity to mitigate challenges of globalisation, pointing out complexities across borders and the fit of the existing systems into the dynamics of international financial crime. This implies that, though internal frameworks are considered firm, there are constant external threats posed by global integration which cannot be eliminated with existing strategies.

The moderation analysis further showed that globalisation, in a subtle manner, affects AML/CTF effectiveness, especially in such elements as transaction monitoring and training. That does not dramatically alter the result; globalisation amplifies or limits the impact of these measures according to the extent to which institutions adjust to global trends. Overall, the findings point to the requirement for AML/CTF frameworks not only to keep up internal rigour but also to be agile and in line with global financial trends to be able to counter the emerging transnational threats effectively.

Nevertheless, this research has major implications for practice in institutions, regulatory oversight and theoretical development. At the institutional level, the findings underline the need to give priority to the investment in transaction monitoring systems and training programmes since they were found to be the most effective means to mitigate the ML/TF risk. Such strategic focus is a key requirement to improve internal capabilities and create a proactive compliance environment. From a regulatory point of view, this study highlights the need to enhance more aligned global supervisory frameworks that consider the mitigating effects of globalisation. The impact of

global financial integration on the effectiveness of AML/CTF, particularly for cross-border compliance, requires responsive, cooperative methods of regulation and the adoption of risk assessment tools using technology.

Theoretically, the research extends academic discourse by bringing Routine Activity Theory and Risk Management Theory together to explain how AML/CTF systems work under the pressures of globalisation. Such a conceptual blend provides a complex understanding of the interaction of institutional safeguards with changing tactics in crime and worldwide compliance demands. At the society level, the research upholds the wider importance of strong AML/CTF setups in ensuring public trust in the financial systems, curbing illegal financial flows and protecting the international financial credibility of Sri Lanka. Such insights are critical in driving policy reforms and boosting developing economies' resilience in the ever-connected financial world.

Conclusion

This research critically analysed the connection between the AML/CTF measures and ML/TF risk mitigation in Sri Lankan licensed commercial banks, providing useful information with rising global financial integration (globalisation). The results of the correlation analysis showed high, positive associations between all fundamental AML/CTF components, including enhanced due diligence, a risk-based approach, regulatory compliance, transaction monitoring systems and training and awareness and perceptions of the effectiveness of ML/TF risk mitigation. In these, the transaction monitoring systems and training and awareness exhibited the strongest correlations, indicating their key role in shaping AML/CTF results. Strong inter-constructing correlations further revealed the interrelated and complementary nature of these measures in a unified compliance framework.

Further, this research has various contributions to make in terms of theory, methodology, policy, practice, and society. Theoretically, it contributes to the discussion on financial crime prevention by combining Routine Activity Theory and Risk Management Theory, a complex which is rarely used in the context of AML/CTF studies in the developing country setting. Such theoretical integration enables a deeper understanding of how institutional controls and external opportunities co-exist in affecting money laundering and terrorism financing risks, developing a conceptual model that could be used in response to the global influences.

Empirically, the research helps to address a major gap, as it provides a robust, quantitative understanding of how effective AML/CTF frameworks are in the licensed commercial banking sector of Sri Lanka. It uses validated constructions and powerful statistical techniques, including factor analysis, regression, and moderation analysis, to generate evidence-based findings that can be generalised to other under-represented jurisdictions. The study methodologically offers a valid and replicable measurement device for assessing AML/CTF elements. The positive approach, in conjunction with a well-articulated survey design, lays a precedent in research on compliance and financial regulation.

In terms of practice and policy, the study concludes that transaction monitoring systems and training and awareness are the most effective measures, which determine the investment strategies and operational priorities of the financial institutions and regulators. The insights encourage a transition from moving from procedural compliance to more dynamic and informed practices that are in line with developing global standards. Additionally, the results highlight the necessity of an adaptive AML/CTF regime in securing correspondent banking relations and the credibility of the regulators in the international arena.

On the societal level, the study enhances financial transparency and institutional accountability. Enhancing the effectiveness of AML/CTF directly correlates with the efforts to discourage financial crimes that have the potential to damage public confidence, economic well-being, and national safety. Through enhancing the knowledge in these areas, the research helps to construct a secure and resilient financial ecosystem.

Similarly, the study is a valuable contribution to the international AML/CTF discourse. It reflects on how globalisation is a contextual factor that influences domestic AML strategies in implementation and outcome. This highlights the need for grounded yet globally aware frameworks, which is a view applicable not only to Sri Lanka but to developing economies globally, facing the same regulatory and financial landscape. Pragmatically, the findings provide unmistakable direction for regulators and financial institutions by promoting the need to invest in technology, ongoing training, and flexible structures to address the domestic and foreign AML/CTF obstacles.

Recommendations

Considering the study's central findings (specifically the effectiveness of TMS and TA, moderated by globalisation), several specific recommendations are made to optimise ML/TF risk prevention among Sri Lankan licensed commercial banks.

Firstly, the improvement of the banks' transaction monitoring systems should be prioritised by introducing the best technologies, such as artificial intelligence and machine learning. Conventional rule-based systems typically do not identify advanced, developing typologies and produce an overabundance of false positives. Therefore, partnership with FinTech and RegTech firms is critical in creating flexible, data-driven systems able to analyse complex patterns and detect high-risk transactions across borders.

Secondly, training and awareness programmes are to be extended and contextualised to the realities of the globalised financial system. These programmes must be more than simple compliance training and include scenario-based learning that will prepare staff to identify and respond to the evolving ML/TF threats in the global space, digital asset weaknesses and international regulatory changes. There will be great focus on global interconnectedness so that employees at all levels are projected to be ready to handle the dynamic financial crime risks.

Thirdly, the risk-based approach needs to be refined substantially to be implemented. Existing practices tend to devalue this principle to procedural formality. Regulators and banks need to collaborate to drive a culture of valuable risk assessment, based on clear, applicable tools and guidance. A real and effective RBA should be dynamic, combining qualitative judgement with quantitative data, and should allocate resources to the regions of greatest ML/TF risk, especially those regions whose risks are influenced by international financial flow.

Technological innovation, as well as international cooperation, must also be used to optimise Enhanced Due Diligence practices. Banks should use RegTech to automate data gathering, authentication, and surveillance for risky clients, politically exposed persons, and complex corporate structures. At the same time, Sri Lankan authorities need to seek increased cross-border information-sharing frameworks to eliminate obstacles associated with data privacy and fragmented jurisdictions.

In addition, regulatory supervision must develop from the narrow preoccupation with technical compliance to the evaluation of the real effectiveness of AML/CTF measures. Outcome-based metrics need to be established to calculate the actual decrease in financial crime risks. This strategy would encourage the banks to implement strategies that bear fruit, which could be measured, thereby inculcating a culture of compliance that is based on impact rather than formality.

Finally, because of the transnational nature of financial crime, improved domestic and transnational cooperation is essential. Sri Lankan banks should enhance their partnership with the Financial Intelligence Unit (FIU), law enforcement and counterparts from across the world. Meaningful involvement in international forums and adherence to rules established by such bodies as the Financial Action Task Force (FATF) is critical. This kind of cooperation will not only enhance the resilience of institutions but will also make sure that AML/CTF strategies are alive to the complex issues that arise from the process of global financial integration.

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MULTIDISCIPLINARY AREAS (E.G., PUBLIC ADMINISTRATION, SUSTAINABILITY, EDUCATION AND LEARNING, TOURISM AND HOSPITALITY MANAGEMENT)

IS SRI LANKA HEADING TOWARDS OVER-TOURISM? A COMPARATIVE STAKEHOLDER ANALYSIS WITH INDONESIA, THAILAND, AND VIETNAM

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Abstract

This research assesses whether Sri Lanka is heading towards overtourism through a comparative stakeholder analysis with three impacted Asian hotspots: Bali, Indonesia; Phuket, Thailand; and Ha Long Bay, Vietnam. It aims to understand the impact of various policy frameworks, stakeholder actions, and the perceptions of the local populace on the progression and potential stagnation of tourism in these areas. A qualitative approach was executed, consisting of in-depth, semi-structured interviews with 180 respondents, including officials, businesspersons, residents, and visitors, in all four locations. Thematic and framework analyses identified five contextually relevant, yet collectively shared, predominant concerns: governance fragmentation, socio-inequality, environmental mismanagement, cultural colonialism, and economic instability. Regardless, differing levels of regulatory responsiveness and community involvement suggest differing outlooks. While Thailand and Vietnam demonstrate some policy-responsive changes along with digital visitor management, Sri Lanka is most at risk due to policy fragmentation and the absence of responsive governance and proactive planning. The most important conclusion the research presents is the need for Sri Lanka to integrate sustainable tourism practices through restructuring zones, community involvement, and digital initiatives. Most notably, this research enriches the literature on tourism in the post-pandemic context by illustrating how shared vulnerabilities within a region can shape distinct development trajectories. Further studies should focus on exploring secondary tourism destinations from a geographical perspective, as well as applying mixed methods for longitudinal studies. A closer look into tourist behaviour and emerging market trends would add value in understanding the nature of overtourism and its evolution in Asia.

Keywords: Governance, over tourism, South Asia, stakeholder analysis, sustainable tourism

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DOI:

Introduction

The history of Sri Lanka's tourism industry is as captivating as it is intricate. When tourism began to develop more formally in the 1960s, it was primarily viewed as a means of opening the country to the rest of the world. The government was also beginning to view tourism as a strategic project on a national level, not just as a means of generating revenue. The Ceylon Tourist Board was established in 1966, and the first tourism master plan was created in 1967, formalising the first steps in creating a structured, organised system for the country's planned and infrastructural growth in tourism (Samaranayake et al., 2013). These initiatives were successful, and the country experienced a tourism boom in the early 1970s and 1980s, particularly from Western European countries. This, however, was brought to a standstill when civil disturbances broke out in 1983. This conflict subsequently negatively impacted Sri Lanka's reputation as a tourist destination, leading to a decline in the tourism industry.

The end of the war in 2009 provided an opportunity for the tourism sector to flourish. The post-war recovery was dramatic (Buultjens et al., 2016). This was even more the case after the 2010s established new niche markets for eco, health, adventure, and heritage tourism, all of which highlighted the country's natural and cultural resources. Unfortunately, the absence of growth management has intensified the challenges of overtourism in some vulnerable regions (Perera, 2023). This, of course, led to ecological and socio-political challenges. Perera (2017) noted that between 2013 and 2014, the country experienced a remarkable growth rate of 19.8% in tourist arrivals, with more than 1.7 million tourists arriving in 2015. Each of these aspects contributed to the sector's reawakening. The internal civil war's Northern and Eastern regions were first opened up, economically liberalised, and made accessible. New marketing strategies and the expansion of international flight routes helped facilitate movement. The newly emerging eco, health, adventure, and heritage tourism sectors helped post-war Sri Lanka establish its reputation as a tourism destination.

However, these developments can also pose challenges. Over tourism, usually associated with places like Venice, Barcelona, or Bali, has also entered conversations regarding Sri Lankan tourism. Although the volume of international arrivals has increased, the necessary developments in regulation and infrastructure have tended to lag, particularly in some coastal and cultural focal points that receive large numbers of tourists. Stakeholders are concerned with accompanying social, infrastructural, and environmental burdens, as well as cultural erosion and localised service and infrastructure overload. Similar situations in the past have provided valuable lessons in addressing these challenges on time. Thailand and Indonesia are examples in this respect. Both countries have been struggling with the same issues for years.

This study revolves around the following question: Is Sri Lanka experiencing over-tourism, and if so, how can it be mitigated? Within the framework of sustainable tourism development and economic geography, this research employs a qualitative approach to investigate the interrelated and complex policies, perceptions, and practices that comprise the current tourism market in Sri Lanka. It also contrasts Sri Lanka with Thailand, Indonesia, and Vietnam, countries that share cultural, geographical, and developmental similarities, albeit with different policy approaches to similar problems. Fully understanding the impact of tourism on stakeholders and participants thus requires integrating different perspectives, including those of governmental policymakers, market operators, residents of tourism destinations, and tourists. This makes it possible to integrate micro-level data and the experiences of the most affected.

This approach draws on Perera's (2017) observation that tourism data encompass not just volume metrics but must consider profile and behavioural attributes. Treatments of over-tourism often overlook critical details, such as shifts in tourists' age profiles, the narrowing of travel seasons, an increase in short, back-to-back trips, and the proliferation of mono-functional tourism zones that alienate residents. These details are critical in revealing the underlying narrative of over-tourism.

Sri Lanka's tourism sector, like that of other South Asian countries, is facing challenges where unplanned expansion is leading to the overutilization of local capital, inequity, disintegration of local socioeconomics, and socio-cultural and environmental harm and deterioration, as seen in other similar markets (Malinda & Maharani, 2024). This situation, therefore, presents a compelling case for the urgent need for more sustainable, inclusive, and regionally adaptive tourism governance frameworks to prevent permanent damage (Laksiri, 2025). Without implementing proactive governance initiatives, planned sustainable frameworks, and other measures to address Sri Lanka's socio-economic challenges related to tourism, the consequences are irrevocable and comparable to those of other over-tourism destinations (Judisseno, 2015). The situation calls for immediate resilience-designed frameworks that are diversified to manage tourism socio-economic pressures (World Economic Forum, 2025).

Literature Review

The body of work focusing on over-tourism in Southeast Asia encompasses a wide range of variables related to the rapid growth of the tourism sector, including its causes, effects, and potential solutions to address the issue. While there is considerable variation in the literature, a strong consensus remains on the need to rethink the development of the tourism industry in a way that prioritises approaches that are sustainable, equitable, and resilient, rather than focusing primarily on the volume of tourism and the income generated. Sri Lanka occupies a unique position in the region, and, like its neighbours Thailand, Indonesia, and Vietnam, is subject to considerable pressure in its tourism development. This allows for a more comprehensive understanding of the challenges Sri Lanka faces in the Asian tourism landscape, particularly its vulnerabilities and the gaps in its tourism governance.

Over-tourism involves excessive tourism that exceeds the biological, social, economic, and cultural limits of a destination, as indicated in various studies (Peeters et al., 2018). The European parliamentary report reiterates the stresses over tourism places on destinations when the number of visiting customers exceeds the available, even the environmental and social limits of the destinations, which is evident in the Sri Lankan case where tourist attractions like Ella, Sigiriya, and Unawatuna face degraded infrastructure, ecosystems, and conflicts with tourists, as well as weak monitoring and poorly developed policy frameworks surrounding tourist destinations.

For the unregulated growth of tourism, Indonesia, especially Bali, serves as a cautionary example. Bali is documented as suffering some of the worst impacts of over-tourism (Utama et al., 2024). These impacts include the destruction of coral reefs, depletion of groundwater resources, social alienation, and the commodification of cultural heritage. Although some pressures are being alleviated through the implementation of community-based tourism and mixed-methods assessment frameworks, the challenges persist, primarily due to the conflicting goals of economic growth and sustainability. The case of Bali illustrates the need for incorporating fully inclusive stakeholder participation, local empowerment, and the active and fully enforced implementation of prohibitive policies as the foundations of sustainable tourism and planning. These are potential building blocks for sustainable tourism that are sorely lacking in Sri Lanka's governance.

Thailand, as another major tourist destination, provides a different perspective. According to Malinda and Maharani (2024), the Thai government has taken strategic steps, including green public procurement, tightening regulations, and utilising digital platforms to alter tourist behaviour for the conservation of culture and the environment. Thailand, unlike Indonesia, has a more top-down governance model with active state involvement, which suggests the equitable impact of policy-driven sustainability in tourism. This is certainly a lesson for Sri Lanka, which has a poorly developed and piecemeal approach to regulation and unsustainable tourism driven by weak governance.

In terms of tourist segmentation, Herryani and Nugroho (2025) discussed the expansion of the backpacker phenomenon in Thailand, which has resulted in a concentration of tourist activities in specific urban and coastal regions. While there are economic benefits, especially to micro-enterprises, the uncontrolled backpacker tourism is greatly detrimental to locally managed tourism due to poorly regulated budget hostels and public facilities. This is particularly relevant to Sri Lanka, where informal tourism businesses are active, poorly regulated, and lack access to essential supporting infrastructure, resulting in over-tourism and land-use conflicts. This informal sector largely determines the use of tourism infrastructure and contributes to outdated policies in the tourism sector.

Wong (2024) is one of the few authors in this region who unpacked the techniques that can be adopted to alleviate over-tourism through time- and space-based dispersal of tourists, visitor segmentation, and urban infrastructural development. Drawing on recommendations from the United Nations World Tourism Organisation (UNWTO), he illustrated the importance of effective integrated planning and stakeholder collaboration. For Sri Lanka, these pointers indicate the importance of transitioning from volume-based marketing to more sustainable tourism governance frameworks that integrate dispersal policies, infrastructural improvements, and visitor education.

The gap in Sri Lanka is perhaps best articulated in the European Parliament-commissioned study on macroeconomic strategies (Peeters et al., 2018). He identified tourism intensity, tourism density, and the distribution of short-term rentals as triggers of over-tourism. He argued that tourism management needs to rationalise and integrate empirical adaptive control systems within the planning process. It is particularly concerning that the study stated that over-tourism most impacts island and heritage tourism, exactly the categories that Sri Lanka falls within. The importance of developing a specific strategy in this context can thus not be overstated.

The World Economic Forum's scenario analysis (2025) presents a crucial foresight component to the discourse. The scenarios described include fragmented, environmentally driven, technologically disrupted, and harmoniously balanced pathways. This highlights the necessity of preparing, displaying, and implementing

institutional flexibility through anticipation. For Sri Lanka, this presents an opportunity to situate itself within the 'green ascent' or 'harmonious horizons' scenarios by embracing eco-friendly and equitable tourism development in the country.

The examined writings collectively suggest that over-tourism is a complex, systemic problem involving governance, markets, and socioecological interactions. For Sri Lanka, the over-tourism situation is not yet at the benchmark level of Bali or Barcelona, but the evidence is clear: the infrastructure is lagging behind a fast-growing tourist population, ecological systems are stressed, and the local population is dissatisfied. Countries that have managed to delay or reverse the over-tourism spiral have done so through a combination of inclusive governance frameworks, adequate market regulations, and diversification of tourism products.

Conducting qualitative, interview-based research becomes imperative in this scenario. Most studies conducted so far have relied on secondary data or macro-level assessments, with few investigating the lived experiences and perceptions of ground-level stakeholders, such as tourism operators, local residents, or visiting tourists. This gap in research is particularly problematic in the Sri Lankan context, where national tourism policies often fail to align with local realities or expectations. This study aims to shed light on this gap by collecting primary data through semi-structured interviews, providing empirical depth to the discourse on over-tourism.

Academically, this research is premised on three theoretical pillars. First, the 'tourism area life cycle' (TALC) model provides a means of understanding the evolution of a tourism destination from the initial stage of exploration to possible decline, a cycle shaped by visitation volume and the actions of relevant stakeholders. Second, the 'limits of acceptable change' (LAC) framework helps in understanding the maximum impact of tourism that a community and its environment can sustain without negative repercussions. Third, 'stakeholder theory' emphasises the involvement of different groups in tourism planning, arguing that sustainability concerns can be addressed only through integrative governance.

These three frameworks provide a valuable basis for qualitative research, as they justify considering different stakeholders, highlight the socioecological limits within which destination development can be planned, and offer a longitudinal perspective on the study of tourism in Sri Lanka. This theoretical perspective, in turn, serves to guide the research design and expand the policy scope of the research, thereby addressing both practical and theoretical concerns.

Methodology

This research was developed within a qualitative interpretivist framework, seeking to understand the complex, context-sensitive, and subjective nature of over-tourism. This was explored through the perspectives of four case study locations: Bali (Indonesia), Phuket (Thailand), Halong Bay (Vietnam), and Galle (Sri Lanka). Fieldwork was conducted from November 2024 to January 2025. This timeframe was chosen for its overlap with the high and post-peak tourism seasons, thus aligning the research with a diverse set of relevant stakeholder experiences.

Choosing a qualitative approach is an expression of my ontological belief that realities are multiple and constructed. The subjective nature of over tourism, where economic, ecological, and cultural thresholds are heavily contested, makes a qualitative approach highly relevant. Therefore, the chosen primary data collection method of semi-structured interviews allowed the research to gather narrative accounts that are more valuable for understanding the complex layers of the realities of over-tourism than quantified data.

Data was collected from a purposefully selected sample of 180 participants, with a minimum of 45 interviews carried out at each of the four study sites. This sample size was deemed appropriate according to saturation theory (Ahmad & Wilkins, 2025), which suggests that saturation is reached when no new themes are identified during data collection. The target population consisted of government tourism officers, local policymakers, private sector tourism operators, host community members, and both domestic and international tourists. These groups were selected to ensure a wide range of perspectives, as all have a direct stake and are impacted by tourism dynamics. This aligns with stakeholder theory, which suggests that all groups should be involved in the governance of a system (Bouncken et al, 2025).

The primary sampling approach employed was purposive sampling, selected for its capacity to enable the targeting of participants with experience and expertise regarding the impact of tourism at the study sites (Ahmad & Wilkins, 2025). This approach emphasises theoretical and contextual depth as opposed to mere statistical significance. Where formal access was restricted, this research also applied snowball sampling to the extent that referrals were used to access additional participants (Golzar et al, 2022). This enabled the obtainment of a well-rounded sample that is robust from a policy perspective. Participants highlighted aspects of overtourism, including social norms, conflicts over resources, market dynamics, pressure on infrastructure, and policy implications.

The interview guide was developed from the theoretical groundwork established in the literature review. It was predominantly grounded in three central constructs: the TALC model, LAC, and stakeholder theory. The TALC model provides insight for questions concerning perceptions around destination maturity, saturation, and the future trajectory of the region. The LAC framework provides questions focused on ecological limits, levels of carrying capacity, and resident tolerance thresholds. Stakeholder theory focuses on questions concerning the roles and responsibilities, power inequalities, and perceptions of governance legitimacy, framing questions around the perceptions that actors hold. Consequently, the guide contained thematic sections on the perceived benefits and costs of tourism, experiences related to the management of tourism, behavioural observations of visitors, tensions and conflicts created by tourism activities, and exploratory pointers for sustainability.

Internal validity and trustworthiness were ensured through the use of secure digital platforms. All interviews were conducted by the lead researcher, either in person or digitally when physical access was impossible. Interviews were recorded and fully transcribed for thematic analysis. Cross-site comparisons and thematic analysis were conducted after coding the transcripts in NVivo. Thematic analysis allowed for the development of categorised themes in a combination of deductive and inductive ways, which was important for the research to remain grounded. The chosen analytical techniques, framework and thematic analysis are appropriate for the qualitative nature of the research. Framework analysis offers flexibility in organising and comparing data for multiple case studies, aiding in the consistency of interpretation. Thematic analysis relies on the data provided by participants to identify recurring themes, which provide a rich description of the socio-ecological dynamics of over-tourism. The chosen methods are well-suited for this research in the tourism sector (Braun & Clarke, 2021).

Before commencing fieldwork, the researcher obtained ethical clearance from the relevant ethics review board within the institution. Information sheets were provided to the participants, who then signed consent forms. The data collection integrity for this study is ensured through the described methodological transparency, participant selection, adherence to standardised interview procedures, and data analysis, which encompass ethical dimensions, thereby establishing the integrity of the research outcomes. Data collected from participants is guaranteed to be anonymised, confidential, and qualitatively described, using pseudonymous transcripts and publications to safeguard participant identity. The research's cross-cultural dimension necessitated a sensitive approach, which involved the linguistic and contextual adaptation of interview frameworks, as well as the potential use of translators and cultural intermediaries.

Findings

This section presents a consolidated thematic analysis of qualitative interviews and relevant literature concerning four major coastal destinations: Sri Lanka (Galle), Indonesia (Bali), Thailand (Phuket), and Vietnam (Ha Long Bay). Based on interviews with stakeholders across various sectors, the findings illuminate critical systemic issues. These relate specifically to inadequate spatial planning, socio-economic disparity, cultural appropriation, and ecological neglect. Conversely, recent innovations and policy changes, often designed using readily available local documents situated within the study localities, indicate a strong desire for change. The frameworks detailed in the subsequent narratives, along with Tables 1, 2, and 3, discuss these interrelated issues and anticipated transformations in detail.

Table 1
Thematic analysis

Theme	Total frequency	Combined interview evidence	Included sub-codes
Governance and spatial planning failures	101	Gov. official (Phuket): "We never planned zones, so resorts eat up villages." Local (Galle): "They're building hotels on paddy fields." Tour operator (Galle): "Everyone wants the beach; nobody promotes the inland." Resident (Bali): "My farm is dying, but surfers are everywhere." Planner (Halong Bay): "We didn't study the limits before allowing cruises." Tourism officer (Galle): "We lack data to say when enough is enough." NGO Leader (Bali): "The law exists, but nobody enforces it." Tourist official (Sri Lanka): "We fear backlash from investors."	Lack of destination zoning, overdependence on coastal tourism, ignored carrying capacity assessments, and resistance to regulatory frameworks
Socioeconomic displacement and inequity	73	Vendor (Phuket): "I can't afford my own rent now." Local elder (Galle): "Tourism raised prices beyond our means." Resident (Bali): "They moved us for a hotel chain." Heritage officer (Galle): "Temples now shadowed by villas." Fisherman (Halong Bay): "Tourists block fishing routes." Resident (Phuket): "Freshwater gets diverted to hotels."	Tourism-driven inflation, displacement of locals from heritage zones, and resource conflict with local needs
Environmental degradation and mismanagement	56	Cleaner (Halong): "Trash from cruises ends up on our shores." Environmental officer (Galle): "No bins, no education." Eco-tour operator (Thailand): "They call it green but drive SUVs." Community rep (Galle): "Planting trees for pictures, nothing else."	Tourism waste mismanagement, greenwashing by operators

Cultural displacement and identity loss	57	Teacher (Galle): "Kids dance for tourists, not tradition." Elder (Bali): "Festivals are now Instagram shows." Volunteer (Vietnam): "Drunkenness at temples." Host (Phuket): "Tourists ignore dress codes."	Erosion of local cultural identity, tourist misconduct and value clashes
Tourism market volatility and instability	47	Souvenir seller (Thailand): "No sales 8 months a year." Local (Galle): "We survive on peak season only." Marketing analyst (Bali): "Every influencer posts the same waterfall." Youth (Galle): "No discovery left."	Seasonal economic vulnerability, digital influencer saturation
Futures-oriented, tech-driven solutions	32	Tech planner (Thailand): "AI helps predict overcrowding." Digital strategist (Vietnam): "We nudge demand to offbeat trails." Entrepreneur (Galle): "We built a site run by the village." Youth leader (Bali): "Now we tell our own story."	AI-driven predictive itineraries, community-led tech tourism platforms

(Source: Authors' Compilation)

Interviews conducted as part of the thematic analysis (See Table 1) identified interconnected issues that appeared multiple times during interviews across the four destinations. The experiences that give rise to these issues are not abstract. They are real and were articulated by local citizens, local tourism officials, planners, entrepreneurs, and others in the tourism value chain. The frequency and intensity of the themes contain both the specificity and the commonality of the pressures of over-tourism across a range of situations.

Out of the 101 coded segments, the largest single issue was described in the categories of Unmanaged Governance and Spatial Planning Failures. There was an impression of lack of order, and in some cases, lack of any planning and of chaotic irregularity. Respondents from Sri Lanka, Thailand, Indonesia, and Vietnam described considerable frustration at the absence of regulated zoning and the overdevelopment of and resource concentration on the coast, as well as the absence of any political interest, data, or analysis in the establishment and evaluation of boundaries for development. Remarks such as "We never planned zones" and "We fear backlash from investors" capture the sense of lack of planning and structural avoidance of setting governance frameworks that are authoritative and long-term.

The accounts illustrate the inequities and inequitable displacements occurring as the rapid growth of tourism creates uneven socio-economic burdens. Respondents reported displacements in the form of removals from formerly owned homes, rising costs of living, and inequitable access to water. Respondents' statements also conveyed a sense of growing inequity as the burdens of tourism development increased. A vendor in Phuket exclaimed, "I can't afford my own rent now," and an elder in Galle remarked, "Tourism raised prices beyond our means." Both statements evoke the sense of inequity that accompanies the growth of a tourism economy, as profits flow to investors and enterprises located outside the region, while host communities and less affluent tourists bear the burdens of socio-economic inequities from poorly managed tourism growth and unequal socio-economic development.

In the domain of Environmental Degradation and Mismanagement, respondents from Halong Bay to Bali voiced discontent concerning the lack of difference that substantive action on the so-called sustainability agenda would bring. The term "superficial green" captures the lack of waste management, poorly regulated cruise tourism, and the performance of environmentalist activities like "planting trees for pictures, and nothing else." Others complained about the lack of basic facilities like trash bins, pointing to an absence of both theoretical and functional infrastructure for waste management and education.

Displacing Culture and Identity Loss were other major concerns, particularly since several community hosts, educators, and older community members reflected on this theme. Surveyed individuals noted that traditions were increasingly modified and focused on for tourists, leading to a loss of meaning and destruction of purpose. "Kids dance for tourists, not tradition" and "Festivals are now Instagram shows" emphasise how culture is packaged for tourists. Stakeholders felt a global audience negatively affected the preservation of culture, identity, and meaning. While local hosts and visitors felt culture was repackaged for tourists, identity preservation stakeholders noted the repackaging was done negatively for tourists.

Concerns with Tourism Market Volatility and Instability undersell tourism destinations digitally overly focused on seasonal peaks and maintain homogeneous marketing strategies. Many locals described a seasonal tourism window, a singular and concentrated period of tourism flow within the year, and year-round low socio-economic stability. Young locals described the saturation as an endless, monotonous, and homogeneous digital copying — "every influencer posts the same waterfall." The comments reflect not only concerns around income and economic level but also the loss and erosion of uniqueness in the narratives around the tourism destinations of the community as a whole.

Futures-Oriented, Tech-Driven Solutions encourage optimism in how stakeholders are thinking. Although this theme was less reported, it captures the more positive, future-oriented approaches to managing tourism. As described by the respondents, there are no limits to the innovative uses of digital and community technologies to forecast, diffuse, and reclaim narrative ownership of tourism. An AI developer in Thailand described how "AI helps predict overcrowding," and a Galle entrepreneur explained, "We built a site run by the village." These observations demonstrate the understanding of digital technologies as a means of envisioning a new and more equitable tourism economy, should efforts to adapt new AI tools to local contexts and digital technologies be used to promote more equitable and sustainable tourism.

Cross case analysis

Table 2 juxtaposes the challenges and prospects for tourism across the four case studies: Sri Lanka (Galle), Bali (Indonesia), Phuket (Thailand), and Halong Bay (Vietnam). Each destination is analyzed based on prospective risks, opportunities, and trends for various stakeholders. This section integrates qualitative data from stakeholder interviews concerning tourism governance, socio-economic displacement, environmental degradation, and cultural tourism. It also examines the integration of policy and sustainability through the management of overtourism and the development of resilience and inclusiveness in the tourism sector.

Table 2
Cross-case analysis

Destination	Stakeholder Insights	Forecasted Trends & Evidence	Risks Identified	Opportunities for Transformation
Sri Lanka	Participants revealed widespread dissatisfaction with unregulated expansion, lack of inclusive planning, and the growing disconnect between local communities and central policy actors. They pointed to infrastructural gaps and cultural exploitation in hotspots like Galle, warning of irreversible socio-ecological damage without urgent policy realignment.	Sri Lanka's inability to reform tourism governance could exacerbate overtourism, eroding local culture and investor confidence. However, literature suggests integrated resilience planning and regional eco-linkages could reposition Sri Lanka as a slower-paced, culturally rooted destination (Perera et al., 2023; Article 2).	Loss of cultural identity, infrastructure fatigue, political instability, and tourism-induced inequality	Integrate climate-resilient tourism planning with local governance and cultural immersion
Indonesia (Bali)	Respondents shared concerns over land dispossession, unsustainable development, and over-tourism fatigue among locals. Community voices were often ignored in zoning decisions. Operators highlighted growing dependence on short-term rentals and a collapse in rural-urban balance. Calls for zoning and tourism taxation were frequent.	If zoning and taxation reforms are adopted, Bali could emerge as a leader in niche eco and wellness tourism. Academic sources confirm a policy shift toward carrying capacity enforcement and tourism decentralisation (Wijaya, 2024; Article 4).	Community displacement, land speculation, and ecological threshold breach	Empower rural communities via eco-retreat licensing and enforce ecological zoning
Thailand (Phuket)	Local operators and community leaders expressed worry over tourism intensity, rising cultural commodification, and infrastructure bottlenecks. Complaints centred on tourism monopolising public resources, diminishing traditional economies, and unequal policy benefits. Respondents supported regulated caps and cultural heritage zoning.	Phuket may transition to a controlled tourism economy emphasising decentralisation, cultural zones, and visitor tech-tracking. Research forecasts stronger circular governance frameworks and smart-tourism applications in managing demand (Tan & Krit, 2023; Article 6).	Cultural loss, infrastructure stress, and economic overdependence on tourism nodes	Establish tourist caps, redistribute tourism to inland provinces, and strengthen cultural zoning
Vietnam (Halong Bay)	Interviewees highlighted increasing pollution, marginalisation of fishing families, and weak enforcement of marine protections. They emphasised the need for co-managed ecotourism, integrating community voices into state strategy. Waste from tourism was framed as a governance and cultural problem, not only an environmental one.	Halong Bay could develop into a model of eco-governance through community-embedded tourism models and hybrid governance. Literature supports co-management initiatives, linking tourism with sustainable marine and agrarian practices (Laksiri et al., 2023; Article 1).	Marine degradation, exclusion of smallholders, and regulatory enforcement failures	Scale pilot co-management ecotourism, create circular models combining tourism, fisheries, and culture

(Source: Authors' Compilation)

The primary challenges and opportunities related to sustainable tourism in Galle, Bali, Phuket, and Halong Bay are summarised in Table 2. The perspectives of various stakeholders, along with their expectations and potential risks, provide the context for the complex destination analyses that follow. Sri Lanka, for instance, faces unresolved political and structural environmental challenges, and the overlooked issues of diffuse and fragmented

governance, recorded in the table, resonate with the urgent need for reform and widespread political dissatisfaction. Similarly, the risks identified for Bali, Indonesia, relate to the overconcentration of tourists and the displacement of local communities, reinforcing the importance of zoning laws and the enforcement of carrying capacity for viable, sustainable tourism practices. The context of the table also applies to Phuket and Halong Bay, where the need for visitor restrictions and the governance of culture and communities to mitigate over-tourism, as discussed, is paramount. Sri Lanka's climate-resilient tourism frameworks also show potential. The co-managed ecotourism initiatives in Halong Bay and climate-resilient tourism frameworks in Sri Lanka are prime examples for all destinations seeking to address over-tourism while enhancing the protection of their cultural and environmental legacies.

Sri Lanka: Tourism profile and policy overview

According to interviews conducted in Sri Lanka, there is considerable, indeed 'overwhelming,' precariousness in the tourism sector, marked by political conflict, economic dislocation, and environmental neglect. Respondents noted that while tourism is vital for the country's revenue and income generation and employment, the absence of a primary crisis-management plan renders it incapable of responding to cascading crises. There is a 'seemingly permanent disconnectedness' between the national tourism plan and the 'ground' and local reality. The 'remote,' 'hierarchical,' and 'delegated' aspects in regulating, for example, 'urban zoning, tourist infrastructure enforcement in and around protected areas, and rapid urban tourism' contribute to 'overbuilt and layered tourist sprawl' around and in targeted places. Recent work by Laksiri (2025) places Sri Lanka within a politically and economically volatile environment, neglecting climate-adaptive infrastructure, and pushing tourism development to the brink of potential collapse from over-tourism. Within the next decade, provided the country implements the 'needed influential shifts in governance and regional, intersectoral, and effective policy engagement' and 'planning,' Sri Lanka can attempt to reposition itself as a 'resilient heritage' tourism destination in the 'global south,' leveraging current slower-paced tourism and deeper, authentic experiences.

Indonesia: Policy responses to over-tourism

In Bali, feedback provides a sobering perspective on a travel destination over the decades. For tourism concentrated in southern Bali, the real estate market has become over-inflated, and entire communities have become disconnected from their traditional farmlands and temple complexes. The interviews emphasised the urgent need to establish capacity limits and enforce ecologically responsible zoning. Stakeholders highlighted the consequences of unchecked mass tourism on the local populace and both rural and urban ecosystems. Research, especially following Oratmangun et al. (2025), points out that local ecological efforts are undermined by macro-level development across overstretched borders and calls for strategic development in a high-yield, low-volume market while prioritising digital tourism infrastructure and robust zoning to protect Bali's strategic reputation in transition tourism governance. Bali could serve as a unique example in the region for transitional tourism on the governance continuum.

Thailand: Managing tourism pressure in popular destinations

During interviews, respondents noted the resulting oversaturation of tourist-focused experiences, leaving little room for local culture. Thailand, and particularly Phuket, faces issues of spatial saturation and economic monoculture, where the port, water, and waste infrastructures are poorly aligned. Phuket stakeholders warn of the risks of over-tourism without deliberate tourist diversification and limits. This dominant theme in the commodification of Thai identity and the risk of becoming a less distinctive destination (Articles 3 and 6) receives little attention in the literature and risk management. Looking ahead, stakeholders envision preserving the cultural integrity of secondary nodes and uplifting areas through economic diversification. With civil governance and smart tourism implemented, Phuket could become a regional leader in managing the legacies of over-tourism.

Vietnam: Community-based tourism and state regulation

Halong Bay embodies a paradox of surging arrivals and endangered authenticity. Interviews showed how rapid growth has stressed traditional fisheries, increased pollution, and caused cultural erosion, yet also revealed strong community interest in co-managing tourism. Local stakeholders called for a combination of state oversight and grassroots initiatives such as sustainable cruise operations and community-run homestays. Research by Laksiri et al. (2025) supports this view, identifying Vietnam as an emerging regional leader in community-integrated eco-tourism policy. The future of Halong Bay depends on scaling these experimental initiatives—embedding environmental offsets, boosting local profit retention, and developing governance models that support both tourists and traditional livelihoods. If successful, Halong Bay could become a regional benchmark for eco-conscious, community-led coastal tourism.

Framework matrix

Table 3 presents a framework matrix that synthesises stakeholder insights, policy implications, and cross-case evidence across four key tourism destinations: Sri Lanka, Bali, Phuket, and Halong Bay. The table highlights common challenges such as governance failures, socio-economic displacement, and environmental degradation

while offering actionable policy recommendations and opportunities for transformation.

Table 3
Framework matrix

Theme	Stakeholder Voices	Policy Implications	Cross-Case Evidence
Governance and Spatial Planning Failures	Sri Lanka: "They're building hotels on paddy fields." (Local - Galle) Phuket: "We never planned zones." (Gov. Official) Halong: "No study before cruises." (Planner)	Urgent need for zoning laws, carrying capacity audits, and integrated regional planning to prevent saturation.	Seen in all four sites: Galle, Bali, Phuket, and Halong Bay. Lack of zoning and reactive planning is a shared pattern.
Socioeconomic Displacement and Inequity	Bali: "They moved us for a hotel chain." (Resident) Phuket: "I can't afford my own rent now." (Vendor) Galle: "Tourism raised prices beyond our means." (Elder)	Need for equitable tourism policies addressing gentrification, land rights, and community benefit-sharing mechanisms.	Appears strongly in Bali, Galle, and Phuket, where tourism-induced displacement is documented. Halong shows a rising trend.
Environmental Degradation and Mismanagement	Halong Bay: "Trash from cruises ends up on our shores." (Cleaner) Galle: "No bins, no education." (Env. Officer) Bali: "They call it green but drive SUVs." (Operator)	Call for enforceable environmental regulations, transparent reporting, and penalties for greenwashing.	Reported by all coastal locations, especially Halong Bay and Bali. Sustainability rhetoric is rarely backed by action.
Cultural Displacement and Identity Loss	Galle: "Kids dance for tourists, not tradition." (Teacher) Bali: "Festivals are now Instagram shows." (Elder) Phuket: "Tourists ignore dress codes." (Host)	Cultural preservation strategies include heritage zoning, ethical tourism guidelines, and community-led festivals.	Cultural tensions and tourist disrespect were commonly reported in Phuket, Galle, and Bali.
Tourism Market Volatility and Instability	Galle: "We survive on peak season only." (Local) Thailand: "No sales 8 months a year." (Seller) Bali: "Every influencer posts the same waterfall." (Youth)	Introduce tourism stabilisation policies such as seasonal subsidies, secondary destination marketing, and price floors.	Economic fragility linked to peak season reliance was clear in Galle and Phuket. Redundancy of tourism content noted in Bali.
Futures-Oriented, Tech-Driven Solutions	Thailand: "AI helps predict overcrowding." (Planner) Vietnam: "We nudge demand to offbeat trails." (Strategist) Galle: "We built a site run by the village." (Entrepreneur)	Governments should invest in digital infrastructure, community-tech partnerships, and predictive tourism planning platforms.	Tech optimism was highest in Vietnam and Thailand, but community-led tech platforms are emerging in Galle and Bali too.

(Source: Authors' Compilation)

Results from the framework analysis (Table 3) show complex and systemic patterns of challenges and opportunities in tourism development in Sri Lanka, Bali, Phuket, and Halong Bay. Utilizing interview data supplemented by recent literature, this text aims to provide a thematic narrative synthesis that captures and integrates stakeholder voices, identifies concerns, implications for action, and insights across contexts.

Concerns of inadequate governance and failures in spatial planning were noted across all four destinations. This points to a common regional problem of uncontrolled tourism expansion. Stakeholders in Sri Lanka and Thailand echoed the same frustrations as a Galle-based participant who stated, "They're building hotels on paddy fields," similar to a candid government official in Phuket: "We never planned zones." This is indicative of a systemic absence of spatial policy frameworks. Stakeholders' frustration about the absence of tourism carrying capacity reports, reactive state intervention, and planning aligns with literature on the South and Southeast Asian tourism governance gap (Perera et al., 2023). The need for integrated zoning is now urgent. The absence of cohesive and coordinated land-use policies, integration of regulatory frameworks, and transboundary tourism planning will lead to the rapid depletion of destination resources. The need for integrated zoning is now urgent.

Alongside issues of governance are longstanding problems of socioeconomic inequity and displacement. Socioeconomic inequity and displacement were among the top concerns of local communities in Bali, Galle, and Phuket. As one resident from Bali recounted, "They moved us for a hotel chain," and one vendor from Phuket stated, "I can't afford my own rent now," highlighting the dispossession and gentrification experiences of local communities. The inequities outlined in the case studies seem to stem from a lack of effective community participation and revenue sharing. That is, the socioeconomic inequities regarding the benefits from tourism suggest the need for the incorporation of social equity as a core value in tourism planning. Literature by Wijaya (2024) supports this, highlighting how decentralisation and community-managed licensing could restore balance between profit and people.

Disregard for sustainability is apparent not only in the discourse but also in the management of environmental resources. Halong Bay and Bali illuminated the shortcomings of sustainability rhetoric. A Halong Bay cleaner recounted, "Trash from cruises ends up on our shores." Liber Bali denounced the environmental hypocrisy of "green" Bali: "They call it green but drive SUVs." These testimonials relay the glaring absence of enforcement and oversight from the state on so-called "eco" initiatives. With "eco" governance, the state needs to do more than

superficial commercial branding to address direct infractions of overexploitation of the community and the commons.

Place and identity loss occurred in the cases of Bali, Galle, and Phuket. There are many community sectors where cultural scripts perform culturally discordant performances and embody community values. In Galle, a teacher lamented, “Kids dance for tourists, not for tradition.” An elder in Bali stated, “The festivals are now Instagram shows.” Such comments pertain to the commodification of cultural heritage and the loss of cultural authenticity. In relation to the culturally driven commodification of cultural performances, there are cultural tourism strategies for de-marketing purposes. Efforts for community and cultural tourism strategies must be grounded in community, community control, respect, and ethics.

Respondents highlighted the economic fragility of Galle and Phuket, particularly concerning the shortness of peak seasons and inconsistent international demand, further emphasising the perils of Galle’s tourism dependency. One local said, “We survive on peak season only.” Bali experiences similar digital fatigue. This suggests the need for improved and expanded domestic tourism and policy innovation, as well as the need for content innovation driven by the desire for depth of experience rather than volume. The hope for the future of tourism, as discussed in Vietnam and Thailand, stems from the use of technology. These tourism planners spoke of the use of AI for visitor management and the digital nudging of tourist flows. “AI helps predict overcrowding,” noted a planner in Thailand. “We built a site run by the village,” said an entrepreneur from Galle. This shows the promising adoption of technology in the governance of tourism. Future planning must prioritise the digital gap by ensuring the local, as opposed to the corporate, community leads the digital charge.

These themes highlight the weaknesses and possibilities that affect the governance of tourism within Asia. The apparent uniformity of stakeholder narratives across diverse geographies suggests a likely overtourism crisis. This is attributable to unregulated, retention-centric, and exclusionary development practices. That said, community-initiated and technological innovations, along with stakeholder consciousness, represent constructive and proactive opportunities for tourism governance. This is contingent upon their application within participatory governance and comprehensive policy frameworks.

To further improve this argument and highlight the originality of the Sri Lanka case, the relevant data must be connected more clearly to the theoretical frameworks of the TALC model, the LAC model, and Stakeholder Theory. One indicator of the originality of Sri Lanka’s tourism development experience is the internally governed, fragmented tourism system. This is both a pathological characteristic of the system and a component cause of over-tourism. Local stakeholders emphasise the poorly coordinated spatial distribution of tourism activities and the lack of administrative controls. Over-tourism is conceptually understood through the scrutinised case studies of Bali and Phuket. In contrast, Sri Lanka is developing its tourism system, and the challenges of governance provide a different narrative. Within the literature, the dominant Sri Lankan narrative focuses on socioeconomic, spatial, and political ungovernance vulnerabilities, inequitable environmental exploitation, and the political ungovernance that exposes the gap.

The application of the LAC framework in this instance is ground-breaking, as it denotes that tourism policies within the Sri Lankan context remain to define what ‘impact on communities and ecosystems’ consists of in practical terms. This is especially pertinent to the study of ‘limits of acceptable change’ in circumstances that so far lack such legislation and policies. Given Sri Lanka’s relative vulnerability in this context and the developing systemic transformations, it is different compared to the rest of the destinations studied. This has implications for the theoretical constructs and the policy approaches likely to be put in this context.

Discussion

Key findings in this research point to a multitude of inequalities and tensions, which are both relational to, and necessary for, positive change in the tourism contexts of Sri Lanka, Indonesia (Bali), Thailand (Phuket), and Vietnam (Halong Bay). The four destinations have unique and overt manifestations of overtourism, but taken as a whole, they tell a regional narrative of fragile equilibrium characterised by rapid growth, reactive governance, and poorly developed socio-ecological systems.

Sri Lanka: Governance vacuum and potential for revival

To have a meaningful discussion on the tourism governance vacuum in Sri Lanka, there must first be some governance structure in place. Respondents pointed to the lack of correspondence between national tourism governance arrangements and the tourism realities on the ground. The inability to contain urban sprawl, especially within the heritage areas of Galle, is primarily a governance failure. The loss of agricultural reserve lands to hotels and unproductive urban sprawl is a hallmark of a governance deficit. The absence of genuine zoning regulations makes Sri Lanka comparable to the situation Wong (2024) describes, where tourism hyper-concentration occurs

due to the lack of effective spatial controls. Political and economic instability render the Sri Lankan state particularly ill-equipped to address the negative consequences arising from unmanaged growth in the tourism sector. However, unlike a majority of the stakeholders in this research, the interviewees displayed an understanding of the positives. The Sri Lankan grassroots tourism movement, coupled with the community's sense of pride and rich cultural traditions, provides a fertile ground for the revival of tourism governance.

Bali, Indonesia: Inequitable growth and ecological harm

The high price placed on economic achievements in Bali, Indonesia, indicates the possible repercussions of inequities in growth and development. Isolated escapism remains a strong image of the island. However, this image is built on cultural homogenization, dilution, and serious environmental harm—issues that stakeholders tend to ignore. Of greater concern are narratives on land dispossession and ecological harm that accompany the unfettered growth of tourism and real estate speculation (Utama et al., 2024).

Community zoning proposals at the micro-scale and other initiatives offer instances for optimism. The key issue is the degree to which grassroots efforts can grow and whether the official state will support them. Perera et al. (2024) explore the idea of transitional tourism governance, for which Bali exemplifies the potential for mid-course corrections. It is neither a cautionary tale nor a utopian paradise; there is still the possibility of progress in a positive direction.

Phuket, Thailand: The intensity of disorder

Concerning Phuket, Thailand, the problem is not a lack of order but rather the intensity of the disorder. Phuket is a perfect example of the overtourism problem. The destination has the wrong type of state-supported marketing and hospitality infrastructure. Many respondents talked about cultural and infrastructural decay as well as unsatisfactory economic disparity due to the commodification of the space. Malinda and Maharani (2024) highlight the economic and geopolitical spatial issues caused by the centrifugal distribution of tourism infrastructure and poorly circulated economic resources for tourism activities. The Thailand example provides a fine illustration of state tourism. Phuket has stated policies of dynamic tourism, tourist traffic technologies, and heritage zoning. Phuket's stakeholders and citizens understand that there is a need for tourism control. This cultural acceptance of limits is something that Sri Lanka and tourism economies of a comparable caste can work towards.

Halong Bay, Vietnam: Hybrid model and co-management

The mosaic that is Halong Bay, Vietnam, is a region that bridges the gap between community aspirations and system outcomes. In contrast to the privatised accommodations found in Bali or the top-down governance model in Phuket, Halong is a hybrid model with an active community willing to partake in sustainable tourism development, although policy gaps exist. Of course, the primary concerns are pollution and the marginalisation of fishing and tourism stakeholders. Many people interviewed demonstrated their strongest aspirations toward co-management models, reflecting Laksiri et al.'s (2025) expectation that Vietnam has the potential to become a regional leader in community tourism governance. Halong is also unique in that it is the only case in this study with a rich tourism potential and adjacent traditional livelihoods that can run alongside tourism.

Cross-cutting insights and strategic direction

Cross-cutting insights that are present and which would benefit from additional exploration can be viewed from the four-case study. The unchecked expansion of tourism is bound to create additional costs; in this regard, displacement, inflation, and alienation were sentiments expressed uniformly across residents. Third is the inequitable burden mass tourism places on tenuous and vulnerable ecosystems, be they natural or social.

The negative consequences of tourism mismanagement and the eventual degradation and exhaustion of resources are evident in coral reefs, freshwater resources, and social customs. In every one of these instances, the local agency is extraordinary, employing technology in grassroots ways to contest the dominant tourism frameworks, re-channel tourist footfall, and reclaim tourism narratives in the digital realm. There is an immense opportunity in the refusal to quit tourism and, instead, to redistribute tourism by geography, society, and technology.

Having observed the neighbor countries, listened to local stakeholders, and engaged in limited sustainable shifting, there is no reason for Sri Lanka to remain in its current condition. Sri Lanka is positioned to confirm the primary discussion point for the study. Sri Lanka should avoid sustainable tourism development frameworks and tourism development plans, even if they mean to establish such collaborative frameworks. Recognising the barriers, involving the local citizenry, and protecting the limited destination are priorities, rather than focusing on the excess destination tourism. As countries in Southeast Asia enter the more digitally disturbed, climate-changed, and

ethically compromised consumer tourism, they will continue to thrive if they focus, at the core, on authentic tourism. Those countries will thrive.

Theoretical contribution and practical implications

This study expands the theoretical discussions on over-tourism by applying the TALC model, the LAC frameworks, and Stakeholder Theory to Sri Lanka and the Southeast Asian region. The friction inter and intra overlapping over tourism frameworks provides a deeper understanding of the complex interrelations of fragmented governance, inequity and socio-economic distress, and the environmental convergence that drives overtourism. This study uses the comparative case study approach to showcase the importance of participatory governance and the need for tailored frameworks and contextualised systems. Recent contributions to this debate, especially Laksiri (2025) and Judissen (2015), highlight the need for sustainable tourism governance and the importance of integrating appropriate technology and local actors, especially concerning overtourism hotspots and tourism resilience.

Strategies to reduce over-tourism must be adopted with caution. For instance, while zoning changes, tech-assisted visitor management, and dispersal tourism may assist in alleviating overcrowding, economically expanding, and lessening variances in poverty, some local stakeholders may view these initiatives negatively due to fears of reduced control, declining profits, and/or loss of cultural identity. In addition, AI and other digital systems designed to track visitors raise privacy concerns and may be highly demanding systems that exacerbate strain in less developed areas that are resource-poor. Moreover, cultural resource preservation may run counter to community tourism in economic terms, which helps to motivate the community and undermine cultural authenticity. The proposed solutions provide some hope, but their implementation needs to consider local stakeholder imbalances to minimise detrimental consequences.

The practical implications of this study can be directed towards Sri Lankan policymakers and those involved in the local industry. To solve the issue of overtourism, integrated spatial planning and strategic zoning, coupled with the development of a holistic national tourism blueprint, are needed while taking the local socio-ecological community into account. Advocates of tourism pluralism and sustainable tourism development, which promote equitable socio-economic development within and across host communities, should be encouraged. AI and digital storytelling can be utilised to assist in overtourism mitigation while allowing tourism planners to shift visitor management and cultural narrative co-creation to local communities. Sri Lanka, and places like it, should be given the ability to excel in a turbulent tourism context, and the development of adaptive co-management strategies with the appropriate degree of flexibility to address unforeseen circumstances should be encouraged.

Outlining obstacles and regional dynamics

The obstacles outlined in the document can be framed according to patterns of overtourism already observed in Bali and Phuket, and, in the case of Sri Lanka, also due to the specific circumstances of the country. Weak and fragmentary governance, lack of proactive spatial governance, and politically unstable governance are also regional outliers. These conditions, along with an overwhelming reliance on coastal tourism and poorly developed tourism regulations, increase the risk of over-tourism. Unlike Bali, Sri Lanka has not experienced attempted policy changes, nor does it have the community-based tourism governance seen in parts of Vietnam. Sri Lanka's emerging tourism pressures indicate the need for the country to develop tourism policies in a more concentrated manner. The study seeks to address this by placing the Sri Lankan case within more cohesive regional dynamics.

Conclusion

The stakeholder comparative analysis here focused on Indonesia (Bali), Thailand (Phuket), and Vietnam (Halong Bay). For Sri Lanka (Galle), the goal was to understand whether the island was moving toward overtourism, focusing on the identification of differences rather than mere parallels. Systemic differences in stakeholder and contextual governance patterns determine the unique tourism development pathways of these selected Asian geographies. Primary research involved qualitative interviews with 180 stakeholders across the four countries, focusing on spatial mismanagement, socio-economic displacements, and the socio-structural problems of environmental collapse, cultural commodification, and market attenuation. These themes were integrated into a detailed, regionally contextualised, and locally broad thematic and framework analysis, thereby offering both comparative and interpretive depth to the findings.

Sri Lanka is in a similar situation to other countries, but lacks frameworks to protect or defend against tourism pressure. It faces this tourism dilemma undermanned due to the absence of institutional or regulatory frameworks. Compared to Thailand, Sri Lanka does not possess a similar robust tourism framework, but it also lacks the community models of co-management seen in Vietnam. Feedback from stakeholders, particularly in Galle, demonstrated the local capacity for guiding tourism toward preferred cultural and ecological directions. The

research indicates that the existence of over tourism points to deeper socio-political issues in the areas of governance, inequality, and environmental neglect, but it also highlights the emerging consciousness among communities and planners to reshape the trajectory of tourism through participatory, inclusive governance.

This study documents risks through comparative analysis, discusses new developments, and suggests recommendations on potential actions such as reforms in spatial planning, community-inclusive policy, digital visitor management, and heritage zoning. These lessons have relevance not only for Sri Lankan policymakers but also for the scholarly examination of over tourism in the post-COVID-19 period within Asia. The use of a comparative approach has enhanced understanding of how different political, economic, and socio-cultural frameworks influence and condition the experience of universal phenomena, providing a grounded, albeit positive, outlook in tourism studies.

Limitations and future research directions

While the research contributed to the understanding of over-tourism in Sri Lanka and Southeast Asia, some limitations need to be acknowledged. The study period was from November 2024 until early January 2025, which does not account for some potential seasonal and longer-term variations in tourism. Particularly for destinations like Galle and Phuket, longitudinal studies would be useful in fully understanding their temporal dynamics.

While the study was based on an adequate sample of 45 participants from all stakeholder groups for each of the four destinations, other relevant locations should also be taken into account. In Sri Lanka, for example, Ella and Sigiriya; in Bali, Ubud; in Thailand, Chiang Mai; and in Vietnam, Sapa. These are significant in understanding the dynamics of over-tourism, and future studies in these locations are likely to be valuable. Research on tier-two tourist destinations would be essential in reinforcing the need to address concerns about equity in regional tourism.

Future research in this field could include a mixed-methods framework that integrates geospatial mapping with tourism density metrics and environmental impact assessments that include stakeholder analyses. These methods would contribute to a better understanding of over-tourism and allow qualitative insights to be captured alongside quantitative metrics.

Future research could also look to expand the geographical focus to include Arugam Bay, Pasikudah, and Trincomalee, which are secondary tourism sites, to explore community-based tourism alternatives with a greater focus on the local population. There remains a need for longitudinal research that employs a mixed-methods approach to shift the understanding of the dynamics of change, particularly concerning tourist behaviour and structural changes in overtourism, including the anticipatory adjustments of infrastructure, governance, and policies. The behaviours of novel tourist segments, including digital nomads and eco-conscious tourists, also need to be researched to sustainably plan for future tourism demand.

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FACTORS AFFECTING THE BEHAVIORAL INTENTION TO USE IOT-BASED PATIENT MANAGEMENT SYSTEMS BY HEALTHCARE PROFESSIONALS IN SRI LANKA

P T T Gamage¹, R S Gamage²

Abstract

Internet of things (IoT) can greatly enhance service quality, boost operational efficiency, and improve patient outcomes in healthcare. This study examines the factors influencing healthcare professionals in Sri Lanka regarding the adoption of IoT-based patient management systems, utilising the Technology Acceptance Model (TAM) and incorporating organisational and technological aspects to develop a contextual framework. We surveyed 170 respondents, comprising doctors, nurses, and consultants, using a structured questionnaire. The study used correlation and regression analyses to explore the relationships among perceived usefulness (PU), perceived ease of use (PEOU), perceived challenges (PC), perceived benefits (PB), technological factors (TF), and organisational factors (OF). In this framework, attitude toward technology acted as a mediator, while behavioural intention was the dependent variable. Findings show that perceived usefulness and ease of use significantly impact attitude and behavioural intention, confirming the mediating role of attitude. Organisational and technological factors were not very effective in predicting outcomes, highlighting the infrastructural and managerial challenges in Sri Lanka's healthcare system. Successful IoT implementation hinges on technological readiness, organisational support, and staff training. This study enhances the Technology Acceptance Model by incorporating contextual factors relevant to developing nations, providing valuable insights for healthcare administrators and policymakers to inform improved IoT adoption strategies. The findings clarify how perceived ease, usefulness, and organisational readiness influence behavioural intention towards IoT healthcare innovations.

Keywords: Attitude toward technology, behavioural intention, internet of things, Sri Lankan healthcare sector, Technology Acceptance Model

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DOI:

Introduction

Adopting new technology in healthcare is crucial for enhancing service quality, improving operational efficiency, and improving the patient experience. The internet of things (IoT) represents a significant digital leap, facilitating real-time data monitoring, decision-making, and remote patient management through connected devices and smart systems (Lakra, 2024). IoT adoption in Sri Lanka's healthcare is nascent yet holds significant promise for enhancing hospital operations and clinical care. The sector faces challenges such as inadequate infrastructure, insufficient managerial support, and inadequate staff training (Perera, 2009). A base hospital in Kegalle District, Sabaragamuwa Province, is ideal for examining the adoption of IoT-based patient management systems among healthcare professionals, providing insights into local behaviours. IoT patient management systems leverage smart sensors, cloud applications, and real-time analytics to enhance diagnostic accuracy and emergency response, while also reducing clinical workload and improving patient safety (Bae et al., 2016). Many studies have explored the adoption of IoT in healthcare worldwide, with a primary focus on developed countries and broader institutional perspectives. There has been a lack of focus on the micro-level behavioural factors affecting healthcare professionals' willingness to adopt IoT in developing countries such as Sri Lanka, where technological infrastructure and institutional support vary greatly. The Technology Acceptance Model (TAM) offers a valuable theoretical lens; however, aspects such as organisational and technological readiness are frequently neglected in adoption frameworks within healthcare in developing nations (T. Dutta et al., 2020). This study examines the factors affecting healthcare professionals' intention to adopt IoT-based patient management systems. Key areas include usefulness, ease of use, benefits, challenges, organisational factors, and technological factors. Attitude toward technology (ATT) mediates the relationship between these constructs and behavioural intention. This study evaluates healthcare professionals' awareness and perception of IoT patient management systems, analyses the connections among perceived usefulness, ease of use, benefits, challenges, organisational factors, and technological factors related to attitude and behavioural intention, and assesses how views on technology influence the likelihood of adopting IoT systems. This study enhances the Technology Acceptance Model for developing countries, offering practical insights into addressing adoption barriers through management support, infrastructure upgrades, and workforce training.

Literature Review

The IoT represents a significant technological advancement in multiple industries, enabling seamless data exchange and facilitating prompt decision-making. In healthcare, IoT applications, referred to as the internet of medical things (IoMT), have become essential for digital transformation, facilitating patient monitoring, diagnosis, and personalised care delivery (Li et al., 2024). This review summarises existing research on IoT adoption in healthcare and analyses the theoretical frameworks that clarify behavioural intentions and attitudes towards technology adoption. The review is structured around key variables from the TAM and further elaborated through organisational and technological factors, highlighting the empirical relationships among these constructs.

IoT adoption in healthcare

The medical and healthcare sectors are experiencing rapid growth, with researchers continually creating new trends through innovative methods (Devadharshini & Anitha, 2019). Healthcare is leveraging IoT technology to enhance patient care and outcomes, creating new avenues for efficient delivery and remote monitoring of personalised treatment plans (Li et al., 2024). The swift expansion of the IoT has increased the potential use of the IoMT, as many consumer mobile devices now incorporate Near Field Communication (NFC) radio frequency identification (RFID) tags, enabling data transfer with IT systems. The implementation of the IoT may significantly enhance patients' quality of life (Alanazi & Soh, 2019).

Behavioural intention (BI)

Behavioural intention can be defined as an indication of an individual's willingness to engage in a specific behaviour (Acikgoz et al., 2023). Behavioural intention (BI) is crucial in assessing an individual's intention to use an information system, defined as the strength of one's intention to perform a specific behaviour (Zhao et al., 2018). The effort required to learn a new technology often outweighs the perceived benefits, making perceived usefulness and ease of use crucial for influencing behavioural intention (Alanazi & Soh, 2019).

Technological factors (TF) and organisational factors (OF)

Organisational readiness, or the factors influencing the adoption of information systems, refers to the commitment and capability of an organisation concerning the thoughts and behaviours associated with information systems (IS) adoption. Successful technology implementation in healthcare management relies on key organisational factors, including culture and leadership support, training and education, interoperability and data integration, workflow redesign and process optimisation, privacy and security, cost and return on investment (ROI), and user acceptance and change management (Bhatia, 2023). Executive management support simplifies service unification, resource sharing, and process re-engineering, which are crucial organisational factors in adopting the internet of

things. Eight key technological factors influence medical professionals' adoption of IoT-based healthcare systems: usefulness, ease of use, design, compatibility, technical challenges, content, personalisation, and convenience (Jacob et al., 2020).

H1 – *TF positively affects the ATT in IoT-based patient management system adoption.*

H2 – *OF positively affects the ATT in IoT-based patient management system adoption.*

Perceived ease of use (PEoU)

Perceived ease of use (PEOU) refers to the extent to which a person believes using a specific technology requires little to no effort (Zhao et al., 2018). Perceived ease of use is a key component of the TAM, affecting user perceptions of technology or information systems' usability (Augusta et al., 2024). Perceived ease of use in digital health management indicates how easily users adopt and utilise health management technologies on the IoT platform (Liu et al., 2022).

H3 – *PEoU positively affects the ATT in IoT-based patient management system adoption.*

Perceived usefulness (PU)

Perceived usefulness refers to the extent to which users believe a specific technology (such as a platform or application) can improve their overall performance (Liu et al., 2022). The perceived usefulness in the TAM mediates the relationship between PEOU and behavioural intention. The ease of use directly enhances perceived usefulness, influencing the user's willingness to adopt the technology (Caleb, 2024).

H4 – *PU positively affects the ATT in IoT-based patient management system adoption.*

Perceived benefits (PB)

Perceived benefits refer to the advantages the IoT offers to organisations, leading to positive outcomes (Ahmetoglu et al., 2022). The consumer's view of the benefits of a system reflects their subjective assessment of the trade-off between the advantages gained from using the system and the sacrifices made for those benefits. End users are willing to overlook potential challenges due to the perceived benefits they receive (Alviyendra & Pardede, 2024).

H5 – *PB positively affects the ATT in IoT-based patient management system adoption.*

Perceived challenges (PC)

The internet of things offers many advantages, but it remains in its early development, facing several challenges that need to be resolved before widespread implementation (Ahmetoglu et al., 2022). IoT improves organisational efficiency and performance but introduces significant security and privacy challenges due to the increasing number and variety of connected devices (Ahmetoglu et al., 2022). The perceived challenge significantly influences individuals' acceptance of new medical innovations (Qi et al., 2021).

H6 – *PC positively affects the ATT in IoT-based patient management system adoption.*

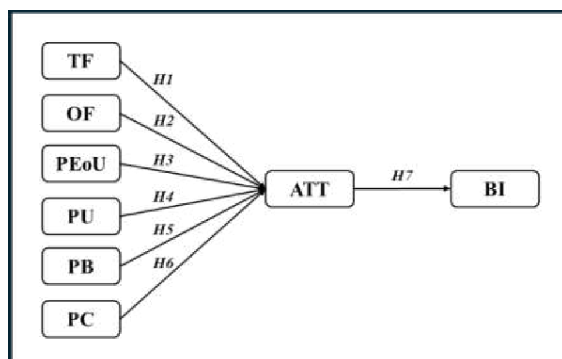
Attitude towards technology (ATT)

The intention to use a system is primarily influenced by a person's attitude, which reflects their positive or negative evaluation of the relevant behaviour (Karahoca et al., 2018). Attitude mediates the relationship between PEOU and BI, highlighting a key connection where PU enhances the user's perception of technology's usefulness, thus fostering a positive attitude towards its use (Caleb, 2024). This mediating relationship supports the theoretical foundations of the Technology Acceptance Model, the Theory of Reasoned Action (TRA), and the Theory of Planned Behaviour (TPB), while adding relevance through organisational and technological readiness from the Technology-Organisation-Environment (TOE) framework. (A. Dutta et al., 2023).

H7 – *ATT positively affects the BI in IoT-based patient management system adoption.*

Conceptual Framework

Figure 1
Conceptual model



(Source: Author's Compilation)

Methodology

Data collection

A Google Forms questionnaire was created and shared with selected participants via email, WhatsApp, and Facebook Messenger. The instrument was adapted from prior scales and evaluated for clarity and relevance by five healthcare professionals. Terminology was adjusted to align with Sri Lankan healthcare standards. The questionnaire comprised three sections: demographic information, independent and mediating variables (perceived usefulness, perceived ease of use, perceived benefits, perceived challenges, organisational factors, technological factors, and attitude toward technology), and the dependent variable (behavioural intention). Participants were informed about the study's purpose, the voluntary nature of their involvement, and the confidentiality of their responses prior to data collection. Informed consent was obtained electronically prior to the commencement of the questionnaire. Participants could exit at any time without consequences. Data were anonymised and analysed solely for academic purposes.

Participants

The study included 307 healthcare professionals, 175 nurses, 120 doctors, and 12 consultants from a base hospital in Kegalle District, Sabaragamuwa Province. Sample size was set at 172, with a 5% margin of error (Saunders et al., 2012). A total of 170 valid responses were collected, representing 98.84% of the target sample size. The survey results showed that 71.2% of respondents were female, and 28.8% were male. Nurses comprised 62.9% of participants, doctors 34.1%, and consultants 2.9%. 45.3% of respondents were aged 31 to 40 years. Participants were recruited via hospital channels and professional WhatsApp groups, with administrative approval obtained. Invitations featured an information sheet and a link to the consent form. Eligibility was limited to staff at the selected hospital engaged in patient care. The study employed purposive sampling due to time and resource limitations. This method was selected to confirm participants' relevant experience with IoT technologies. This method may limit generalisability but offers valuable insights for exploratory research in new contexts.

Research methodology and sampling technique

This study employed a cross-sectional design to collect data at a single point in time. A deductive approach was employed to formulate hypotheses based on established theories (TAM and TOE) and test them using empirical data. A quantitative method was selected for the objective measurement of variable relationships. A structured questionnaire was utilised, employing a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Data analysis was conducted using SPSS, Version 26. While advanced methods, such as structural equation modelling (SEM), are ideal for complex mediating relationships, regression analysis was chosen due to the sample size and exploratory nature of the study. Regression yields reliable results for small samples and simplifies the interpretation of individual variable effects on attitude and behavioural intention. Future studies could utilise SEM for model validation with larger and more diverse datasets. Cronbach's Alpha assessed internal consistency, with all variables surpassing the 0.7 threshold, ensuring reliability. Hypotheses were tested and mediation effects assessed using Pearson correlation and linear regression analyses.

Measures

Table 1 illustrates that all parameters used to evaluate the variables in this study were derived from previous research and adapted to the current context. All items had a Cronbach's alpha score above 0.7, showing strong internal consistency in assessing the study's variables. A five-point Likert scale was used to evaluate items related to each variable, with 1 representing strongly disagree and 5 representing strongly agree.

Table 1

Source and Cronbach's Alpha value of measures

Variable	PEoU	PU	PB	PC	OF	TF	ATT	BI
Number of Items	4	4	3	3	6	5	3	3
Source	(Alloghani et al., 2016)		(Alqudah et al., 2021)					(Alloghani et al., 2016)
Cronbach's alpha value	0.779	0.811	0.760	0.771	0.787	0.845	0.871	0.780

(Source: Author's Compilation)

Findings of the Study

Correlation analysis

When the assumptions of Pearson's correlation analysis are violated, researchers may choose to employ Spearman's rank correlation analysis as a non-parametric alternative.

Table 2

Correlation analysis summary

Independent Variables	PU	PeoU	PB	PC	TF	OF	ATT
Dependent Variable	ATT						BI
Spearman's Rank Correlation	0.617	0.494	0.419	0.183	0.07	0.059	0.903
Significance of the relationship	0	0	0	0.017	0.366	0.446	0

(Source: Author's Compilation)

The Spearman's rank correlation values indicated a weak positive correlation between TF – ATT and OF–ATT. Significance values exceeding 0.05 indicate that the relationships between TF – ATT and OF–ATT were not significant in the sample analysed. All other relationships between the independent and dependent variables are significant with positive correlations. A significance level of 0.000 and a high Spearman's rank correlation of 0.903 indicate that the relationship between ATT and BI is consistent with previous studies. The findings align with recent studies and provide a solid framework for future research in this area.

Regression analysis and hypothesis testing

Assessing the direct impacts of the independent variables, PU, PeoU, PB, PC, TF, and OF, on the mediating variable, ATT, is crucial. This study examines how ATT and independent variables affect BI, emphasising ATT's mediating role. Analysing regression coefficients, p-values, and R-squared values is essential for evaluating the strength and significance of relationships. A higher R-squared indicates a better model fit, with values over 0.5 considered acceptable. A p-value of less than 0.05 indicates statistical significance in hypothesis testing. The regression analysis predicting ATT yielded an R-squared value of 0.857, showing that the model explains 85.7% of the variance in ATT. This outcome shows that PU, PeoU, PB, PC, and OF have a significant positive influence on ATT. TF was not a significant predictor, with a p-value of 0.192, failing to reach the threshold for statistical significance.

Table 3

Regression analysis summary (IVs – ATT)

Independent Variables	PU	PEoU	PB	PC	TF	OF
Dependent Variable	ATT					
β-value	0.603	0.502	0.453	0.21	0.04	0.097
p-value	0	0	0	0	0.192	0.002

(Source: Author's Compilation)

The analysis showed an R-square value of 0.861 for the impact of independent variables and ATT on BI. The independent variables and ATT explain 86.1% of the variance in BI. The analysis reveals that PU, PEOU, PB, PC, TF, and ATT are significant predictors of BI, with each relationship yielding acceptable p-values in the model. The Organisational Factors (OF) had a p-value of 0.284, surpassing the 0.05 significance threshold, making it statistically non-significant.

Table 4

Regression analysis summary (IVs + ATT – BI)

Independent Variables	PU	PEOU	PB	PC	TF	OF	ATT
Dependent Variable	BI						
β-value	0.251	0.258	0.259	0.12	0.088	-0.033	0.486
p-value	0	0	0	0	0.004	0.284	0

(Source: Author's Compilation)

After evaluating the hypotheses in this study, all were accepted except for one. The analysis shows that TF is not a significant predictor of ATT in this context, with a p-value of 0.192, which does not meet the accepted criteria.

Table 5

Hypothesis testing summary

Hypothesis	H1	H2	H4	H3	H5	H6	H7
β-value	0.04	0.097	0.603	0.502	0.453	0.21	0.486
p-value	0.192	0.002	0	0	0	0	0
Decision	Rejected	Accepted	Accepted	Accepted	Accepted	Accepted	Accepted

(Source: Author's Compilation)

The analysis showed that healthcare professionals at a major base hospital in the Kegalle district were significantly influenced by various factors in their intention to use an IoT-based healthcare management system. In this study, ATT serves as a crucial mediator between the independent and dependent variables, influencing their relationships. The findings support previous studies, emphasising the significance of a positive attitude towards technology for adopting healthcare technologies in the sector. Results show that PU and PEOU significantly affect user attitude and adoption intention, consistent with the TAM. The model shows a strong fit with an R-squared value of 0.857, indicating that it effectively captures the factors influencing healthcare professionals' behavioural intentions and highlights the mediating effect of attitude.

Conclusion

Discussion

The Internet of Things has transformed healthcare through improved digital connectivity and real-time data systems. This study explored factors affecting healthcare professionals' readiness to adopt IoT-based patient management systems in a Sri Lankan-based hospital, emphasising the mediating role of attitude toward technology. Findings indicate that perceived usefulness and perceived ease of use significantly impact ATT and behavioural intention, supporting essential aspects of the Technology Acceptance Model. Healthcare professionals are more inclined to adopt IoT systems when they see them as advantageous and user-friendly, particularly in resource-constrained settings. Perceived benefits and challenges impact professionals' attitudes toward adoption. The limited predictive capacity of technological and organisational factors highlights contextual challenges in Sri Lanka's healthcare system, including inadequate infrastructure, insufficient management support, and limited training opportunities. Successful IoT adoption in healthcare in developing countries hinges on institutional commitment, workforce readiness, and effective integration into existing clinical workflows, beyond just technology design. Attitude is crucial for linking individual perceptions with organisational readiness and behavioural intention. This mediating relationship supports the theoretical foundations of TAM, TRA, and TPB, while adding relevance through organisational and technological readiness from the TOE framework.

Conceptual contributions and practical implications

This research presents three key theoretical contributions: 1. It enhances the Technology Acceptance Model by integrating organisational and technological factors (OF and TF), providing a comprehensive approach to studying technology adoption in healthcare within developing. This study provides evidence that attitude toward technology mediates the relationship between individual perceptions (PU, PEOU, PB, PC) and behavioural intention. This study adds to the literature on digital health adoption in the Global South, demonstrating that the traditional TAM model is still relevant but requires adaptation to local infrastructural, managerial, and cultural contexts. The findings underscore the need for targeted strategies to enhance the technological readiness of

healthcare professionals. Hospital leaders and policymakers should prioritise training, enhance digital infrastructure, and establish clear guidelines for IoT integration to enhance confidence and usability. Insights can guide policymakers in crafting national e-health strategies to address infrastructure gaps, establish effective cybersecurity policies, and enhance capacity-building initiatives. Establishing a supportive institutional environment can enhance Sri Lanka's healthcare systems by adopting IoT, leading to better operational efficiency and patient care outcomes.

Limitations and future works

This study recognises limitations that could impact the generalisability of its findings. The main limitation is the small sample size from a single hospital, which affects the generalizability of the findings. Future studies should involve a variety of hospitals, both public and private, to enhance representativeness. Self-reported data can introduce bias, and the cross-sectional design limits the ability to observe changes in adoption behaviour over time. Future studies may investigate the evolving attitudes and continued use of IoT among healthcare professionals. This study excluded factors like age, gender, and professional experience, which can significantly impact technology adoption behaviours. Future studies should consider these demographic and contextual factors to gain a better understanding. This study employed regression analysis; however, future work could utilise structural equation modelling to investigate complex relationships and enhance validation of the extended TAM framework.

This study offers a model grounded in empirical evidence, elucidating healthcare professionals' intentions to adopt IoT-based patient management systems in a developing country. Findings show that a technological design alone isn't sufficient for adoption; success depends on user attitudes, perceived usefulness, managerial support, and workforce capability. This study enhances the existing model by incorporating contextual variables and validating it through empirical research in Sri Lanka, offering insights into digital health transformation in resource-limited healthcare settings.

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UNDERSTANDING STATUS QUO BIAS IN ELECTRIC VEHICLE ADOPTION: A SYSTEMATIC REVIEW THROUGH THE LENS OF PROSPECT THEORY

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Abstract

The transition to electric vehicle (EV) mobility is widely recognised as a critical step toward achieving global decarbonisation goals. Regardless of technological advancements and supportive policy frameworks, consumer adoption of EVs remains limited. This systematic literature review investigates the psychological barrier of status quo bias (SQB) as a central factor in consumer resistance to EV adoption, using Prospect Theory as the theoretical foundation. A total of 37 peer-reviewed journal articles were selected through a structured screening process based on predetermined inclusion criteria, focusing on behavioural constructs, automobile-related decision-making, and the clear application of Prospect Theory. Descriptive and thematic analyses revealed that SQB is marked through behavioural motions, default preferences, and loss aversion, all of which are amplified by perception of risk reference and point dependence. The review also identifies key psychological and contextual factors that reinforce SQB, including bounded rationality and uncertainty aversion. While Prospect Theory offers a robust explanatory framework, significant gaps remain in the literature, including the limited application of alternative behavioural theories, the scarcity of cross-cultural research, and the underutilization of experimental methods. The findings underscore the importance of integrating behavioural insights into EV policy design, alongside technological and infrastructural improvements. This review contributes to a deeper understanding of consumer behaviour in sustainable mobility transitions and highlights the need for behaviourally informed strategies to overcome resistance to EV adoption.

Keywords: behavioural economics, electric vehicle adoption, Prospect Theory, status quo bias, sustainable mobility

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DOI:

Introduction

Background of the study

Given that the transportation sector accounts for approximately 70% of all oil production and contributes around 25% of global CO₂ emissions, the increasing urgency of mitigating climate change has elevated decarbonisation to the top of international policy agendas (Zhou et al., 2021). Governments around the world have taken proactive measures to reduce reliance on transportation based on fossil fuels after realising their significant contribution to greenhouse gas emissions. Notably, in line with the decarbonization goals of the Paris Agreement, the European Union has committed to phasing out internal combustion engine vehicles (ICEVs) by 2035 (European Commission, 2022; European Parliament, 2018; UNFCCC, 2023). With life-cycle emission reductions of up to 90% when compared to ICEVs, electric vehicles (EVs), and especially battery electric vehicles (BEVs), are viewed as key to this transition (Verma et al., 2022).

Despite these advantages, global EV adoption rates remain relatively low (European Environment Agency, 2022), suggesting that barriers extend beyond technical and economic considerations. Insights from behavioural economics, especially Prospect Theory, provide valuable explanations for this gap. In relation to the prospect theory, people often view possible losses more strongly than comparable gains, which causes them to make risk-averse decisions (Wang et al., 2018). In the context of EV adoption, this manifests as consumer apprehension regarding higher upfront costs, limited driving range, and unfamiliar charging infrastructure, even when these disadvantages are offset by long-term benefits (Anastasiadou & Gavanis, 2022). Furthermore, by encouraging a preference for well-known, current car technologies over novel ones, status quo bias (SQB) strengthens this resistance (Illmann & Kluge, 2020; Zhang et al., 2018). Nevertheless, the current literature does not adequately examine the role of status quo bias in sustainable mobility transitions, despite its importance.

Research problem

Despite the environmental and technological advantages of electric vehicles, global adoption rates remain low, indicating that non-economic factors significantly influence consumer decisions. The status quo bias has emerged as a significant barrier in this context. It causes individuals to overvalue familiar internal combustion engine vehicles and undervalue EVs, even when presented with rational benefits. Understanding status quo bias is therefore essential for uncovering the psychological roots of consumer resistance and for designing more effective EV adoption strategies.

Objectives of the review

In this context, the following objectives are formulated to guide a systematic review of literature examining the influence of status quo bias on EV adoption:

RO1: To recognise and classify the ways in which status quo bias develops in consumer choices regarding the adoption of electric vehicles.

RO2: To evaluate the extent to which Prospect Theory has been used to explain consumer hesitancy and perceived trade-offs when switching from traditional to electric vehicles.

RO3: To investigate the contextual, behavioural, and psychological elements that contribute to status quo bias in the adoption of electric vehicles.

RO4: To provide guidance for future behavioural research on sustainable mobility transitions by combining knowledge from the body of existing literature and identifying theoretical and empirical gaps.

Methodology

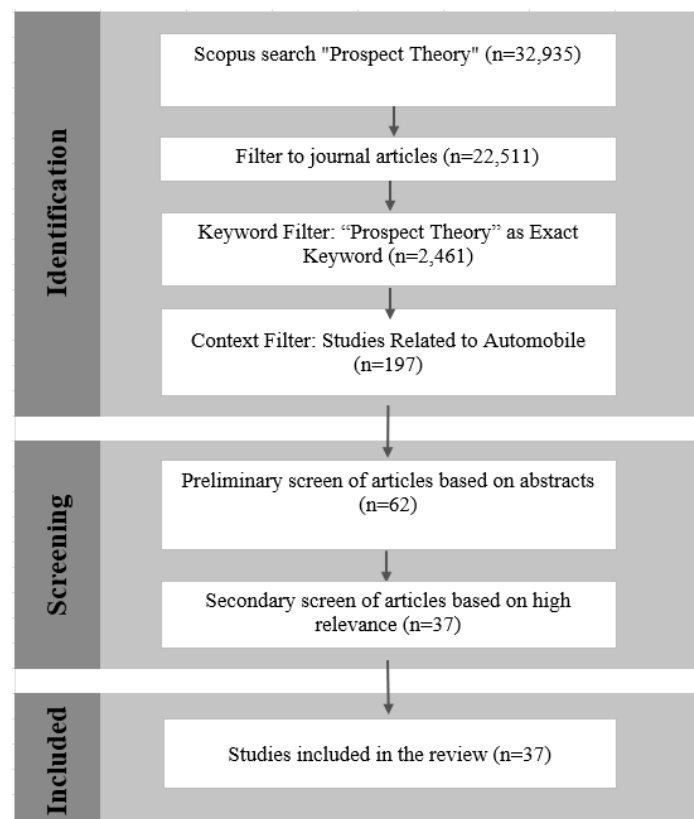
Research design and strategy

This study adopts a systematic literature review (SLR) approach, structured in alignment with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol to ensure transparency, replicability, and academic rigour. The review aims to explore how Prospect Theory has been applied in understanding status quo bias and its influence on electric vehicle adoption. Clear inclusion and exclusion criteria were applied to filter relevant literature. Only peer-reviewed journal articles were considered to ensure credibility. Articles were included if they (i) explicitly applied Prospect Theory, (ii) focused on automobile-related consumer behaviour (mainly EVs), and (iii) addressed behavioural constructs such as SQB. Articles lacking direct relevance to consumer decision-making or EV context were excluded. Non-English publications and non-journal documents were also filtered out to maintain consistency in line with PRISMA 2020 guidelines.

Data sources and selection process

The literature search was conducted using the Scopus database, which offers extensive coverage and advanced filtering capabilities. A five-phase process was used: (1) mapping the field through a scoping review confirmed a research specific at the intersection of Prospect Theory, status quo bias, and EV adoption; (2) a comprehensive search narrowed 32,935 initial records to 197 articles using the string TITLE-ABS-KEY (prospect AND theory) AND (automobile) with additional filters (article type and exact keyword); (3) quality assessment involved manually screening abstracts for theoretical relevance and contextual alignment, producing 62 articles, of which 37 were selected for final review; (4) data extraction involved coding article metadata, theoretical application, and behavioural findings; and (5) data synthesis and write-up involved thematic mapping of SQB-related constructs to Prospect Theory.

Figure 1
PRISMA flow diagram



(Source: Authors' Compilation)

Results, Discussion and Limitations

Descriptive analysis

Geographical coverage of studies

The geographical distribution of the 37 included studies reveals a strong concentration in Asia and North America. The majority of studies were conducted in China (12), followed by India (5) and the United States (4). Other countries represented include Germany, Australia, South Korea, Mexico, Malaysia, Indonesia, Oman, Japan, Belgium, and several global or regional contexts such as North America and European cities. This indicates an emerging global interest in behavioural economics and sustainable mobility, though contributions remain unevenly distributed.

Theoretical frameworks employed

Theoretical mapping revealed that Prospect Theory was the most prevalent framework, being explicitly used in 11 out of 37 studies, whereas neither the Diffusion of Innovations Theory nor the Technology Acceptance Model (TAM) was used in any of the studies. A large portion of studies (26 articles) did not specify any alternative

framework beyond Prospect Theory, underscoring its centrality in analysing SQB and risk-based decision-making in EV contexts.

Methodological approaches used

A wide range of methods, including empirical, experimental, theoretical, and simulation-based designs, was employed. Behavioural game theory, survey-based econometric analysis, simulation modelling, field experiments, and discrete choice experiments were among the specific techniques used. This diversity illustrates the interdisciplinary integration of psychology, economics, and transportation studies in this field and reflects the difficulty of studying behavioural constructs like SQB.

Thematic synthesis

Objective 1: Identification and categorisation of the ways in which Status Quo Bias manifests in consumer choices regarding the adoption of electric vehicles.

According to the reviewed literature, SQB is a complex psychological tendency that manifests as reluctance on the part of consumers to transition from internal combustion engine vehicles to electric alternatives. Key forms of this bias include inertia in adoption timing, default preference for known technologies, and resistance to change rooted in perceived risk or uncertainty. Studies such as Goyal et al. (2022), Li et al. (2024), and Klein & Deissenroth (2017) explicitly highlight how SQB contributes to delayed EV adoption, despite policy incentives or environmental benefits. According to these works, consumers frequently return to the status quo because they are psychologically comfortable with it, even in situations where logical economic or ecological arguments favour the change.

Objective 2: Evaluation of the extent to which Prospect Theory explains consumer hesitancy and perceived trade-offs when transitioning from traditional to electric vehicles.

Prospect Theory plays a central role in the literature in explaining why consumers exhibit resistance to EV adoption regardless of long-term benefits. A dominant theme across studies is loss aversion, where potential disadvantages, such as a limited range, charging inconvenience, and resale uncertainty, are weighed more heavily than future gains. Additionally, reference point dependence, the tendency to evaluate new choices relative to existing ICE vehicle experiences, distorts consumer evaluations. Multiple studies, including those by Wang et al. (2022), Ryu & Kim (2023), and Zhang & Zhang (2025), demonstrate that framing effects and cognitive biases rooted in Prospect Theory can systematically bias consumer decisions against EVs. These insights underscore the necessity of behavioural models that move beyond rational choice assumptions.

Objective 3: Investigation of contextual, behavioural, and psychological factors contributing to Status Quo Bias in the adaptation of electric vehicles.

Status Quo Bias in EV decision-making was strengthened by a variety of behavioural and psychological factors that interacted with contextual variables. Notably, bounded rationality, the tendency to rely on cognitive shortcuts when facing complex decisions and risk perception, plays a substantial role in shaping consumer resistance. Regardless of their apparent advantages, consumers view EVs as riskier or less useful, according to studies like those by Ryu & Kim (2023), Wang et al. (2025), and Heutel (2019). Contextual uncertainties, such as underdeveloped infrastructure or insufficient information, further compound psychological hesitation. These findings collectively emphasise that overcoming SQB requires addressing not only attitudes but also the surrounding decision environment.

Objective 4: Provision of guidance for future behavioural research on sustainable mobility transitions through synthesising existing literature and identifying theoretical and empirical gaps.

While Prospect Theory has been extensively applied to EV adoption behaviour, the literature reveals clear empirical and theoretical gaps. A notable limitation is the geographical concentration of studies in China, India, and North America, with minimal representation from smaller or developing markets. Additionally, most studies are cross-sectional or simulation-based, lacking longitudinal data or real-world behavioural interventions. It is also necessary to expand theoretical frameworks beyond Prospect Theory by incorporating the Theory of Planned Behaviour (TPB), the Diffusion of Innovations Theory, or nudge-based models, as noted by Zhang & Zhang (2025), Hammond et al. (2020), and Wang & Hazen (2016). Filling in these gaps would allow for more complex insights and facilitate the development of more efficient, context-sensitive EV policies.

Limitations

Although this review applied a rigorous PRISMA protocol, several limitations must be acknowledged. First, the review was limited to peer-reviewed journal articles published in English, which may have excluded relevant regional or grey literature. Second, reliance on the Scopus database could have introduced publication bias by omitting studies indexed elsewhere. Third, while thematic synthesis enabled conceptual depth, it did not include quantitative meta-analysis, which could have provided stronger empirical generalisation. Finally, most reviewed studies originated from developed or rapidly industrialising nations, limiting transferability to smaller developing economies such as Sri Lanka. Future research should incorporate multiple databases, longitudinal field experiments, and cross-cultural behavioural analyses to broaden the understanding of Status Quo Bias in sustainable mobility contexts.

Conclusion and Recommendations

Conclusion

This systematic review concludes that Status Quo Bias constitutes a significant psychological barrier to the adoption of electric vehicles, even in contexts where economic and environmental incentives are in place. The literature consistently highlights that consumers tend to maintain existing preferences for internal combustion engine vehicles due to perceived risks, habitual behaviour, and aversion to change. SQB manifests in forms such as default decision-making, delayed adoption, and resistance to innovation, which are deeply rooted in loss aversion, reference point dependence, and framing effects as defined under Prospect Theory.

The results confirm that policy incentives and technological advancements by themselves are not enough to change consumer behaviour in favour of sustainable mobility. Rather, it is necessary to specifically address the behavioural and psychological aspects. Resistance to EV adoption is further exacerbated by a variety of behavioural, psychological, and contextual factors, such as uncertainty aversion, bounded rationality, and social influences. The persistence of SQB continues to slow down the rate of transition despite widespread international efforts to promote EVs, especially in cases where behavioural interventions are either absent or ineffective.

Recommendations

Based on the synthesised evidence, the following key recommendations are proposed to guide future research and policy development:

1. Apply experimental and simulation-based methods: As several reviewed studies (Ryu & Kim, 2023; Wang et al. (2025) highlight that simulation enables modelling of behavioural uncertainty, making it a valuable extension for future EV research.
2. Design culturally adaptive EV policies: Findings reveal that cultural context influences risk perception (Zhou et al., 2021), suggesting that localised behavioural interventions are essential.
3. Integrate behavioural economics into EV adoption strategy: Given that loss aversion and framing effects dominate consumer resistance (Wang et al., 2018); therefore, policy communication should emphasise relative gains.
4. Bridge theory and practice in policy design: Combining Prospect Theory with complementary models such as TPB can yield multi-layered strategies for behavioural change.

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ASSESSING DOMESTIC PREFERENCE IN SRI LANKA'S HEALTH SECTOR PROCUREMENT: DRIVING LOCAL GROWTH VIA EU INNOVATIVE PROCUREMENT PRACTICE

K.L.S. Dinesh¹, U.P. Liyanage², W. M. D. N. Wijeyaratne³

Abstract

In Sri Lanka, all government institutions must adhere to established public procurement guidelines for the acquisition of goods, works, or services. The objective of public procurement is to ensure value for money, transparency, and accountability. The latest public procurement guideline in Sri Lanka for 2024 still does not define sustainable public procurement; however, the Ministry of Environment has introduced the National Policy on Sustainable Consumption and Production (SCP), which includes provisions for public procurement and the health sector. Under this policy, the Ministry of Health aims to reform healthcare consumption practices into environmentally friendly work environments by 2030. Adopting green and sustainable public procurement (GSP) is expected to optimise public spending, minimise environmental impacts, and generate economic and social benefits for the health sector. Domestic preference policies play a strategic role in supporting local industries, fostering economic growth, and enhancing the resilience of the health system. Such policies prioritise local bidders in evaluations, helping retain public funds and build national capacity. European Union (EU) member states utilise Information and Communication Technology (ICT)-based tools to streamline procurement evaluations and enhance public procurement practices, thereby fostering local economic growth. The design-based research (DBR) method was employed in this study, utilising multiple interventions. During the first intervention, it was found that there is a significant correlation between the adoption of innovative procurement methods in the health sector and the applicability of domestic preference policies in public procurement. Hence, the EU concept of innovative procurement was identified as a factor for verification and validation during the second intervention. Findings reveal that innovative procurement is a significant factor that can be adopted for the sustainable and green public procurement (SGPP) framework. The developed framework was disseminated to the National Procurement Commission (NPC) for practical policy implementation and further refinement or research.

Keywords: domestic preference, health sector governance, innovative procurement in the EU, local economy growth and sustainability, public procurement reform

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DOI:

Introduction

Public procurement is a critical component of Sri Lanka's financial management strategy, with over twenty-five per cent (25%) of the national budget being allocated through the public procurement system. As the government is the single largest purchaser in the country (USAID, 2016), the effective implementation of public procurement reforms is expected to have a significant impact on the national economy and support the development of the private sector. However, the practical application and evaluation of key procurement concepts such as sustainability and domestic preference are not clearly defined, even in the latest procurement guideline issued in 2024. In some instances, these concepts appear contradictory or insufficiently detailed. Although the current public procurement guideline explains the domestic preference, innovative procurement has yet to be fully defined at the policy level and adopted by public organisations in the health sector. Sustainability has been recognised by the government of Sri Lanka as a vital element in enhancing governance and institutional leadership (Mohan, 2010).

Literature Review

Aligned with sustainability principles, Sri Lanka's National Policy on Sustainable Consumption and Production was approved in 2019 (Ministry of Environment, 2019). This policy initiative allows public institutions to integrate traditional procurement practices with sustainable and green procurement principles, thereby maximising value for money. It encourages institutions to consider not only economic and financial stability but also environmental protection and social equity during procurement processes. Domestic preference refers to the advantage granted to local bidders or locally produced goods and services in the procurement of goods, work, consulting, and other services. In Sri Lanka, a significant portion of the national gross domestic product (GDP) is allocated to the health sector. Public health institutions utilise these funds for the procurement of standard categories, including goods, services, work, and information systems, as well as essential medical supplies and pharmaceuticals for citizen healthcare. The core focus of this study is to identify the significance of granting preference to local suppliers within the public procurement process as a means to foster local economic growth. Despite its potential, no comprehensive study has yet been conducted to evaluate the adaptability and current applicability of domestic preference policies in public procurement within Sri Lanka's health sector, which this research aims to address.

Impact of the economic crisis on the health sector in Sri Lanka

The ongoing economic crisis in Sri Lanka has posed a significant threat to the country's healthcare delivery system. The dual pressures of constrained government resources and rising demand for public health services have placed considerable strain on the overall health infrastructure. Sri Lanka heavily relies on foreign procurement for essential hospital supplies, medical equipment, vaccines, and pharmaceuticals. However, the shortage of foreign currency reserves has severely disrupted the supply of these critical health commodities. This shortage has had a particularly devastating impact on the availability of medicines and other pharmaceutical products. According to the Sri Lanka Chamber of the Pharmaceutical Industry, approximately 5% of essential medicines are already out of stock, and the situation is expected to deteriorate further in the coming months. In response, top-level policymakers have implemented budget cuts aimed at reducing public expenditure, including reductions in the health sector budget. However, evidence suggests that health systems typically require increased resources during times of economic crisis, further highlighting the potential long-term risks of such austerity measures. In any case, the Sri Lankan government is seeking to promote local manufacturing to address this situation and encourage its adoption in public procurement.

Lack of use of green technologies and best practices for cost-saving

Despite its growing importance, green and sustainable procurement remains a relatively new concept within Sri Lanka's health sector and has not yet been widely studied. This paper aims to systematically review and analyse the possibility of adopting innovative procurement in the European Union (EU) as a key factor for public procurement practices in Sri Lanka to achieve sustainability. It also examines how the health sector within the EU has adopted and regulated green and sustainable procurement principles, with the aim of identifying adaptable strategies that can enhance cost efficiency in the Sri Lankan context. In the EU, when identifying procurement needs, several core factors are considered, namely, environmental impact, budgetary significance, and the potential to influence the market. Throughout the procurement lifecycle, electronic procurement (e-GP) systems play a central role in enhancing efficiency and transparency. A recent study recommends that all components of the procurement process, from bid initiation and approval to final payment, could be gradually transitioned into an integrated e-procurement system. Once the e-GP system is fully operational, traditional manual processes should be phased out, and all procurement should be handled through the e-GP system. Activities, from budgeting to bill settlement, should be conducted exclusively through the electronic platform (Mohan, 2010). For the successful adoption of such systems, several features are essential: the ability to track and integrate green

public procurement (GPP) criteria, the capability to evaluate life cycle costing, and a user-friendly interface that facilitates participation by new or smaller suppliers. Findings from recent research indicate that the Sri Lankan public procurement process could be significantly streamlined by eliminating manual procedures and transitioning to a digital system.

Background: Adoption of government circulars and policies related to public procurement

Adopting a domestic preference approach in the evaluation of bids for public sector tenders could play a significant role in alleviating poverty, strengthening the local economy through promoting local production, and reducing unemployment in Sri Lanka. By prioritising local firms in procurement processes, such policies contribute to increased local employment opportunities and facilitate the retention of apprentices and trainees, thereby fostering skills development and workforce sustainability. Recognising these benefits, the government of Sri Lanka has included domestic preference provisions in detail in the new guideline issued in 2024 (Government of Sri Lanka, 2024). The criteria for the application of domestic preference, as described in section 7.7.1 of said guideline, are presented below:

- *Local labour, locally produced raw material & components sourced within Sri Lanka, will account for thirty per cent or more (30% $\geq$) of the EXW (Ex-Works) price of the product offered.*
- *The production facility in which those goods would be manufactured had been engaged in manufacturing such goods by the time of the invitation for bids.*
- *The Bidder shall be registered under the Companies Act No. 7 of 2007 in Sri Lanka.*
- *Bidder shall submit an affidavit stating that the value addition is 30% or more of the EXW price, along with the breakdown of the price structure; and*
- *Bidder shall submit certified audited financial statements to prove that the value addition is 30% or more of the EXW price.*

Domestic preference is closely associated with the economic pillar of the sustainability concept. However, to date, no comprehensive study has been conducted to assess the adaptability and current applicability of domestic preference or possible adaptation of innovative procurement for local economic growth in public procurement within Sri Lanka's health sector. Anyway, domestic preference policies could distort fair competition by favouring local suppliers regardless of efficiency or quality. Restricting competition from domestic firms could disrupt global supply chains, especially for specialised goods not produced locally.

Material and Methods

The researcher conducted a comprehensive review of published documents related to sustainable and green public procurement across various sectors in Sri Lanka, as well as green public procurement guidelines issued by the European Union. These sources were examined to identify potential factors influencing the adoption of sustainable and green procurement practices in Sri Lanka. The insights gained aim to inform people how such practices can be adapted to the local context, thereby promoting more efficient use of public funds and contributing to the country's economic development. For the survey component of the study, Cochran's formula was employed to determine an appropriate sample size. Within the Ministry of Health, there are five Procurement Committees (PCs), each consisting of five members, totalling 25 individuals. Within the Ministry of Health, there are five procurement committees (PCs), each consisting of five members, totalling 25 individuals. Correspondingly, there are five technical evaluation committees (TECs), each supporting one PC with technical assessments and also comprising five members, resulting in an additional 25 individuals, as shown in Table 1. The composition of both PCs and TECs may include any combination of staff at the officer grade or above, either from within the Ministry of Health or nominated external members, as designated by the chief accounting officer of the respective public institution. Since the total number of potential participants is not precisely known, the population mean or size for this study is considered to be unknown. For the survey, Cochran's equation was used to determine the sample size, and the judgmental sampling method was employed, as prior knowledge was required among the participants to answer the questions.

Table 1
Sample size calculation for the first intervention

For each procurement instance, the combined population of the Procurement Committee (PC) and the technical evaluation committee (TEC) is assumed to consist of a minimum of 50 individuals, comprising various combinations of staff at the officer grade or higher.

confidence level = 95%, population proportion is unknown = 50%, margin of error = 5%

Hence, the sample size of 45

(Source: Authors' Compilation)

A comparison between the current procurement guidelines in Sri Lanka and the European Union's directive 2014/24/EU on green and ethical public procurement reveals eight key areas addressed in the EU directive that are not currently incorporated into Sri Lanka's guidelines, particularly in relation to the health sector. These areas include: (1) Most Economically Advantageous Tendering (MEAT), (2) Innovation Partnerships, (3) Exclusion Criteria, (4) Framework Agreements, (5) professionalization in public procurement within health systems, (6) eco-labeling, (7) compliance with environmental, social, and labor law obligations, and (8) life-cycle costing (LCC) evaluation. Based on these findings, a structured questionnaire was developed to assess the current level of adoption of national procurement guidelines within the public health sector in Sri Lanka as the first intervention. The questionnaire also aimed to gather data on the awareness and implementation of the aforementioned eight thematic areas, which were used as key variables in this study. A structured questionnaire using a Likert scale was developed to collect quantitative feedback from the study sample. The research followed a design-based research approach (Brown, 1992; Design-Based Research Collective, 2003), an iterative and collaborative methodology that integrates qualitative and quantitative paradigms to support practical innovation and theory refinement (Armstrong et al., 2020). In the first intervention, participant feedback was predominantly favourable and was analysed to identify the key 'green' factors relevant to developing a sustainable and green public procurement (SGPP) framework for Sri Lanka. Those factors informed the construction of a test SGPP framework for evaluation in a second intervention focused on statistical compliance assessment and validation. A subsequent survey administered using a structured questionnaire examined the extent to which the test SGPP framework aligned with the previously identified green factors and its applicability as a sustainability-enhancing procurement instrument. The sample size used in the second iteration is reported in Table 2. Two (2) samples were used for introversion to mitigate bias in the selected samples.

Table 2
Sample size calculation for the second intervention

Sample Size	Population		
	Institute	Representatives	Numbers
104 (Group 1)	Ministry of Health (MoH)	05 members each for TEC/ PC (5 committees X 10 Members)	050
	Line Hospitals managed by the MoH	Hospitals = 45, 03 members each for TEC/ PC (45 X 06 Members)	270
018 (Group 2)	For Provincial Hospitals managed by provincial Ministries	Provincial Areas = 09 03 members each for TEC/ PC (09 X 06 members)	054
016 (Group 3)	Indigenous Medicine section	05 members each for TEC/ PC (5 committees X 10 Members)	050
138			424

(Source: Authors' Compilation)

During the third intervention, the refined SGPP Framework was validated against existing procurement guidelines and circulars in Sri Lanka to identify new policy implementation requirements for the developed SGPP framework. The R, an open-source programming language for statistical analysis and data visualisation, and Python, a widely adopted language for developing graphs and visual representations, were utilised to enhance both the analytical rigour and the visual presentation of the findings during the study.

Data Collection and Analysis Method

Professionals from government health institutions who had basic knowledge of public procurement were invited to a knowledge-sharing session on sustainable procurement through an internal circular. A total of 47 participants attended. The session provided a detailed explanation of newly identified EU procurement concepts related to green and ethical public procurement. Following the discussion, a structured Likert-scale questionnaire was administered to collect participant feedback confidentially. No selection bias or exclusion criteria were applied. Questionnaires were distributed to all attendees, ensuring comprehensive representation of the group. Insights from this initial intervention informed the development of the draft sustainable and green public procurement framework, based on the findings derived from the descriptive analysis. During the second intervention, a structured questionnaire derived from the factors in the draft SGPP framework was administered to a judgmental sample of 138 respondents. Confidential feedback was collected from all. The instrument used a five-point Likert scale. For analytic clarity, responses of 3 (occasionally), 4 (frequently), and 5 (always) were recorded as applicable, whereas 1 (never) and 2 (very rarely) were recorded as not applicable. The questionnaire link was distributed online by email, and responses were obtained from all invited participants. Data was analysed using the open-source statistical environments R and Python to assess factor-level compliance with the framework. The findings of the first intervention were subjected to deep empirical statistical analysis. Ethical approval was not required for this research as it did not involve human participants, identifiable personal data, or animals. The data analysed were publicly available and anonymised.

Results

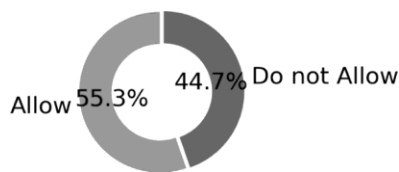
At the first intervention, the age distribution of the survey participants, with the largest proportion of 15 (31.9%) participants, was within the 41–50-year age group. Additionally, 26 (55.32%) of the participants were female. A total of 26 (55.32%) of the survey participants had more than 10 years of service experience in their relevant sectors. When knowledge specialisation in relation to years of service is analysed, the majority were from medical and clerical professionals with 11 to 20 years of experience. At the time of the survey conducted, 53.2% of respondents had received training in public procurement. Among those without adequate training, 36.4% were medical officers, and 50% had less than 10 years of experience in the Sri Lankan health sector. Notably, 20% of the respondents who had received training in public procurement were directors. Additionally, 36% of those trained had more than 11 years of service experience. Among the trained participants, 52% reported that the training they received was relevant to their daily public procurement responsibilities within the health sector in Sri Lanka. According to the feedback from the participants, 83% stated that an innovative procurement method could be important for the health sector in Sri Lanka, and 55.3% stated that it would enable domestic preference in applicable procurement within the health sector. The Pearson correlation resulted in a significance (2-tailed) of 0.046, which was less than 0.05. Hence, we found a significant correlation between the adoption of innovative procurement methods in the health sector and the applicability of domestic preference policies in public procurement.

Hence, innovative procurement was identified as a factor for the SGPP test framework, to be further verified and validated in the next interventions. The second questionnaire was prepared to verify and validate the factors identified for the SGPP test framework, and the corresponding feedback is presented below.

Question 1: Do you give preference to domestic bidders for potential procurement opportunities?

Figure 1

Feedback for question Q1 (For n= 138)



According to the feedback, 34.1% of health professionals in the Sri Lankan health sector reported that they never allow local preferences, in adherence to government guidelines. Conversely, 55.3% of respondents indicated that they follow the circular's instructions and allow for local preferences when preparing bidding documents.

(Source: Authors' Compilation)

Further analysis of the professional categories among those who do not permit and are marked as 'do not allow' in the local preference section of the Likert scale reveals that the majority fall within the designations of directors and clerical staff (e.g., development officer, management assistant). These groups represent the largest segment of professionals in Sri Lanka's healthcare sector and play a significant role in decision-making processes, particularly regarding the procurement of pharmaceuticals and medical equipment. Clerical group, on the other hand, belongs to the non-executive service category and is primarily responsible for documentation related to public procurement. Additionally, a majority of health professionals who reported not allowing domestic preference to possess less than 10 years of service experience, as shown in Table 3. However, this resistance appears to diminish with increased professional experience. Notably, female health professionals constitute the majority of those who stated that they do not support the application of domestic preference in public procurement, outnumbering their male counterparts in this regard, as shown in Figure 2.

Table 3

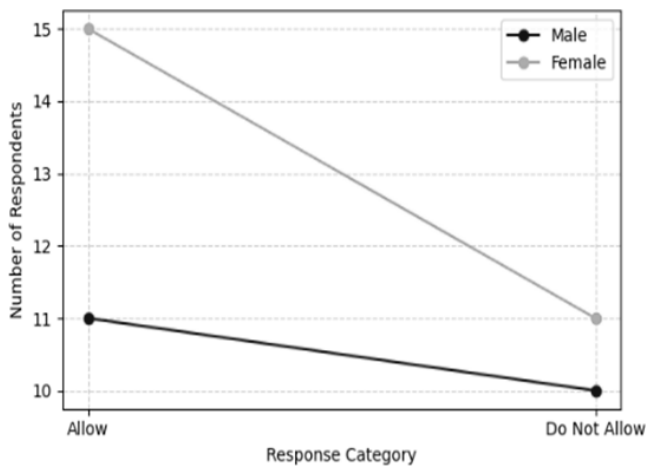
Service experience of those who stated "don't allow the domestic preference" for Q1 (n= 138)

Service experience (Years)	frequency	percentage %
0-10	5	31.3
11-20	4	25.0
21-30	3	18.8
31>	2	12.5
Not mentioned	2	12.5
Total	16	100.0

(Source: Authors' Compilation)

Figure 2

Feedback by gender wise for Q1 (For n= 138)



(Source: Author's Compilation)

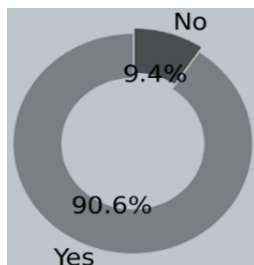
A chi-square goodness-of-fit test was conducted to determine whether participants exhibited a significant preference for allowing local preferences in procurement opportunities. The results ($\chi^2 = 0.53$, $p > 0.05$) indicate no statistically significant difference between respondents who favour allowing local preference (55.3%) and those who do not (44.7%) among the 47 participants. The observed difference between the two response groups is not statistically significant, suggesting that stakeholders are nearly evenly divided on the issue of local preference for procurement. Although a slight majority (55.3%) supports local preference, the chi-square analysis confirms that this difference is not strong enough to indicate a clear consensus. Hence, the compliance test was conducted, considering domestic preference as a variable under innovative procurement at the second iteration of the DBR process, with a sample of 138 participants.

Question 2: Do you think that the local economy could be developed by enabling domestic preference for local innovations in public procurement?

A chi-square goodness-of-fit test was conducted to examine whether there is a significant preference for enabling domestic preference for local innovations in public procurement. The results revealed a statistically significant difference in responses ($\chi^2 = 90.96$, $p < 0.001$), with 125 out of 138 participants (90.6%) agreeing that domestic preference can help develop the local economy, as shown in Figure 3. The overwhelming majority of respondents (90.6%) support domestic preference for local innovations, and the chi-square test confirms this preference is highly significant, rejecting the null hypothesis of no preference. These findings highlight strong stakeholder support for domestic preference for local innovations in public procurement as a means to promote economic development.

Figure 3

Feedback on support to domestic preference for local innovations for Q2 (For n= 138)



(Source: Author's Compilation)

The remaining variables related to factors of innovative procurement were analysed to further investigate the correlation between domestic preference and innovative procurement in the health sector of Sri Lanka. Feedbacks are presented in Table 4.

Question 3: What is the level of applicability of innovation partnerships in public procurement for the health sector in Sri Lanka?

Question 4: Do you think that ‘innovation partnerships procurement’ is the most applicable procurement method for challenging occasions in the health sector of Sri Lanka?

Question 5: Do you think that the government should enable policies for research and innovation-based public procurement?

Question 6: Do you think that the innovation partnerships procurement would ensure sustainability by saving foreign currency and encouraging local businesses?

Table 4

Feedback and chi-square goodness-of-fit test result for Q3 - Q6 (n= 138)

	Feedback	χ^2	P	Significance
Q3	(75.36% said applicable and 24.64% said not applicable)	35.50	0.0001	p < 0.0001, statistically significant
Q4	(81.2% said applicable and 18.8% said not applicable)	53.56	0.0001	p < 0.0001, statistically significant
Q5	(84.1% said Required and 15.9% said not Required)	64.00	0.00001	p < 0.00001, highly significant
Q6	(87.7% said Agreed and 12.3% said not Agreed)	78.36	0.00001	p < 0.00001, highly significant

(Source: Authors' Compilation)

Discussion and Conclusion

Cronbach's alpha (Hair et al., 2010) was used as a reliability test to assess the internal consistency of the findings, thereby verifying the scale's reliability before conducting factor analysis. As a validity test, the Kaiser-Meyer-Olkin (KMO) value is applied to assess sampling adequacy and determine whether the data are suitable for structure detection in factor analysis. KMO checks the correlations and partial correlations among variables, and a high KMO indicates that the patterns of correlations are compact, making factor analysis more likely to yield reliable factors.

Table 5

Variables (Vn) of the factor innovative procurement

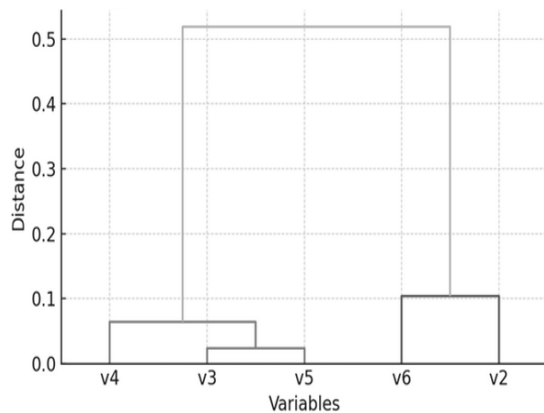
Questions	Variables (Vn)	Interpretation
Q2	V2	Enabling domestic preference for local innovative
Q3	V3	Level of applicability of innovation partnerships procurement
Q4	V4	'Innovation procurement' is the most applicable procurement method for challenging occasions
Q5	V5	Enable policies for research and innovation-based public procurement
Q6	V6	Innovation partnerships procurement would ensure sustainability

(Source: Authors' Compilation)

In factor analysis, the factor matrix illustrates the correlation between each variable and each extracted factor. Cronbach's Alpha value for five (05) variables as presented in Table 5 was 0.601, which indicates reliable internal consistency. This suggests that the items may reliably measure a single underlying construct. The suitability of the data for factor analysis was assessed using the KMO measure and Bartlett's test of sphericity. The KMO value (0.574) indicates marginal sampling adequacy for factor analysis, suggesting that the variables have only a moderate level of shared variance. However, Bartlett's test of sphericity ($\chi^2 = 96.479$, degrees of freedom = 10, p < 0.001) is highly significant, confirming that the variables are sufficiently correlated to justify factor extraction. The factor matrix indicates that variables v6 (0.746) and v2 (0.642) make significant contributions to the underlying factor, suggesting that they align well with the latent construct. In contrast, variables v3 (0.390), v5 (0.366), and v4 (0.322) exhibit weaker loadings, suggesting they are less representative of the extracted factor.

Figure 4

Dendrogram diagram based on factor loadings



(Source: Authors' Compilation)

The dendrogram (Hair et al., 2010), constructed based on the factor loadings of the five variables, visually illustrates how the variables cluster according to the similarity of their loadings. The clustering pattern is consistent with the results obtained from the factor analysis. Here, v4 and v5, which have similar (lower) loadings, are grouped first, v6 and v2, which have stronger loadings, form another close cluster, and v3 lies in between these clusters as presented in Figure 4. Hence, innovation partnerships procurement is scientifically accepted as one of the six factors to build the SGPP framework (Dinesh et al., 2025). This framework presents a comprehensive and practical model for adopting sustainable public procurement practices, including domestic preference.

Disseminated the developed framework to the National Procurement Commission (NPC) of Sri Lanka for practical policy implementation and further refinement or research.

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USAGE OF GENERATIVE AI IN SECONDARY SCHOOL EDUCATION: A CASE OF ABC INTERNATIONAL SCHOOL IN GAMPAHA DISTRICT, SRI LANKA

Nishika Rodrigo¹, D C L Digoarachchi²

Abstract

This study explored the integration of Generative Artificial Intelligence (GenAI) in secondary education through a case study of ABC International School in Sri Lanka's Gampaha District, Sri Lanka. The research explored how GenAI is currently used by teachers, the challenges faced and strategies that can be used for effective integration. Theoretical frameworks like Bruner's constructivist principles emphasize learner readiness, structured teaching, and extrapolation, aligning with GenAI's capacity to scaffold learning. A qualitative case study approach was employed, utilizing semi-structured interviews. A thematic analysis approach with open coding was employed for interpreting findings. Key findings of this study aligned with Bruner's constructivist principles whereas institutional policies, teacher perceptions and content limitations emerged as mediating factors. The research advocates for comprehensive teacher training programs, national policies regulating ethical GenAI use, and hybrid assessment models that accommodate digital literacy. These recommendations aim to guide policymakers and educators in creating equitable, innovative learning environments prepared for an AI-driven future.

Keywords: Case study, constructivism, GenAI, secondary education, teacher perspectives

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DOI:

Introduction

Generative Artificial Intelligence (GenAI) is a rapidly transforming technology capable of offering new avenues in education (Lee & Low, 2024). The usage of GenAI in education is a dilemma where it is seen as a tool for improved educational outcomes, while concerns about potential misuse exist (Belkina et al., 2025). While existing global research on GenAI examines the potential setbacks and benefits of GenAI, most of them focus on tertiary education or informal education whereas secondary education remains comparatively under-examined (Pei et al., 2025). However, secondary education serves as a crucial bridge between primary and tertiary education, playing a vital role in individual and national development (Walia & Randhawa, 2015). Further, secondary education differs majorly from tertiary education in term of purpose, curriculum, assessments, teaching strategies and skills emphasized (Gueudet, 2008). In addition, a formal secondary school classroom is bounded by teacher perceptions, institutional policies and parental involvement at a comparatively higher rate when compared to tertiary education. Accordingly, these key differences highlight the need of unique study in secondary school level.

In the Sri Lankan context, the usage of GenAI remains minimal given the constraints in infrastructure, strategic expertise and the lack of data strategy and data governance framework (Ministry of Digital Economy, 2024). Simultaneously, the global educational landscape is transforming (Jayasinghe, 2024). It becomes mandatory to re-evaluate the current teaching/ learning practices and educational policies that exist to match the momentum of the global landscape. The Sri Lankan education system is a mixture of international schools and government funded public schools. International schools as opposed to public schools poses greater flexibility in terms of access to technology and infrastructure. Further, the international curriculum followed makes it the ideal case to test on how upcoming technologies transform the educational landscape given the local context. Thus, through the exploration of GenAI integration in international schools and the challenges faced, state policies can be reformed and brought forward to expedite the adoption of GenAI throughout the educational system through the strategic recommendations identified.

Guided by Bruner's constructivist principles of learner readiness, structured teaching, and extrapolation, this study explores how secondary-level teachers in a Sri Lankan international school integrate GenAI into their teaching practices. Using a qualitative case study approach, the research explores (1) how teachers integrate GenAI into pedagogical practice, (2) the challenges they encounter, and (3) strategies to enhance responsible and effective use. Through this focus, the paper aims to contribute to both the local discourse on AI in education and the broader understanding of GenAI integration in developing-country contexts.

Literature Review

Usage of GenAI

With GenAI's increasing multidisciplinary capabilities, disruptive innovations, and automation of even traditionally creative tasks, individuals and businesses can innovate and stand out in the highly competitive economic landscape (Banh & Strobel, 2023). Given GenAI's outstanding accomplishments, many people think it will result in a new era of GenAI and have a significant global influence (Cao et al., 2023). Despite the fact that there is potential in using GenAI for transforming a variety of sectors, the incorporation of this technology brings a number of problems such as inequality in terms of access and ethical questions, particularly bias, data privacy, and the risk of overreliance on AI-generated content (Shen et al., 2023). The fast pace of GenAI development leaves regulatory rules far behind causing a gap between creativity and control.

Education

The way that education is offered and experienced could be completely transformed by AI technologies like GenAI and personalised learning experiences (Abunaseer, 2023). GenAI aids teaching by producing information that is suited to the needs of the students, improving their comprehension and level of involvement and creating content that is in line with current curriculum and standards (Greenhow et al., 2022). However, problems that persist in GenAI such as biases, limited diversity in learning resources and ethical concerns limits the potential of GenAI integration in learning. Concerns about the credibility of assessments, specifically in relation to academic integrity and plagiarism, have been voiced by those opposed to the use of GenAI in education (Beckingham et al., 2024). However, the potential of GenAI to improve higher-order thinking, creativity, and active learning is one of the main opportunities mentioned in studies (Khlaif et al., 2025). Researchers recommend that assessment tasks be made more difficult for GenAI tools to do in order to make them "AI-resistant" (Moorhouse et al., 2023).

Learner readiness

Learner readiness is frequently used to describe a student's capacity to seek information and initiate modifications to their behaviour in order to achieve successful learning outcomes (Chorrojprasert, 2020). Through a thorough literature search, the study also confirms an 8% contribution of learner readiness in student outcomes and a 56.2% contribution towards student interaction. GenAI can serve as an important tool in the classroom throughout the teaching-learning process to build learner readiness and motivate learners as per the studies of Moundridou et al. (2024). However, technological readiness comes forth as an important factor in learner readiness when integrating GenAI in education (Moorhouse, 2024).

Structured teaching

The cornerstones of Bruner's theory Scaffolding and Spiral Curriculum aids students develop their critical thinking and problem-solving abilities so they can get used to a variety of contexts, rather than simply imparting facts (Chand, 2023). The spiral curriculum involves organising the material so that difficult concepts could be taught at a basic level first and then revisited at a more advanced level later whereas scaffolding involves the educator 'controlling' the parts of the activity that are first more challenging for the learner (Gonulal & Loewen, 2018). A study conducted by Chien et al. (2024) claims that GenAI can offer instant feedback on engaging scaffolding that can be employed as tutors to aid learning. However, the inconsistencies, inaccuracies and misjudgements provided by GenAI models require caution and over-reliance of students on the GenAI model for every task required the close study in the importance of fading as suggested by Bruner (1960), even when using GenAI for scaffolding.

Extrapolation

In learning, extrapolation are conclusions derived from previously established information points that go beyond the information at hand. In simple terms, it is "Informed speculation" (Watts, 2021). Teachers can forecast future performance and recognise learners through that might need more support or intervention by using GenAI algorithms to analyse student data (Maulana et al., 2023). Another application of extrapolation in education is when a student uses previously learned information and applies it to a new situation. There is a threat that GenAI can centre on novelty over accuracy, leading to the generation of content that is misleading or incorrect. Also, students should be trained to critically evaluate AI-generated content and be conscious of its potential biases and limitations.

Methodology

The researcher follows an interpretivist stance on reality and knowledge and therefore follows Qualitative methods for this study. A case study strategy was used to research the case within its real-life context. Accordingly, the study was being conducted in an international school within Gampaha District. Convenience sampling, while not ideal in every scenario, became necessary here due to logistical challenges and the researcher relied on volunteers from the school's staff and who were readily available and willing to share their experiences. Data saturation was reached after the seventh interview, where no new codes or themes emerged, indicating adequacy of the sample size for exploratory qualitative research.

Further, institutional restrictions on classroom observation and data access limited triangulation of data although it reflects the real-world scenario when conducting research in a private institution. However, rich and detailed qualitative data were obtained through semi-structured interviews via Zoom with seven teachers representing different subject areas and levels of experience. This diversity enabled triangulation across participant perspectives. All interviews were recorded with consent, and an audit trail was maintained to ensure the transparency and traceability of the research process. Focusing on a single case with a small dataset provides in-depth insights but limits generalizability, reduces diversity of perspectives, increases context-specific bias, and restricts the ability to compare findings across different schools or capture evolving practices.

Table 1
Teacher demographics

	Gender	Years of Experience	Subject Taught	Grades Taught	Familiarity with AI Tools
Teacher A	Female	9	English	Grade 6	ChatGPT, Black Box AI
Teacher B	Female	10	Maths	Grade 7	ChatGPT, Anyword
Teacher C	Female	18	History and Geography	Grade 8	ChatGPT, Claude AI, Seek AI
Teacher D	Female	12	Life Skills	Grade 6,7,8	ChatGPT-4
Teacher E	Female	1.5	Computer Science	Grade 8	ChatGPT
Teacher F	Female	8	Maths	Ordinary Level	ChatGPT
Teacher G	Female	8	Commerce	Grade 8	ChatGPT, Magic School

(Source: Authors, based on survey results)

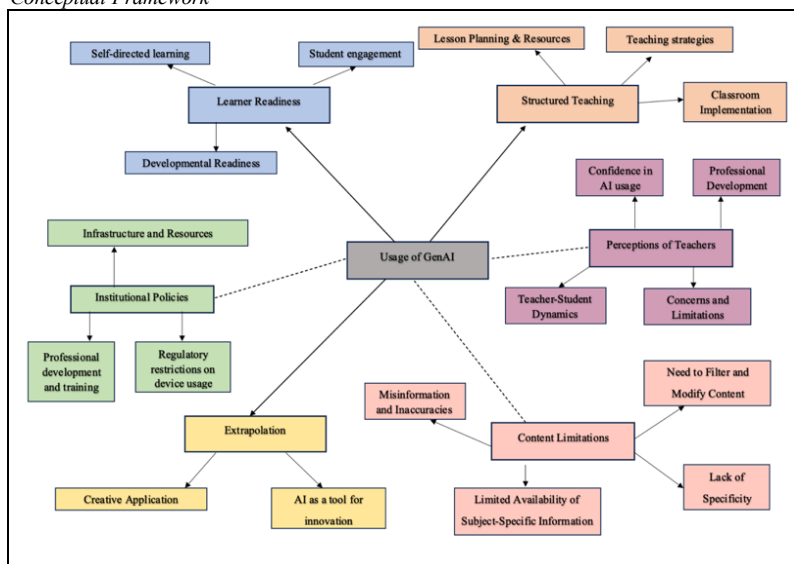
All interviews were transcribed verbatim and coded line-by-line manually using an open thematic analysis. A manual coding approach was adopted as the dataset was comparatively small and allowed deep immersion in the text allowing to interpret data within the context. Initial codes were generated through the gathered data while sensitising concepts derived from Bruner's constructivist framework guided the organization to broader themes. Although the coding was conducted by the researcher the entire process was continuously reviewed by the corresponding author to ensure consistency and academic rigor.

This study followed an internal ethical protocol where all participants were consenting adult teachers who provided written and verbal informed consent and were assured of confidentiality and the right to withdraw at any time. The research involved interviews on professional experiences only, with no sensitive personal data collected.

Results and Analysis

The findings are organized under four key areas that align with the research questions.

Figure 1
Conceptual Framework



(Source: Developed by authors based on literature (2025))

Integration of GenAI in teaching practices

The findings on the integration of GenAI is presented under 3 key themes as per Bruner's Constructivism theory.

Learner readiness: The interviews suggest that many students, particularly those in secondary education, are developmentally prepared to benefit from GenAI integration as the teacher mentions *"they directly go and get the answers from GenAI."* However, at this developmental stage while cognitive abilities are maturing, emotional and behavioral regulation are still evolving. The need for adult supervision or structured guidance is critical to ensure that GenAI is used ethically and constructively.

Structured teaching: Teachers reported that GenAI tools such as ChatGPT have become valuable aids in lesson preparation, particularly for generating creative ideas, structuring content, and modifying activities to suit different learning needs. GenAI tools have also enabled teachers to diversify their teaching methods through innovative teaching strategies and engaging learning materials.

Extrapolation: Teachers indicated that using GenAI opens up creative avenues that allow both teachers and students to generate ideas beyond the limits of traditional curricula. Teacher C reinforces, *“If we did not have this, then we will only have the knowledge of what we have learned years ago.”* Teachers also noted that GenAI acts as a support for innovation by providing access to information and ideas that are not readily available through traditional sources.

Challenges faced in using GenAI for teaching

Institutional policies have significantly limited the effective integration of GenAI in teaching practices. Two primary concerns emerged from the interviews: restrictions on device usage and the absence of GenAI training for teachers. Teacher perceptions regarding the integration of GenAI reflect a combination of optimism and concern. Teachers expressed concerns about the risks of over-reliance on GenAI, and its potential to hinder essential skills such as critical thinking and problem-solving. Further, several content-related limitations (ex: History and Sinhala Language) that hinder effective integration has been encountered.

Strategies to enhance effective use of GenAI

The data brought forth important strategies in terms of institutional policies and the perceptions of teachers. The teachers advocated for formal professional development, curricular alignment to treat GenAI as a teaching/learning aid and the creation of localized GenAI platforms. Findings also revealed the need of policy reformations for device usage and access to appropriate tools.

Discussion of Findings

Integration of GenAI in teaching practices

Learner readiness: Teachers noted that students possess a natural inclination toward independent learning aligning with Bruner’s concept of readiness. However, a key finding reported high levels of student initiative, others observed that not all students were equally prepared to take full advantage of GenAI without teacher guidance. This discrepancy may be due to differences in individual learning backgrounds or varying levels of technological exposure, suggesting that learner readiness in the context of GenAI is multifaceted and influenced by factors such as prior experience and personal motivation (Hung et al., 2010). In addition, it also highlights the importance of emotional and digital readiness in an AI-mediated classroom (Iddrisu & Iddrisu, 2025). Accordingly, this highlights that readiness in a Sri Lankan classroom learner readiness expands beyond cognitive maturity where socio-economic factors such as access to technology and digital literacy play a major role as well.

Structured teaching: A key finding was the variability in how teachers employed GenAI tools. This aligns with Bruner’s notion of structured teaching or scaffolding where teachers gradually withdraw support to encourage independent learning (Gonulal & Loewen, 2018). Lower-secondary teachers integrated GenAI seamlessly as a resource for generating diverse teaching tools assuming an active role in structuring teaching whereas upper secondary teachers expressed the usage of GenAI for generating additional notes, allowing students to regulate their learning. Thus, the role of GenAI in structured teaching is clear however it is mediated by existence of institutional policies, the perceptions of individual teachers and inaccuracies encountered in GenAI software.

Extrapolation: A major finding in this area is the contribution of GenAI for professional development. The teachers mentioned that through GenAI they were able to learn new strategies and approaches to teaching that were not captured during their training period. However, the true potential of GenAI in extrapolation for applications such as forecasting student grades were not observed at ABC international school (Rafiq et al., 2025). Harnessing this power, especially in a Sri Lankan context where student dropouts remain high, would allow teachers and policy makers to take prior action and direct support to where it is needed (Mayadunne & Kariyasekera, 2021).

Challenges faced in using GenAI for teaching

Institutional policies: The study’s findings indicate that institutional policies are a significant factor affecting the integration of GenAI in teaching practices. Teachers reported the existence of restrictions on device usage without clear guidance on GenAI usage or restrictions on GenAI usage. The absence of institutional scaffolding aligns with Bruner’s principle of scaffolding, in the context of teachers here. Absence of institutional support in the form of training and clear policies on GenAI usage hinders teacher autonomy in adopting these technologies (Meli et al., 2024). This reality serves as a microcosm of broader national realities where digital transformation efforts are poorly implemented. National level policies should scaffold schools and teachers to structure their AI policies with actionable mechanisms such as training, ethical guidelines and curriculum reformation.

Perceptions of teachers: Teacher perceptions are a strong mediating factor in integrating GenAI for teaching. However, teachers expressed concerns where easy access to GenAI may limit critical thinking and promote academic dishonesty. These concerns were expressed by teachers globally (Chaudhuri & Petkovic, 2025), but the strong exam-centred culture and traditional passive teaching present in Sri Lankan classrooms fuel these concerns (Hettihewa & Karunathilake, 2015). By preparing the education system through training programs and ethical frameworks, this could transform apprehension to informed confidence.

Content limitations: Teachers shared their experience of situations where GenAI lacked specific information in subjects such as Sri Lankan History and Sinhala. The teachers mentioned that GenAI is capable of providing general information, but accurate in-depth information was inaccurate. This highlights the limitations that arise due to the training data used in training GenAI. Further, GenAI models reflect the biases present in their training data, which can lead to culturally or regionally inappropriate content. Similar concerns were observed in other non-western contexts as well.

Strategies to enhance effective use of GenAI

The enhancement of effective GenAI usage requires reforms at both national level and institutional level. National level policies would facilitate the foundation while institutional policies would provide teachers and students with the required scaffolding. The following framework represents how GenAI usage can be extended island-wide with relevant and equitable technology.

Table 2
Institutional and National level strategies for effective usage of GenAI

Institutional level	National level
Adopting national policies for ethical usage	Implementing a national AI Policy and Guidelines
Infrastructure and access	Development of a localised GenAI platform better suited for education with culturally relevant content
Teacher training & Capacity building	Teacher and Researcher Collaboration
Ethical and critical literacy for students	Infrastructure and access
	Monitoring and updating curriculum

(Source: Authors, based on survey results)

Conclusion

The results show that GenAI is used by teachers mostly as a supplementary tool for strengthen activities like learner readiness, structured teaching, and extrapolation. In a practical scenario, educators use GenAI in lesson planning, development of resources, and generating new content. Most importantly, it was clearly observed that teachers failed to make use of GenAI to its maximum potential owing to gaps in teacher training, institutional policies and content limitations. Teachers also shared a cautious positive perspective on the future of GenAI. They emphasized that there should be continuous professional training to foster digital literacy and inform students about the ethical usage of GenAI. Teachers also supported the creation of authoritative national-level policies to identify ethical limits and standard protocols for GenAI adoption which would be ideal grounds for future research. Further, teachers also mentioned the need of exposing students to technologies but placing boundaries and limitation to ensure responsible usage. This study's value lies in its contextualized empirical insights and actionable recommendations rather than in theoretical novelty. By evidencing how global GenAI systems interact with local curricula, languages, and institutional constraints, the paper provides a foundation for future theory-building and locally grounded AI design.

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FACTORS INFLUENCING STUDENTS' INTENTION TO USE E-LEARNING IN INDIGENOUS MEDICAL EDUCATION IN SRI LANKA

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Abstract

E-learning has emerged as a transformative approach in higher education, driven by advances in information and communication technologies. However, its adoption in Indigenous medical education in Sri Lanka remains limited compared to developed countries. This study investigates the key factors influencing undergraduate students' intention to use e-learning in this context. Drawing on the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Technology Acceptance Model (TAM), an integrated framework was developed to examine multiple dimensions affecting e-learning adoption. A quantitative research design was employed, collecting data from 239 undergraduates at the Faculty of Indigenous Medicine, Gampaha Wickramarachchi University, using a structured questionnaire. Convenience sampling was applied for participant selection. Findings indicate that performance expectancy, effort expectancy, social influence, accessibility, computer playfulness, system quality, information quality, and service quality significantly influence students' intention to use e-learning, whereas enjoyment showed a weaker effect. The study extends TAM with context-specific variables relevant to indigenous medical education, offering theoretical and practical insights for policymakers and educators to enhance e-learning engagement and integration in Sri Lanka's higher education sector.

Keywords: E-learning, higher education, indigenous medicine, Sri Lanka, Technology Acceptance Model-TAM, UTAUT

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DOI:

Introduction

E-learning has become a core component of higher education worldwide, enabling flexible, accessible, and learner-centred education through digital technologies (Sun et al., 2023). It integrates information and communication technologies (ICT) into the teaching–learning process, allowing students to engage with content, peers, and instructors beyond traditional classroom boundaries (Al-Fraihat et al., 2020). The global COVID-19 pandemic accelerated the adoption of e-learning platforms, demonstrating their value in sustaining educational continuity (Dhawan, 2020). Despite these advancements, the successful implementation and sustained use of e-learning remain uneven across countries, institutions, and disciplines (Kebritchi et al., 2017).

In Sri Lanka, e-learning initiatives have been increasingly promoted within higher education, yet adoption levels vary across disciplines due to differences in technological readiness, institutional support, and learners' digital literacy (Perera & Hewagamage, 2021). Within the field of Indigenous medical education, which traditionally relies on face-to-face, practice-oriented instruction, integrating e-learning poses unique challenges. Students and instructors often face barriers such as limited infrastructure, low motivation, and a lack of culturally adapted content (Jayasinghe et al., 2022). Understanding the determinants that influence students' intention to use e-learning in this context is therefore critical for ensuring the effective integration of digital tools in Indigenous medical education.

Previous research on technology adoption has primarily focused on general higher education contexts, with limited attention to Indigenous or culturally specific medical education. Studies using the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) have demonstrated that factors such as performance expectancy, effort expectancy, and social influence significantly affect users' technology adoption (Venkatesh et al., 2012; Davis, 1989). However, little empirical work has examined how these factors interact within the context of Indigenous medical education in developing countries like Sri Lanka.

Accordingly, this study aims to identify the factors influencing students' intention to use e-learning in Indigenous medical education in Sri Lanka by integrating constructs from TAM and UTAUT models. By doing so, the study contributes to the limited literature on e-learning adoption in culturally specific educational contexts and provides insights for policymakers and educators to enhance digital learning effectiveness.

Literature Review

The Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology (UTAUT) provides a comprehensive framework for understanding how individuals adopt new technologies (Venkatesh et al., 2003). It emphasises four core constructs: performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions, which collectively influence behavioural intention and actual usage. Studies consistently show that PE, EE, and SI directly affect intention, while all four constructs contribute to user behaviour (Wang, 2022). UTAUT has been extensively applied in educational contexts to examine the determinants of e-learning adoption.

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) is a widely used framework for understanding technology adoption, focusing on perceived usefulness and perceived ease of use as the primary determinants of user acceptance (Salloum et al., 2019). Abdullah and Ward (2016) conducted a comprehensive review of 107 studies over a decade, identifying 152 environmental factors influencing technology adoption. Among these, external factors such as self-efficacy, subjective norms, enjoyment, computer anxiety, and prior experience were repeatedly noted. However, only TAM's core constructs, perceived usefulness and perceived ease of use were consistently affected by these factors. While TAM is robust across diverse contexts, its explanatory power is limited in settings with unique cultural or educational characteristics, such as Indigenous medical education. Extending TAM with constructs such as perceived enjoyment, accessibility, playfulness, and system quality provides a more comprehensive understanding of e-learning adoption in these contexts.

Individual factors

Performance expectancy (PE)

Performance expectancy reflects users' beliefs that using a system will enhance their performance (Venkatesh et al., 2012). Research indicates that attitudes toward technology, perceived usefulness, and perceived ease of use are critical in shaping intentions to adopt e-learning (Murniati, 2020). PE has been shown to reliably predict adoption across various domains, including online learning, social media, and mobile banking (Alalwan et al., 2015). In this study, PE refers to students' belief that e-learning enhances academic performance.

H1 - Performance expectancy has a positive impact on learners' behaviour intention to use e-learning.

Effort expectancy (EE)

Effort expectancy (EE) reflects the perceived ease of use and comfort in using a system (Venkatesh et al., 2012). Systems perceived as user-friendly are more likely to be adopted, as supported by Sharma et al. (2016) and Zuiderwijk et al. (2015), who found a positive relationship between EE and learners' intention to use e-learning platforms.

H2 - Effort expectancy has a positive impact on learners' behaviour intention to use e-learning.

Social influence (SI)

Social influence (SI), embedded in the theory of planned behaviour, reflects the impact of peers, instructors, and social networks on technology adoption. Research indicates that learners often rely on social cues when deciding to adopt new technologies. Studies by Maldonado et al. (2010) and Venkatesh et al. (2012) highlight that SI significantly affects behavioural intention, especially when system use is mandatory rather than optional.

H3 – Social Influence has a positive impact on learners' behavioural intention to use e-learning.

Perceived enjoyment (PE)

Perceived enjoyment represents the satisfaction derived from using a system regardless of its performance impact (Venkatesh, 2000). Enjoyable systems enhance perceived usability and usefulness, fostering higher adoption intentions (Elkaseh et al., 2020; Ramírez-Correa et al., 2015).

H4 - Perceived enjoyment has a positive impact on learners' behavioural intention to use e-learning.

Perceived accessibility (PA)

Perceived accessibility (PA) refers to the ease with which learners can access and navigate an e-learning system (Al-Aulamie, 2013). When students perceive an online platform as easily accessible, it enhances both perceived ease of use and perceived usefulness, positively influencing their intention to engage with the system.

H5 - Perceived accessibility has a positive impact on learners' behavioural intention to use e-learning.

Perceived playfulness (PP)

Perceived playfulness (PP) refers to the learner's perception of enjoyment, curiosity, and cognitive spontaneity while interacting with an e-learning system (Venkatesh, 2000). When students perceive the system as engaging and enjoyable, it enhances their intrinsic motivation, positively influencing their intention to use e-learning (Al-Aulamie, 2013).

H6 - Perceived playfulness has a positive impact on learners' behavioural intention to use e-learning.

System characteristics

System quality (SQ)

"System quality" (SQ) is a measure of how elements like usability, reliability, availability, and flexibility in an e-learning system impact user expectation (Iia, 2016). It plays a crucial role in determining the acceptance and utilisation of e-learning systems, as supported by various studies (Shah et al., 2013), (Calisir et al., 2014). Research has shown that an increase in SQ leads to an enhancement in the perceived usefulness of e-learning (Govender & Grange, 2015). Moreover, students' perceptions of the efficacy of e-learning also improve when SQ is utilised. Thus, the following hypothesis was developed:

H7: System quality has a positive impact on learners' behavioural intention to use e-learning.

Information quality (IQ)

Information quality (IQ) refers to the relevance, accuracy, and timeliness of learning materials provided through e-learning platforms (Cho et al., 2009). High-quality information enhances users' trust in the system and contributes to overall satisfaction (McKinney et al., 2002; Jaber, 2016). Previous research indicates that learners' perceptions of platform usability and effectiveness are strongly influenced by IQ, and higher intelligence levels further enhance users' appreciation of the system (Jaber, 2016; Damnjanovic et al., 2015).

H8 – Information quality has a positive impact on learners' behavioural intention to use e-learning.

Service quality (SEQ)

Service quality (SEQ) refers to the level of support and responsiveness provided to users when interacting with an information system (DeLone & McLean, 2003). High-quality service fosters trust, satisfaction, and positive user experiences, which are critical for the adoption of e-learning platforms (Sharma, 2015, 2016). Earlier studies indicate that students are more likely to engage with online learning when they perceive the service as reliable and supportive (Milosevic et al., 2015).

H9 – Service quality has a positive impact on learners' behavioural intention to use e-learning.

The above discussion integrates insights from TAM and UTAUT, contextualised to Indigenous medical education. However, empirical evidence in Sri Lanka's Indigenous medical universities remains limited, highlighting the need for this study to test these relationships in a novel cultural and educational setting.

The adoption of e-learning in higher education has been widely studied using technology acceptance frameworks such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT). These models explain why individuals choose to adopt or reject technologies, emphasising constructs such as performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkatesh et al., 2003; Venkatesh et al., 2012). Recent studies confirm their continued relevance in the context of online learning (Al-Emran et al., 2021; Bozkurt, 2022). However, most existing research focuses on general higher education or corporate e-learning environments, with limited attention to Indigenous medical education, where pedagogical practices, cultural knowledge transmission, and access disparities differ significantly.

A growing body of evidence from developing countries shows that learners' technical readiness, system quality, and service accessibility strongly affect e-learning adoption (Dhawan, 2020; Al-Fraihat et al., 2020). In Sri Lanka, studies by Perera and Hewagamage (2021) and Jayasinghe et al. (2022) identified challenges such as low digital literacy, limited infrastructure, and inadequate training as barriers to effective e-learning use. While these findings provide valuable insights, they do not address the unique characteristics of Indigenous medical education, where students rely heavily on experiential and community-based learning. Consequently, models like TAM and UTAUT must be extended with additional constructs such as system quality, information quality, service quality, enjoyment, and accessibility to better explain technology acceptance in this context (Al-Emran & Granić, 2023).

Critically, prior studies often treat e-learning adoption as a uniform phenomenon, overlooking cultural and contextual nuances. For example, studies from South Asia highlight that while performance expectancy and ease of use are significant, social and environmental factors, including peer influence, institutional support, and cultural attitudes toward technology, play stronger roles in traditional disciplines (Rahman et al., 2022). Furthermore, most empirical research in Sri Lanka's higher education sector uses generalised student samples, rarely distinguishing between programs in traditional or Indigenous medicine (Gunawardhana & Hewagamage, 2020). This leaves a clear empirical and theoretical gap regarding how technology acceptance theories apply to Indigenous medical undergraduates, whose learning combines theoretical knowledge with traditional practices.

Therefore, this study addresses that gap by integrating constructs from TAM and UTAUT with quality-related and affective dimensions (system quality, information quality, service quality, accessibility, playfulness, and enjoyment) to develop an extended model explaining students' intention to use e-learning in Indigenous medical education. By contextualising established theories within Sri Lanka's higher education framework, the study provides a focused, critical, and problem-aligned contribution that extends existing knowledge in e-learning adoption research.

Methodology and Model Specifications

Target population and sampling technique

The study population consisted of all undergraduate students (N = 630) enrolled in the Faculty of Indigenous Medicine at Gampaha Wickramarachchi University of Indigenous Medicine, Sri Lanka. Using Krejcie and Morgan's (1970) sampling table, a sample size of 239 was determined as appropriate for this population.

A simple random sampling technique was employed, ensuring that every student had an equal probability of selection. Random sampling enhances the representativeness of the sample, reduces selection bias, and allows for generalisation of the findings to the broader student population (Etikan et al., 2016).

Data collection methodology and technique

This study adopted a positivist research philosophy, reflecting the focus on objective measurement and hypothesis testing. Following a deductive research logic, the study aimed to test theoretical propositions derived from the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT). A quantitative research approach was employed, and the study utilised a cross-sectional survey design to investigate factors influencing students' intention to use e-learning in Indigenous medical education.

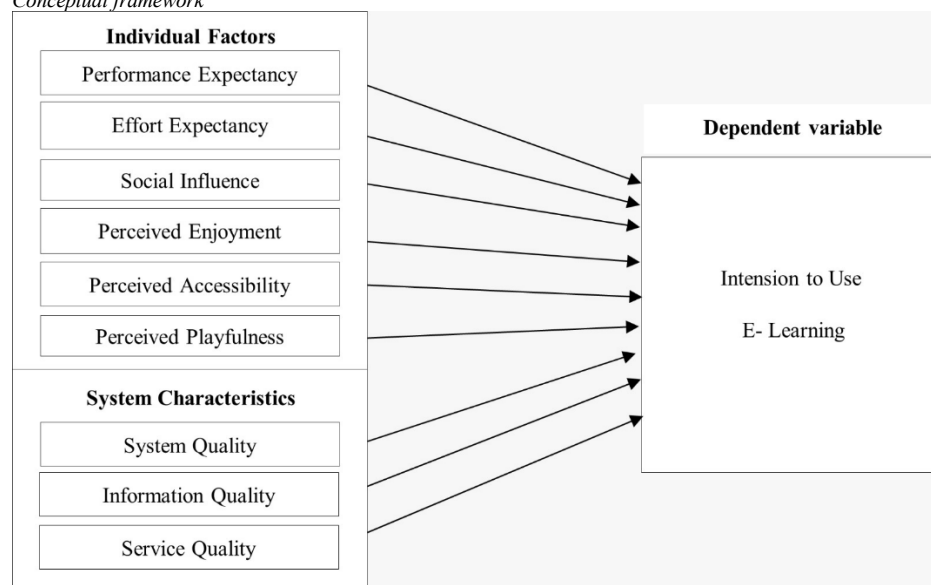
Initially, a review of secondary data was conducted, drawing on journal articles, books, and credible online sources. This review identified key factors affecting e-learning adoption, highlighted gaps in existing research, and informed the development of the conceptual framework. Grounding the study in empirical literature ensured that the variables included in the questionnaire were theoretically and contextually relevant.

For primary data collection, a structured questionnaire was developed and divided into two sections. Section A gathered demographic information, including age, gender, and year of study. Section B measured research variables using a five-point Likert scale. Independent variables included individual acceptance factors (e.g., performance expectancy, effort expectancy, social influence, perceived enjoyment, accessibility, playfulness) and system-related factors (system quality, information quality, service quality), while the dependent variable was students' intention to use e-learning.

The questionnaire was distributed electronically via Google Forms to undergraduate students at the Faculty of Indigenous Medicine. The survey method was chosen because it allows for systematic measurement of perceptions, attitudes, and behaviours across a population, facilitating objective analysis of relationships between variables. Data were analysed using descriptive statistics, correlation, and regression analyses to test the study hypotheses. This method aligns with the deductive, quantitative nature of research, enabling rigorous testing of theoretical constructs within a specific educational context.

Conceptual framework

Figure 1
Conceptual framework



(Source: Authors' work)

Pilot Study

A pilot study was conducted with 30 learners to assess the clarity, reliability, and validity of the questionnaire. Feedback from the participants was used to refine the wording of the items and ensure that each question measured the intended construct.

The reliability of the questionnaire was assessed using Cronbach's alpha for each variable separately, and all constructs exceeded the acceptable threshold of 0.7, indicating a high level of internal consistency. This process helped ensure that the survey instrument was suitable for the main study.

Empirical Results

Convergent validity

To determine whether the hypothesis that the correlation components of the data matrix form an identity matrix is valid, the sphericity test developed by Bartlett is applied.

KMO (Kaiser-Meyer-Olkin) Test

Data from 239 undergraduate students were analysed using SPSS. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.838, indicating a moderate to high level of adequacy and suggesting that the sample was suitable for factor analysis. Bartlett's test of sphericity was significant ($\chi^2 = 3618.595$, $df = 45$, $p < 0.001$), confirming that the correlations among variables were sufficient to justify factor analysis. These results demonstrate that the dataset is appropriate for exploring underlying factor structures. Table 1 summarises the KMO and Bartlett's test results, supporting the validity of proceeding with further analyses, including correlation and regression tests.

Table 1
Kmo And Bartlett's Test Results

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.838
Bartlett's Test of Sphericity	Approx. Chi-Square	3618.595
	df	45
	Sig.	.000

(Source: Authors' work)

Correlation test

Pearson correlation coefficients revealed positive associations between students' intention to use e-learning and the independent variables: performance expectancy ($r = 0.645$, $p < 0.001$), effort expectancy ($r = 0.639$, $p < 0.001$), social influence ($r = 0.781$, $p < 0.001$), perceived enjoyment ($r = 0.007$, $p = 0.019$), accessibility ($r = 0.606$, $p < 0.001$), computer playfulness ($r = 0.554$, $p < 0.001$), system quality ($r = 0.780$, $p < 0.001$), information quality ($r = 0.734$, $p < 0.001$), and service quality ($r = 0.623$, $p < 0.001$). These results suggest that all proposed factors are positively related to learners' intention to adopt e-learning, consistent with prior studies highlighting the importance of perceived usefulness, ease of use, and system quality in technology acceptance (Venkatesh et al., 2012; Al-Fraihat et al., 2020).

Table 2
Correlation test results

Variable	Pearson's Correlation	Sig. (2tailed)	N
Performance Expectancy	.645**	.000	239
Effort Expectancy	.639**	.000	239
Social Influence	.781**	.000	239
Enjoyment	.007**	.019	239
Accessibility	.606**	.000	239
Computer Playfulness	.554**	.000	239
System Quality	.780**	.000	239
Information Quality	.734**	.000	239
Service Quality	.623**	.000	239

(Source: Authors' work)

Multicollinearity

Multicollinearity among the independent variables was assessed using the Variance Inflation Factor (VIF), which quantifies how much the variance of a regression coefficient is inflated due to correlation with other predictors (Hair et al., 2019). As shown in Table 3, the VIF values for all variables ranged from 1.034 to 2.802, well below the commonly used threshold of 5, indicating that multicollinearity is not a major concern.

This suggests that the independent variables performance expectancy, effort expectancy, social influence, accessibility, computer playfulness, enjoyment, system quality, information quality, and service quality are sufficiently independent, allowing for reliable estimation of regression coefficients in subsequent analyses.

Table 3
VIF Values

Model	Unstandardized Coefficients		Standardized Coefficients	Collinearity Statistics	
	β	Std. Error	β	Tolerance	VIF
(Constant)	-.410	.053			
PE	.075	.020	.064	.397	1.987
EF	.024	.020	-.020	.568	2.032
SI	.151	.026	.102	.247	1.034
PE	.014	.006	-.015	.508	1.128

PA	.029	.013	-.027	.325	1.077
PP	.737	.011	.760	.398	2.024
SQ	.311	.012	.319	.534	1.114
IQ	.167	.019	-.147	.465	1.941
SEQ	.052	.024	.046	.708	2.802

(Source: Authors' work)

Regression analysis

Multiple linear regression was conducted to examine the impact of the independent variables on students' intention to use e-learning. The model was significant ($R^2 = 0.888$, Adjusted $R^2 = 0.886$, $p < 0.001$), indicating that 88.8% of the variance in intention could be explained by the predictors. Performance expectancy ($\beta = 0.075$, $p < 0.001$), effort expectancy ($\beta = 0.024$, $p = 0.014$), social influence ($\beta = 0.151$, $p < 0.001$), perceived enjoyment ($\beta = 0.014$, $p = 0.018$), accessibility ($\beta = 0.029$, $p = 0.029$), computer playfulness ($\beta = 0.737$, $p < 0.001$), system quality ($\beta = 0.311$, $p < 0.001$), information quality ($\beta = 0.167$, $p < 0.001$), and service quality ($\beta = 0.052$, $p = 0.028$) were significant predictors of intention. The intercept was -0.410, representing the expected intention score when all predictors are zero. While most factors showed positive effects, the small coefficient for perceived enjoyment may indicate that although students find e-learning enjoyable, its influence on behavioural intention is weaker compared to functional and social factors. This is in line with prior studies suggesting that affective factors may have a secondary influence in professional or practice-oriented education contexts (Ramírez-Correa et al., 2015; Elkaseh et al., 2020).

Table 4.

Regression Analysis

Model	Coefficients		β	t	Sig.
	Unstandardized Coefficients	Standardized Coefficient			
	β	Std. Error			
Constant	-.410	.053		-7.710	.000
PE	.075	.020	.064	3.778	.0001
EF	.024	.020	-.020	-1.245	.014
SI	.151	.026	.102	5.736	.0001
PE	.014	.006	-.015	-2.387	.018
PA	.029	.013	-.027	-2.191	.029
PP	.737	.011	.760	68.379	.0001
SQ	.311	.012	.319	25.923	.0001
IQ	.167	.019	-.147	-8.683	.0001
SEQ	.052	.024	.046	2.207	.028

(Source: Authors' work)

Accuracy of the model

The overall fit and predictive power of the regression model were evaluated using the model summary statistics (Table 5). The R value of 0.942 indicates a strong correlation between the observed and predicted values of students' intention to use e-learning. The R^2 value of 0.888 shows that approximately 89% of the variance in the dependent variable is explained by the independent variables included in the model. The adjusted R^2 of 0.886 accounts for the number of predictors and confirms the model's robustness.

These results suggest that the selected individual and system-related factors, performance expectancy, effort expectancy, social influence, accessibility, computer playfulness, enjoyment, system quality, information quality, and service quality, collectively have a substantial impact on students' intention to adopt e-learning, while also leaving room for future research to explore additional variables that may influence this behaviour.

Table 5

Model Summary

R	R Square	Adjusted R Square	Std. The error of the Estimate
.942 ^a	.888	.886	.1870

(Source: Authors' work)

Conclusion

This study demonstrates that the Extended Technology Acceptance Model (TAM), integrated with contextual factors, effectively explains students' intention to use e-learning in Indigenous medical education in Sri Lanka. The findings indicate that key factors such as performance expectancy, effort expectancy, social influence, accessibility, computer playfulness, system quality, information quality, and service quality significantly influence students' behavioural intentions. Interestingly, Perceived Enjoyment showed only a weak effect, suggesting that

students' engagement is more strongly driven by perceived usefulness, ease of use, and system reliability rather than intrinsic enjoyment.

These results align with prior studies in higher education e-learning adoption, where usefulness and ease of use often outweigh hedonic factors in influencing student intentions (Al-Fraihat et al., 2020; Venkatesh et al., 2012). The weak effect of enjoyment implies that current e-learning platforms in Indigenous medical education may lack engaging, interactive, and practical components, limiting students' motivation to explore the system voluntarily. Enhancing the platform with practical simulations, visual demonstrations, interactive exercises, and gamified learning could increase engagement and learning effectiveness.

From a practical and policy perspective, the study emphasises the importance of user-friendly system design, high-quality content, prompt support services, and reliable infrastructure. University administrators and policymakers should ensure that e-learning systems are accessible, responsive, and aligned with the practical and experiential needs of Indigenous medical students. This approach will not only improve learning outcomes but also encourage broader adoption of digital learning solutions in culturally specific educational contexts.

The study was conducted at a single faculty and relied on self-reported data, which may limit generalizability and introduce response bias. Future research could include multiple institutions, longitudinal designs, and objective usage measures to strengthen and extend these findings.

Finally, the study contributes theoretically by extending TAM with context-specific factors such as system quality, information quality, service quality, accessibility, and playfulness. Future research could explore additional motivational and cultural factors, longitudinal adoption patterns, and the integration of blended learning approaches to further enhance e-learning acceptance in Indigenous medical education. Overall, these findings provide actionable insights for educators, developers, and decision-makers aiming to improve e-learning systems in Sri Lanka and similar developing country contexts.

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