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Editorial

Information Management and Business Review (IMBR) provides a digital forum for researchers to share their knowledge and publish research work in the fields of information management, business, management and related disciplines. The work submitted for publication consideration in IMBR should address empirical and theoretical developments in the subjects related to the scope of the journal in particular and allied theories and practices in general. Author(s) should declare that work submitted to the journal is original, not under consideration for publication by another journal and that all listed authors approve its submission to IMBR. It is IMBR policy to welcome submissions for consideration, which are original, and not under consideration for publication by another journal at the same time. Author (s) can submit: Research Paper, Conceptual Paper, Case Studies and Book Review. The current issue of IMBR comprises papers of scholars from different universities of Malaysia, Indonesia and Thailand. Financial Resources and Environmental Orientation as Core Drivers of Sustainability, Blended Learning Environment, Gamification Acceptance Model in Higher Education, Board Gender Diversity and Corporate Sustainability Performance, AI-Assisted Learning Tools, Stakeholder Participation and Social Responsibility, Exploring the Suitability of Blockchain Technology, Financial Literacy to Non-Finance Managers, Integrating Environmental, Social and Governance (ESG) into Higher Education, Digital Payment Adoption, Accountability and Trustworthiness in Consumer Dispute Resolutions, Paradoxical Leadership in the Sustainability Transition, Integrating Technology Acceptance Model and Task-Technology Fit Theory, Navigating Borderline Personality Disorder, Enterprise Risk Management Maturity in Banking Industry, Unified Theory of Acceptance and Use of Technology, Integrating Digital Leadership with Workforce Agility, Tourist Satisfaction and Social Media Recommendations, Demographics and Socio-Psychological Attributes, Organizational Determinants of Environmental Management Accounting Adoption, Artificial Intelligence and Assistive Technology, Emergence of Neuroaccounting, Green Digital Technologies and Economic Resilience, Balancing Job Demands and Resources and Job Stress and Career Change Intentions are some of the major practices and concepts examined in these studies. All the submitted papers were first assessed by the journal committee and then the external editorial team for relevance and originality of the work and then blindly peer-reviewed by external reviewers depending on the subject matter of the paper. After the rigorous peer-review process, the submitted papers were selected based on originality, significance and clarity of the purpose. The special issue will, therefore be a unique proposition, where scholars will be able to appreciate the latest results in their field of expertise and to acquire additional knowledge in other relevant fields.

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TABLE OF CONTENTS

Description	Pages
Title	I
Editorial	II
Editorial Board	III
Table of Contents	IV
Papers	VII
Beyond Executive Mandates: Financial Resources and Environmental Orientation as Core Drivers of Sustainability in Malaysian Manufacturing Erna Masfiza Mohamed Ramli, Mohamed Said Aly Amin, Nabawiyah Binti Abdul Hadi, Noor Idayu Ismail	1
Perception of Readiness among Malaysian and Indonesian Accounting Students in the Sustainable Development Goal (SDG) No. 13 Pitching Video Competition Corina Joseph, Azura Ahmad, Mariam Rahmat, Saifulrizan Norizan, Taufiq Arifin	14
The Role of Perceived Usefulness and Attitude in Student Engagement: A Conceptual Study in Malaysian Blended Learning Environment Mohd Zailani Othman, Shahreena Daud, Norraeffa Md Taib, Zarinah Abu Yazid, Nornajihah Nadia Hasbullah	29
The Role of Perceived Usefulness and Ease of Use in Online Gamification: A Conceptual Study Using Gamification Acceptance Model (GAM) in Higher Education Zarinah Abu Yazid, Norraeffa Md Taib, Nornajihah Nadia Hasbullah, Mohd Zailani Othman, Shahreena Daud	36
Does Board Gender Diversity and Independent Drive Affect Corporate Sustainability Performance? Evidence from Malaysia Raja Adzrin Raja Ahmad, Nurul Azlin Azmi, Nor Balkish Zakaria	43
Motivation and Perceived Learning Benefits in the Use of AI-Assisted Learning Tools: Evidence from Higher Education in Malaysia Hanafiah Hasin, Rahayu Mohd Sehat, Zaleha Mahat, Anita Jamil, Mazlan Salleh, Muhammad Arif Hakimy Syamsul Kahar	57
Stakeholder Participation and Social Responsibility: A Dynamic Framework for Corporate Governance Maizatul Akmal Musa, Shahril Eashak Ismail	68
Unpacking the Drivers and Outcomes of Management Innovation Using System Dynamics: A Conceptual Approach Lin Qingying, Debbra Toria Nipo, Ang Hong Loong	86
Exploring the Suitability of Blockchain Technology in Improving Inter-Organizational Collaboration Workflows in E-Payment Processes at the Transport License Department of Malaysia Naharudin Saadan, Khairil Faizal Khairi	102
The Importance of Financial Literacy to Non-Finance Managers of Healthcare Institutes in Malaysia Mohd Hafiz Bakar, Siti Norbaya Yahaya	115
Integrating Environmental, Social and Governance (ESG) into Higher Education: Voices of Accounting Undergraduates Mohamad Hafiz Rosli, Nurul Azlin Azmi	127
Parents' Readiness to Nurture their School Children Adopting Digital Payment Masita Hassan, Norlinda Tendot Binti Abu Bakar	136
Analysis of Macroeconomic Factors of Energy Consumption in Malaysia, Thailand and Indonesia Hamidah Ramlan, Sahaida Laily Md Hashim	146
The Role of Motivation, Commitment and Awareness in Zakat Payment Intention: Evidence From Employees of Private Higher Learning Institutions in Northern Malaysia Raja Rizal Iskandar Raja Hisham, Saiful Azizi Ismail, Noraini Yusuff, Wan Aishah Wan Mohd Nowalid	150

Accountability and Trustworthiness in Consumer Dispute Resolutions: A Comparative Study of Initial and Repeated Consumers Mei Teh Goi, Abd Rahman Said Alli	163
Steering Through Multi-Level Contradictions: Paradoxical Leadership in the Sustainability Transition of Malaysian Higher Education Ashman Shahrudin Bin Khairuddin	172
Integrating Technology Acceptance Model and Task-Technology Fit Theory: Investigating Students' Intention to Use AI Chatbots in Public Universities Cheong Yew Ooi, Ali Vafaei-Zadeh	184
Navigating Borderline Personality Disorder (BPD) and addiction to Online Impulse Purchases – A Malaysian Take Azrin Ali, Yasmin Kamall Khan, Azlin Shafinaz Arshad	195
Integrating ESG and Shariah Frameworks for Enhanced Equity Market Returns Mei Ching Lim, Normaziah Mohd Nor, Aslam Izah Selamat, Siti Nur Iqmal Ibrahim	202
Validation of the Educator-Targeted Bullying Measurement Nusrah Samat, Goi Mei Teh, Abdul Mutalib Mohamed Azim, Norashikin Hussein	216
Population Growth, Available Resources and Quality of Life: A Goal Programming Model Approach Amoke Chukwunonso Valentine	225
Enterprise Risk Management Maturity in Malaysia's Banking Industry: A Conceptual Assessment Nura Lina binti Md Elias, Nurhuda binti Nizar, Shamshimah binti Samsuddin	237
Adoption of Self-Service Kiosk Technology in Quick Service Restaurants: An Application of the Unified Theory of Acceptance and Use of Technology (UTAUT) Nur Alya Batrisyia Binti Johari, Lovelyna Benedict Jipiu	246
Unveiling Barriers: A Qualitative Study on Halal Certification for SMFEs in Penang Firdaus Ahmad Fauzi, Noorliza Karia, Wan Hayati Wan Bujang, Zubaidah Mohd Ali Tan, Nurul Hijja Mazlan	254
Exploring the Expectations of the Malay Generation X Towards Senior Living Accommodations in Malaysia Salamiah A Jamal, Norzuwana Sumarjan, Chemah Tamby Chik, Mohd Taufik Zamri	267
Integrating Digital Leadership with Workforce Agility: A Conceptual Model for Malaysian Public Schools Azmi Bin Ahmad Sapian, Fauzi Bin Kamarudin	277
Nature's Value: Unveiling How Perceived Value Drives Tourist Satisfaction and Social Media Recommendations Muhammad Zulhilmi Zulkurnain, Nor Asmalina Mohd Anuar, Zuliah Abd Hamid, Khairul Mohd Azemi, Ratna Mulyany	295
Who are Xenocentric Consumers? A Review of the Demographics and Socio-Psychological Attributes Azila Sopian, Siti Zaleha Sahak	308
Organizational Determinants of Environmental Management Accounting Adoption: Evidence from Malaysian Local Councils Che Ku Hisam Che Ku Kassim	315
Breaking Barriers: Empowering Special Needs Accountants in Malaysia through Artificial Intelligence and Assistive Technology Nur Nariza Mod Arifin, Anita Che Hassan, Musliha Musman, Nor Jaslina Nik Wil	326
The Emergence of Neuroaccounting: A Bibliometric Analysis of Financial Decision-Making Research Nur Syuhada Adnan, Syafiq Abdul Haris Halmi, Noor Emilina Mohd Nasir, Suraya Ahmad, Muhammad Shaqif Azfar Afandi	335
The Law of E-Waste: Closing the Loop for Green Digital Technologies and Economic Resilience-A Malaysian Perspective	347

Abd Shukor Mohd Yunus, Nurul Asyikeen Abdul Jabar, Normawati Hashim, Angelina Anne Fernandez, Mumtazah Narowi	
Balancing Job Demands and Resources: Enhancing Resilience in the Accounting and Auditing Profession Noor Hasniza Haron, Nurshamimi Sabli, Nurhaiyyu Abdull Hamid, Mazurina Mohd Ali, Siti Nurul Afiqah Binti Kamal Anuar	357
Influence of Job Demands, Job Control and Social Support on Malaysian Independent Musicians' Job Stress and Career Change Intentions Syarifah Rahayu Ida Wan Ali, Mei Teh Goi	371

PAPERS

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Beyond Executive Mandates: Financial Resources and Environmental Orientation as Core Drivers of Sustainability in Malaysian Manufacturing

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Abstract: Malaysia's manufacturing sector faces mounting pressure to integrate sustainable practices amid rising environmental concerns, resource constraints, and regulatory demands. Despite government initiatives, many firms struggle to align profitability with environmental and social responsibility, hindered by limited resources, uneven managerial commitment, and varying levels of internal environmental orientation. This study examines the key drivers of sustainable manufacturing in this context, focusing on the influence of financial resources, managerial support, and internal environmental orientation on sustainability performance. Grounded in the Natural Resource-Based View (NRBV) theory, it investigates how these determinants shape environmental, social, and economic outcomes. A quantitative approach was adopted, using a cross-sectional survey of senior executives from medium and large manufacturing firms, yielding 330 valid responses. Partial Least Squares Structural Equation Modelling (PLS-SEM) was applied to test the proposed relationships. The findings reveal that financial resources and internal environmental orientation significantly enhance sustainability performance, whereas managerial support does not show a significant effect. This suggests that while resource allocation and a sustainability-oriented culture are critical enablers, the practical impact of managerial support may be constrained by organizational or cultural barriers. The study extends NRBV theory to the Malaysian manufacturing context, providing empirical evidence on strategic drivers of sustainability and highlighting the need for targeted investments and internal capability development.

Keywords: *Sustainability performance, manufacturing, green supply chain management*

1. Introduction

Malaysia's manufacturing sector is vital to the economy. It makes up 24% of GDP and nearly 80% of exports (MITI, 2023a, 2023b). This sector includes electronics, petroleum, chemicals, rubber, and food processing, and employs over 2.5 million workers (DOSM, 2024). Table 1 presents the key statistics of Malaysia's manufacturing sector. While this growth is impressive, it comes with serious environmental costs. Factories are a leading source of greenhouse gases, waste, and the overuse of natural resources, with carbon dioxide levels in the country hitting new highs in 2023 (DOSM, 2024). This issue is even more urgent in Malaysia's export-driven economy, where buyers around the world now expect proof of sustainable practices from suppliers. As a result, Malaysian companies face both pressure and a chance to make sustainability a core part of their operations. Green supply chain management (GSCM) is a strong solution, helping firms combine good profit with good planet care by weaving eco-friendly practices through production and supply chain processes (Ramli et al., 2022).

Although more Malaysian consumers are demanding greener products (Shafie et al., 2024), manufacturers are still held back by hurdles like high costs, weak leadership, and complicated supply chains (Gonçalves et al., 2024; Nath et al., 2023). Using the Natural Resource-Based View (NRBV) framework (Hart, 1995), this study investigates three key organizational determinants -financial resources, management support, and a strong internal environmental focus- and how they affect environmental, social, and economic sustainability performance.

The study has two main objectives. First, to explore how these determinants shape sustainability practices in manufacturing, and second, to evaluate how they connect to sustainability performance across Malaysia's industrial sector. By tackling these objectives, the research aims to deliver practical, data-driven recommendations that can help Malaysian manufacturers strengthen their sustainable strategies in a fast-changing and greener global market.

Table 1: Key Statistics of Malaysia's Manufacturing Sector

Indicator	Value	Source
Contribution of manufacturing to GDP	24%	MITI (2023a)
Share of total exports	approximately 80%	MITI (2023b)
Employment in the manufacturing sector	>2.5 million people	DOSM (2024)
CO_2 emissions trend	Record high in 2023	DOSM (2024)

Source: MITI (2023a, 2023b); Department of Statistics Malaysia (DOSM, 2024)

2. Literature Review

Sustainability Performance

Sustainable performance refers to an organisation's ability to produce lasting and balanced outcomes across economic, environmental, and social dimensions. Such outcomes illustrate the firm's capacity to generate value while simultaneously reducing ecological harm and advancing social well-being, thus forming an essential goal for manufacturing firms that aim to lessen their environmental and social liabilities without compromising profitability (Saad & Manshor, 2024). The topic of sustainability is imperative for ensuring a liveable planet and advancing human well-being for future generations. Achieving this end requires a systematic approach that intentionally aligns economic, environmental, and social factors to create lasting value while curtailing negative impacts (Goyal et al., 2022; Kannan et al., 2023). While the sustainability literature has devoted much attention to environmental safeguards (Aldaas et al., 2022; Bouchmel et al., 2024), a balanced focus on economic performance and social impact is equally vital for a full understanding of sustainable manufacturing practices. Only an integrated and holistic framework will enable manufacturing firms to cultivate and sustain enduring sustainable value. The pursuit of such value thus requires deliberate attention to all three pillars of sustainability, ensuring that progress in one area does not engender regress in another, and that manufacturing systems can remain resilient and responsible across generations.

Financial Resources

Financial resources are essential for organisations aiming to integrate sustainable practices because substantial capital is needed to fund environmentally focused initiatives (Shaharudin et al., 2022). Within industrial operations, environmental practices enable critical activities like green procurement, selection of alternative raw materials, ecological certification, and waste reduction across product lifecycles. These initiatives reduce resource consumption, carbon emissions, and waste, thereby supporting broader sustainability goals and improving environmental, economic, and social outcomes (Asif et al., 2020). However, the scholarly literature consistently highlights that the successful execution of these strategies requires considerable financial investment, particularly for purchasing green technologies, upgrading infrastructure, and modifying operations (Shaharudin et al., 2022). As a result, organisations endowed with greater financial capacity are better positioned to embed environmental practices into their operations and to realise their sustainability targets.

Internal Environmental Orientation

Internal environmental orientation refers to the purposeful integration of environmentally focused processes within an organisation, designed to cultivate a workforce and operational structure that consistently advances the firm's ecological objectives (Malimi, 2017; Vijayvargy et al., 2017). For environmentally proactive practices to yield measurable outcomes, a robust internal environmental orientation is indispensable (Malimi, 2017). This goes beyond surface-level compliance, requiring that sustainability becomes a focal point of every operational process (Malimi, 2017; Rao & Holt, 2005). Central to this orientation are several interrelated activities: training and mentoring personnel to meet environmental targets and to enhance corporate reputation (McMurray et al., 2014), establishing internal audit and reporting mechanisms (Silva et al., 2021), and adopting the ISO 14001 framework, which instills a disciplined approach to embedding green practices throughout the enterprise (Rasit et al., 2019). Collectively, these elements render internal environmental orientation a decisive enabler of enduring, sustainable operations that not only confer competitive advantage but also align the enterprise with wider ecological and societal imperatives (Huma et al., 2024).

Management Support

Support from management plays a crucial role in helping manufacturing companies improve their

sustainability performance (Harun & Senawi, 2024). Alkaf et al. (2023) point out that these backing shapes the overall organisational direction, direct resources to where they're needed, and build a workplace culture that takes environmental responsibility seriously. Their research shows that strong executive leadership is linked to the effective launch and continuing success of sustainability programmes. The same idea is echoed by Shahzad et al. (2023), who highlight that management roles lift the entire organisation's drive toward sustainable practices. When leaders show clear commitment to environmental goals, the organisation often records better results in sustainability and ecological balance. Management participation not only helps carry projects from plan to execution but also fuels a stronger internal resolve for long-term progress. Furthermore, management support brings in a wide range of knowledge and viewpoints that can correct potential strategic missteps. In sustainability planning, leaders from diverse fields are more attuned to environmental and social challenges, enabling wiser decision-making (Zhou et al., 2022). Finally, Nangpiire et al. (2024) conclude that weaving sustainability into the corporate strategy is key for winning employee commitment and ensuring that green initiatives endure.

Natural Resource-Based View Theory

The Natural Resource-Based View (NRBV) framework offers a rigorous platform for analysing how firms cultivate competitive advantage via environmental capabilities. Hart's seminal exposition (1995) posits that enterprises leveraging rare, inimitable, and non-substitutable resources, chiefly eco-efficient technologies and renewable feedstocks, can simultaneously fortify market standing and elevate ecological performance. Within the manufacturing sphere, the NRBV foregrounds the necessity of embedding ecological considerations into strategic design and operational routines. This is operationalised through green procurement policies, capital allocation to eco-efficient technologies, and the cultivation of an employee culture that prioritises pollution reduction throughout the supply chain (Andersén, 2021). The comprehensive institutionalisation of such practices restrains ecological discharge while concurrently yielding strategic paybacks, manifest in lowered operational costs, enhanced corporate reputation, and improved economic performance. Recent empirical investigations indicate that decisive leadership, adequate capital investment, and a pervasive internal orientation toward environmental stewardship are pivotal enablers of sustainable manufacturing performance. Collectively, these variables drive superior environmental, economic, and social outcomes and simultaneously foster operational efficiencies and resilient supply chain alliances (Nazir et al., 2024). Firms whose practices resonate with NRBV tenets are accordingly poised to woo ethically minded consumers and to secure enduring profitability through diminished costs, optimised resource flows, and a strengthened brand reputation in progressively competitive arenas.

Critical Evaluation of Current Literature

Recent empirical studies consistently highlight that financial resources constitute a prerequisite for the effective enactment of sustainable practices (Bouchmel et al., 2024; Saher & Siddique, 2023). Within the context of industrial enterprises characterised by limited internal funding, financial capability acquires particular significance, as these firms must direct capital toward the establishment of sustainable infrastructures, the integration of clean technologies, and the re-engineering of production processes. Such capital expenses are indispensable for the execution of material recovery, product reprocessing, renewal cycles, and component resourcing. Nonetheless, some literature raises caution by evidencing instances in which financial support of sustainability initiatives fails to generate the anticipated benefits. Lin et al. (2020) articulate that, in certain situations, monetary commitment can, unexpectedly, constrain ecological gains, especially when spending is dissociated from coherent sustainability objectives. Hence, a thorough understanding of how financial capacity moderates the trajectory of sustainability performance in the Malaysian manufacturing sector remains a paramount academic and managerial imperative.

Furthermore, leadership commitment emerges as a decisive factor shaping sustainability outcomes in industrial firms. Empirical evidence indicates that top-management resolve is indispensable for directing resources, establishing sustainability-oriented strategic trajectories, and nurturing a pervasive organisational sustainability culture (Nangpiire et al., 2024; Wijaya et al., 2023). Nevertheless, the efficacy of such leadership is often moderated by entrenched corporate cultures, intragroup contextual dynamics, and industry-specific constraints that attenuate its broader impact (Gao et al., 2021). Govindan and Jha (2024) suggest that multiple barriers, including insufficient engagement in environmental initiatives related to green supply chains, can cause a gap that accordingly undermines the broader programme of sustainability advancement.

Additionally, an internal environmental orientation serves as a crucial platform for operationalising sustainability aims. This orientation refers to the systematic embedding of environmental considerations into corporate norms and daily processes, thereby determining the salience of sustainability initiatives at every organisational tier (Malimi, 2017). Comparative studies indicate that firms with a strong internal environmental orientation are significantly more inclined to deploy green operational practices, to engage personnel at multiple organisational levels, and to streamline resource consumption, collectively yielding superior environmental performance (Rasit et al., 2019). In the manufacturing sector, these results are reinforced by harmonised protocols that ensure compliance with environmental regulations, thereby translating regulatory conformity into measurable gains in environmental performance. (Sun, 2020). Nonetheless, scholars continue to question the effectiveness of internal environmental orientation, citing multiple conditional variables: notably, gaps in employee environmental literacy that may inhibit optimal performance results (Choudhary & Sangwan, 2019). Therefore, Table 2 summarizes the identified gaps in the literature.

Table 2: Summary of Gaps in Literature

Focus Area	Existing Finding	Research Gap	Relevance
Financial Resources	Financial investment is critical for supporting green practices and processes (Shaharudin et al., 2022; Bouchmel et al., 2024).	Lack of studies examining the role of financial resources in driving sustainability outcomes in Malaysian manufacturing firms.	Investigating how financial resources influence sustainability outcomes and improve performance in Malaysian firms.
Internal Environmental Orientation	Internal environmental orientation improves the adoption of green practices by implanting sustainability into the organizational culture (Malimi, 2017; Rasit et al., 2019).	Inadequate research on the influence of sustainability outcomes in Malaysian manufacturing firms and the challenges of implementing internal environmental orientation effectively.	Exploring how IEO influences sustainability and identifying barriers to its implementation in Malaysian manufacturing firms.
Management Support	The sustained involvement of management is critical for advancing environmental initiatives throughout the organization (Nangpiire et al., 2024; Wijaya et al., 2023)	Limited research regarding the importance of managerial functions and supportive structures in realizing sustainability objectives among Malaysian manufacturing enterprises	Identifying how management support can be strengthened to drive sustainability within Malaysian firms.

Source: Based on the literature reviewed in this study (Bouchmel et al., 2024; Malimi, 2017; Nangpiire et al., 2024; Rasit et al., 2019; Shaharudin et al., 2022; Wijaya et al., 2023).

Research Hypotheses

Based on insights gained from the literature review, this study formulates the following hypotheses:
H1: Financial resources are positively associated with sustainability outcomes.
H2: Internal environmental orientation is positively associated with sustainability outcomes
H3: Management support is positively associated with sustainability outcomes.

3. Methodology

Research Design

This study adopted a cross-sectional survey approach targeting medium and large manufacturing firms in Malaysia, as these organizations generally possess the financial and operational capacity to implement sustainability initiatives. The unit of analysis was the individual firm, and the sampling frame was derived from the Federation of Malaysian Manufacturers Directory (2018). Survey respondents consisted of senior executives and supply chain managers directly involved in sustainability-related decision-making.

A stratified random sampling method was applied to ensure balanced representation across the sector. The population was divided into strata based on firm size (medium and large, as classified by SME Corporation Malaysia), industry sub-sector (e.g., electronics, petroleum, chemicals, rubber, food processing, and others), and geographic region (northern, central, southern, and East Malaysia). Within each stratum, firms were

randomly selected to participate. This approach minimized sampling bias and ensured that key industry segments were proportionately represented in the dataset.

Following Krejcie and Morgan's (1970) sample size determination guidelines, a minimum of 330 completed responses was targeted. Invitations were sent to both SMEs within the medium-size classification and larger firms, reflecting the study's emphasis on organizations with relatively greater resources for sustainability practices. Data were collected through digitally administered questionnaires distributed via email and online survey platforms. Multiple follow-ups and personalized reminders were used to encourage participation. A total of 330 valid responses were collected, which meets the minimum sample size requirements recommended by Krejcie and Morgan (1970) and is considered sufficient for PLS-SEM analysis in organizational research.

The survey instrument comprised two sections: organizational demographics and core research variables. Demographic data covered firm location, industry classification, respondent position, tenure, company size, and ownership type. Core study constructs were measured using validated scales: financial resources (five indicators adapted from Govindan & Jha, 2024; Leppelt et al., 2013; Zhan et al., 2018), management support (Dubey et al., 2015), and sustainability performance across economic (De Giovanni & Esposito, 2012; Zhan et al., 2018), environmental (Zhu et al., 2005) and social dimensions (Dubey et al., 2015; Wang & Dai, 2018).

Data Analysis

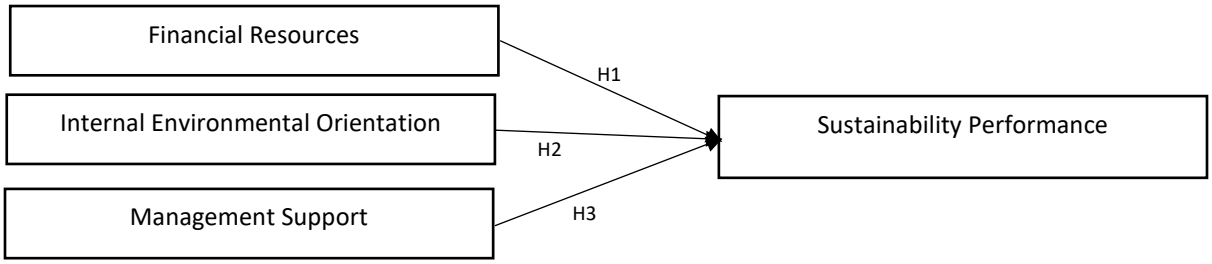
Data analysis was conducted using PLS-SEM with SmartPLS 4.0, a choice justified by its robustness in handling latent constructs, tolerance for smaller sample sizes, and ability to accommodate intricate causal architectures (Henseler et al., 2009). The analysis progressed through sequential stages: first, convergent and discriminant validity were scrutinised; next, composite reliability was computed; thereafter, path coefficients were evaluated; and final estimates of predictive accuracy were derived from R^2 and Q^2 indices (Hair et al., 2014).

Theoretical Background

The research is guided by the Natural Resource-Based View (NRBV), a theoretical framework that elucidates how corporations can elevate sustainability performance into a source of strategic value. Evolving from Hart's (1995) foundational corpus, the NRBV stretches the classical resource-based perspective by positing that distinctive environmental competences, such as proprietary clean technologies, recyclable material streams, and anticipatory managerial oversight, can constitute non-imitable bases for sustained competitive advantage. Translating this theoretical lens to the Malaysian manufacturing setting, the NRBV posits that enterprises must internalise sustainability within the core of their strategic operations. This involves standardised capital allocation to eco-efficient practices and vigorous endorsement from the upper levels. The resulting integration simultaneously tightens the ecological footprint and yields operational gains, including heightened efficiency and enhanced profit margins.

Earlier research indicates that targeted financial investment and strong managerial commitment form critical pillars for the development of environmental competencies within the natural-resource-based view (NRBV) framework. Such practices strengthen both organisational performance and wider sustainability goals, encompassing environmental, social, and economic dimensions (Sarwar et al., 2021). When firms proactively integrate NRBV views, they simultaneously strengthen competitive positioning, satisfy escalating stakeholder demands, and foster sustained value generation via enhanced resource utilisation, cost reductions, and increased brand legitimacy. These relationships are illustrated in Figure 1, which presents the conceptual framework guiding this study.

Figure 1: The framework of this study



Source: Adapted from the Natural Resource-Based View (NRBV) theory (Hart, 1995) and the literature review on Financial Resources. Internal Environmental Orientation and Management Support for Sustainable Manufacturing.

4. Findings and Results

Measurement Model

Before analyzing the structural component of the model, the investigation first validated the measurement properties of the latent variables. Construct reliability was assessed via Cronbach's alpha, composite reliability, and average variance extracted, while discriminant validity was ascertained by means of item loadings and the heterotrait-monotrait (HTMT) ratio. The details of the item loadings, Cronbach's alpha, CR, and AVE for the sample are shown in Table 3. The findings indicate that each item demonstrated a standardized loading exceeding 0.8, which exceeds the conventional cutoff of 0.7 suggested by Henseler et al. (2015). Correspondingly, composite reliability values were all greater than 0.6, attesting to the constructs' strong convergent validity (Hair et al., 2020). Finally, average variance extracted for each construct exceeded the 0.5 criterion, thereby confirming the reliability of the latent variables (Hair et al., 2020).

Table 3: Construct reliability test outcomes

CONSTRUCT	*ITEMS*	*LOADINGS*	*A*	*CR*	*AVE*	*VIF*
Financial Resources	FI1	0.918	0.942	0.943	0.811	4.482
	FI2	0.910				4.626
	FI3	0.917				2.917
	FI4	0.871				3.061
	FI5	0.885				3.097
Internal Environment Orientation	IEO1	0.876	0.912	0.918	0.738	2.940
	IEO2	0.859				2.386
	IEO3	0.814				3.602
	IEO4	0.879				3.029
	IEO5	0.868				4.620
Top Management Support	TM1	0.900	0.815	0.824	0.730	4.614
	TM2	0.895				5.403
	TM3	0.935				4.377
	TM4	0.911				2.502
	TM5	0.839				1.846
Sustainable Performance	LV scores - ENV	0.823	0.939	0.940	0.803	1.656
	LV scores - ES	0.849				2.237
	LV scores - SS	0.889				4.482

Note: α=Cronbach's alpha, CR= composite reliability, AVE= Average variance explained.

Discriminant validity was established through the HTMT ratios shown in Table 4, where every value remained beneath the critical cutoff of 0.85, meeting the standard specified by Hair et al. (2020).

Table 4: Outputs of the HTMT Ratio

CONSTRUCT	*HTMT*	*SRMR*
IEO <-> FI	0.628	0.053
Sust_Perfm <-> FI	0.586	
Sust_Perfm <-> IEO	0.552	
TM <-> FI	0.682	
TM <-> IEO	0.746	
IEO <-> FI	0.628	

Hypothesis testing

Once the constructs demonstrated solid reliability and validity, the analysis shifted to partial least squares (PLS) to formally test the proposed hypotheses. To gauge the structural model's overall robustness, metrics like R^2, VIF, SRMR, and Q^2 were examined. These results are shown in Tables 3, 4, and 5. The R^2 value of 0.32 indicates that the predictors account for a modest proportion of the variance in the endogenous variable (Hair et al., 2020). All VIF scores remained below the threshold of 10, alleviating any concerns related to multicollinearity (Hall & Sammons, 2013). SRMR satisfied the threshold, remaining below 0.08, and Q^2 of 0.299 substantiates the model's forecasting relevance, corroborating its appropriateness for structural inquiry (Shmueli et al., 2019

Table 5: The outcomes of model accuracy assessment

CONSTRUCT	*R2*	*Q2*
Sustainable Performance	0.628	00.053

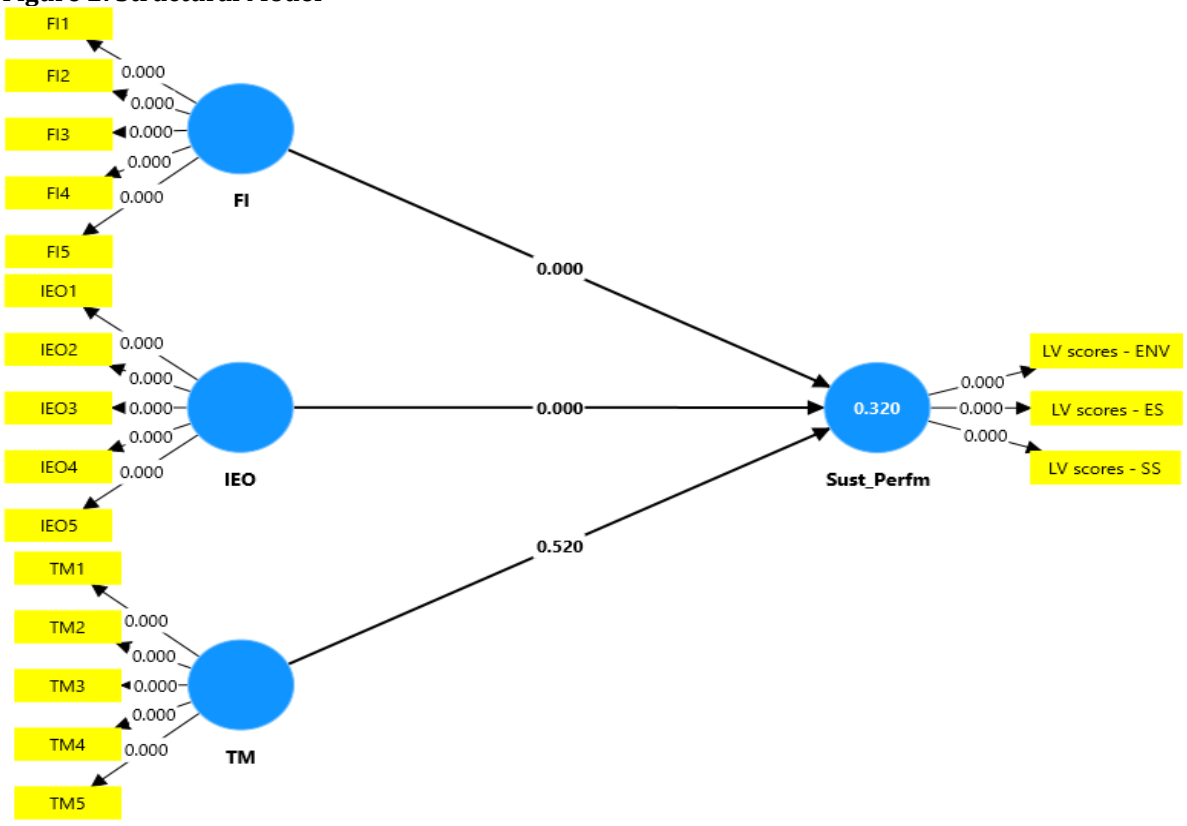
The outcomes of the hypothesis testing are summarized in Table 6 and visualized in Figure 1. The data support Hypothesis 1, with β = 0.344, t = 5.270, and p = 0.000, confirming a strong and positive effect of financial support on sustainability performance. Hypothesis 2 is likewise supported, evidenced by β = 0.247, t = 3.609, and p = 0.000, indicating that a strong internal environmental orientation significantly bolsters sustainability performance. In contrast, Hypothesis 3 is not supported, with β = 0.050, t = 0.644, and p = 0.520, reflecting that green procurement does not exhibit a meaningful relationship with sustainability performance.

Table 6: Outcomes of hypothesis testing

H	*Path*	*β*	*t*	*p*
H1	Financial Support -> Sustainable Performance	0.344	5.270	0.000
H2	Internal Environment Orientation -> Sustainable Performance	0.247	3.609	0.000
H3	Top Management Support-> Sustainable Performance	0.050	0.644	0.520

Note: β=coefficients, t=t-statistics, p=p-value

Figure 2: Structural Model



Discussion

This research contributes significantly to our comprehension of how financial resources, management support, and an internal environmental orientation interact to shape sustainability outcomes in Malaysian manufacturing firms. The hypotheses examined positioned these three elements as critical drivers. The results underscore the nuanced interconnectedness of the drivers, demonstrating that their influence and interplay vary widely in the industry.

The first hypothesis, H1, tested whether financial resources drive better sustainability results and found a clear and significant link. This finding echoes earlier work by Saher and Siddique (2023) and by Yang et al. (2023), which argued that funding allows companies to roll out greener practices, thus lifting their environmental, social, and economic scores. Within a supply chain, financial backing can show up as purchases of better machinery, upskilling staff, or joining forces on sustainability projects. Such investments create a virtuous circle of shared knowledge and practice, further raising sustainability levels all around (Yang et al., 2023). Directing funds to areas like waste reduction, eco-friendly packaging, cutting-edge technology, and R&D is especially important when the goal is to lock in sustainability over the long haul. Green investments are characterized as expenditures aimed specifically at lowering emissions while sustaining production levels, strengthening environmental outcomes, and enhancing the firm's reputation with investors and other stakeholders (Saher & Siddique, 2023). Moreover, spending on sustainability often yields attractive returns when the initial investment is eventually recouped. This practice centers on reclaiming worth from materials that are no longer needed or that have finished their first life. By reducing waste and using resources more efficiently, companies can generate financial gains while also reinforcing the argument for sustainable operations (Rizki & Augustine, 2022).

Hypothesis 2 (H2) explored how a firm's commitment to internal environmental values relates to tangible sustainability benefits and found a robust positive link. This finding validates prior research by Li et al. (2024) and Huma et al. (2024), who argued that a strong internal environmental orientation weaves sustainability into the corporate culture and elevates environmental, social, and financial metrics (Hanumsari, 2021). Firms that prioritize ecological stewardship can translate that commitment into bottom-line gains, since greener operations not only reduce ecological footprints but also enhance profitability. Manufacturers that embed sustainability into core processes are more likely to outperform rivals, for the green initiatives they cultivate effectively chart a long-term, resource-efficient strategic course (Li et al., 2024). Moreover, a well-rooted internal environmental orientation keeps staff updated on evolving green standards for products and technologies, thereby ensuring compliance while curtailing energy, waste, and hazardous substances. Given the dual pressures of tightening regulations and intensifying market rivalry, firms often embed the internal orientation before adopting more visible external measures, such as meeting regulatory benchmarks or securing ISO 14001 recognition (Akhtar et al., 2023).

Hypothesis 3 (H3) explored whether managerial support impacts sustainability performance and found no significant relationship. This finding diverges from research by Nangpiire et al. (2024) and Wijaya et al. (2023), both of which highlighted top management as a critical driver of sustainability initiatives. Although managerial backing frequently signals a company's readiness to invest in green programs, its mere presence may fall short of translating intent into lasting practice. Akhtar et al. (2023) found that management pledge correlates with organizational preparedness to go green but does not independently catalyze the enactment of environmentally sound procedures. Such evidence suggests an understated interplay in which managerial endorsement, while necessary, lacks the potency to generate significant results by itself. Furthermore, contemporary studies pinpoint the absence of management engagement as a pressing obstacle in effective manufacturer–supplier partnerships toward sustainability; a lack of active leadership can hinder the rollout of eco-friendly practices (Govindan & Jha, 2024). In the Malaysian setting, resistance toward change and a limited commitment from senior-level executives weaken the operational influence of supposedly supportive leadership, even if its theoretical value is recognized (Awan & Khan, 2021).

Implications

This study extends the application of the Natural Resource-Based View (NRBV) by empirically validating the different impacts of financial resources and internal environmental orientation on sustainability outcomes in a developing country context, while finding no significant relationship between management support and

sustainability performance. It challenges the assumption that all internal capabilities contribute equally, showing that financial investment and internal environmental orientation have a more direct influence on advancing sustainable manufacturing than management support alone. For industry practitioners, the findings highlight the importance of strategically allocating financial resources towards green technologies, process innovation, and sustainable procurement. Policymakers and industrial executives ought to prioritize the creation of financial instruments and incentive structures that mitigate the upfront costs of transitioning to sustainable practices. Simultaneously, internal environmental orientation should be actively cultivated to drive long-term sustainability success. Ultimately, the design of leadership training programs and associated performance indicators must focus on converting managerial commitment into measurable environmental results. This is particularly prominent in sectors where leadership support is insufficient to drive systemic transformation.

5. Conclusion and Recommendations

This study explored how financial resources, management backing, and internal environmental orientation affect sustainability results in Malaysian manufacturing firms. Designed in response to the rising demand to align industrial expansion with environmental care, the research used the Natural Resource-Based View (NRBV) to examine how firms' internal strengths lead to balanced performance across environmental, economic, and social dimensions. Results show that financial resources and internal environmental orientation have a significant positive effect on sustainability outcomes. The data highlight that robust financial backing is crucial for adopting green technology, sustainable sourcing, and innovative, eco-friendly processes. Additionally, a strong internal environmental orientation is key to embedding a sustainability-minded culture across all levels. In contrast, management support failed to show a significant impact, indicating that management affirmation may not be enough by itself unless it is matched by coherent systems and a culture that genuinely supports sustainability.

This research enriches the sustainability conversation by pinpointing the most influential organizational factors in Malaysian manufacturing. From an academic standpoint, it strengthens NRBV theory by revealing the uneven effects of internal resources. Practically, it delivers guidance for policymakers and industry leaders to prioritize resource allocation and strengthen the implementation of sustainability strategies. Ultimately, the study enhances understanding of how Malaysian firms can move beyond intention to action, positioning themselves for long-term competitiveness in a sustainability-driven global economy.

Future Direction/Limitations

Future research should consider exploring comparative studies across different industries, as well as small enterprises, to enhance the generalizability of the findings. This study focused on medium and large manufacturing firms, which typically possess greater capacity and resources to adopt green practices. However, future research could investigate small firms, as prior studies have identified that they often face resource constraints and encounter challenges in adopting new technologies and sustainable practices (Rahman et.al 2024). Additionally, examining sustainability practices in other sectors, such as services or agriculture, would provide valuable insights into how these factors vary across different contexts. Incorporating objective sustainability performance indicators and examining potential mediating variables, such as green innovation and employee engagement, would also contribute to a more comprehensive knowledge of the factors influencing sustainability outcomes.

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Perception of Readiness among Malaysian and Indonesian Accounting Students in the Sustainable Development Goal (SDG) No. 13 Pitching Video Competition

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Abstract: Universities worldwide play a critical role in advancing Sustainable Development Goal (SDG) No. 13through both formal curricula and informal educational initiatives. Simultaneously, the internationalization of higher education has become a prominent strategic priority. One such informal initiative is the SDG No. 13 Pitching Video Competition, implemented through a competition-based learning (CBL) approach to foster climate awareness and action among students. This study investigates accounting students' perceived readiness to participate in this competition-based learning activity. A structured questionnaire was designed and administered to undergraduate accounting students from Malaysia and Indonesia, who participated in an international academic webinar jointly hosted by two public institutions: University A in Sarawak, Malaysia, and Universitas B in East Java, Indonesia, in October 2024. Descriptive statistical analysis was employed to evaluate the responses. The findings revealed that over 80% of participants expressed agreement with 23 out of 32 survey items, indicating a strong level of readiness to engage in the SDG No. 13 pitching video competition. The paper concludes with a discussion of the implications of these findings, alongside the study's limitations and avenues for future research. This paper promotes the connection between experiential learning and global sustainability goals, which helps shape a generation of graduates who are both skilled and globally aware.

Keywords: *Internationalization, higher education, competition-based learning, sustainable development goals*

1. Introduction

Climate change is one of the most challenging scenarios involving humanity that alerts the United Nations to introduce Sustainable Development Goal (SDG) No. 13. Actions to address climate change and its consequences are urgently needed. Achieving this goal requires engagement from various sectors, including the education system. Higher education institutions have an important role in enhancing sustainability and act as an instrument in preparing future professionals by developing skills, knowledge, and awareness essential to tackle sustainability-related issues (Leal Filho et al., 2019; Lozano et al., 2017). Higher education Institutions have made efforts to integrate sustainability into their academic and operational frameworks, combining interdisciplinary programs such as economics, environmental science, engineering, and social sciences as strategies to foster a comprehensive understanding and innovative problem-solving among students (Žalėnienė & Pereira, 2021). Higher education institutions are the pillar to produce future leaders who would contribute to the implementation and success of the SDGs. Institutions such as Malaysia-Japan International Institute of Technology (MJIIT) have strategically aligned their academic and research pillars with the SDGs to contribute to sustainability efforts since 2012 (Wan & Abdullah, 2021). Higher education institutions (HEIs) highly contribute to various SDGs including Goal 1 (No Poverty), Goal 3 (Good Health and Well-Being), Goal 5 (Gender Equality), Goal 8 (Decent Work and Economic Growth), Goal 12 (Responsible Consumption and Production), Goal 13 (Climate Action) and Goal 16 (Peace, Justice and Strong Institutions)(Žalėnienė & Pereira, 2021). However, changes are essential in embedding sustainability principles into the education system as well as the organizational culture, for instance, the curricula and modus operandi (Žalėnienė & Pereira, 2021). By gaining insights into students' perceptions, educators can more effectively design curricula that cultivate sustainability-oriented competencies.

Competition-based learning (CBL) has emerged as a dynamic pedagogical approach aimed at enhancing student engagement and fostering real-world problem-solving abilities. Competition-based learning (CBL) is an educational strategy to motivate and engage students in the learning process (Issa et al., 2014). In this approach, the students are encouraged to work as a team, enhancing knowledge, improving skills, and deepening their understanding of the concept. Through this technique, students develop problem-solving skills, teamwork, and promote life-long learning (Issa et al., 2014). Competition-based learning (CBL) fosters a sense

of ownership over learning and collaborative efforts, significantly improving learning outcomes in technical disciplines (McGuire, 2025). Competition-based learning is a new model that utilizes two well-known learning models, namely the Project-Based Learning (PJBL) and competitions (Issa et al., 2014). According to Issa et al. (2014), the model is an alternative solution to the lack of motivation, self-esteem, insufficient practical and real-life experience, and inadequate teamwork practices. Components of CBL were presented clearly in (Issa et al., 2014), including the course outline relevant to the course objective, requirements that must resemble real-world problems, well-defined competition rules, a reward system, communication with team members and mentors, a judging committee, and collective learning taking place throughout the process. According to Issa et al. (2014), Competition-based learning enhances students' learning experience and boosts the outcomes of learning compatible with the objective of the curriculum. By engaging in this competition, students can connect with the facility and their classmates better in CBL (Joseph & Rahmat, 2019). Educational intervention strategies such as Project-Based Learning (PJBL) have effectively improved students' understanding and perception of the SDGs CBL model (Espino-Diaz et al, 2025). Through the combination of PJBL and competition, the CBL model could overcome students' deficiencies such as lack of motivation, self-esteem, insufficient practical, real-life experience, and inadequate teamwork practices (Issa et al., 2014). It also prepares them for real-world challenges and initiates collaboration between universities.

According to Joseph et al. (2021), CBL promotes SDG awareness by shifting students from passive recipients to active contributors who apply not only theoretical knowledge but also internalize the practical relevance of SDG No. 13. Such an experiential approach fosters critical thinking, creativity, collaboration, and a sense of personal responsibility towards environmental sustainability (Leal Filho et al., 2019). Competition-Based learning (CBL) can bridge the gap between academic knowledge and societal needs as students engaged in competition, focusing on SDG-related themes, create higher awareness of sustainability for integrating SDG principles into future career aspirations (Joseph et al., 2021). Countries like Malaysia and Indonesia are particularly exposed to the adverse impacts of climate change, highlighting the urgent need for educational strategies that foster climate resilience. The pitching video competition is a non-formal education as part of the university's internationalization approach for sustainable development activity to improve students' awareness of this important global agenda (Joseph et al., 2022). According to Joseph et al. (2022), non-formal learning encompasses activities outside the classroom or academic syllabus aimed at achieving the university's SDG objectives, such as participating in a pitching video competition. Another example of a non-formal education activity, such as Solutions Story Tracker provided by the Solutions Journalism Network, was used to identify and explore solutions based on journalism stories in the non-formal education field (Almeida & Morais, 2025).

Increasing global temperatures, rising climate extremes, and accelerating ecological degradation have translated climate change from a remote matter into an urgent predicament. The risks are high for countries nations i.e., Malaysia and Indonesia, in which coastal people, biodiversity hotspots, and climate-sensitive economies are at risk. At this point, higher education is not only a knowledge provider, nonetheless in addition a crucial agent for developing the problem-solvers, innovators, and leaders necessary to navigate an undefined climate outlook.

Realizing this pressing situation, the United Nations established Sustainable Development Goal (SDG) 13, which demands urgent action to fight against climate change and its effects. Higher education institutions (HEIs) perform a crucial role in realizing this objective by preparing graduates with the knowledge, skills, and values required to tackle sustainability challenges (Leal Filho et al., 2019; Lozano et al., 2017). Even though several HEIs incorporate sustainability principles into academic programs and operations, non-formal learning opportunities can support these efforts by promoting effective engagement and applied problem-solving (Žalėnienė & Pereira, 2021).

Competition-based learning (CBL) is one such pedagogical approach, combining project-based learning with well-defined competition to improve motivation, teamwork, critical thinking, and lifelong learning (Issa et al., 2014; McGuire, 2025). Competition-based learning provides a pragmatic possibility for students to associate academic knowledge with actual climate challenges, encouraging both competence and personal responsibility when supported with sustainability themes (Joseph et al., 2021).

Notwithstanding its potential, limited research examines how students in climate-vulnerable nations recognize their readiness to engage in sustainability-focused CBL activities, specifically in the accounting discipline, in which sustainability reporting and climate-related risk appraisal are progressively important professional competencies. This study addresses this gap by investigating Malaysian and Indonesian undergraduate accounting students' readiness to participate in an SDG No. 13 pitching video competition presented within the CBL framework. As a result of positioning the activity within a cross-border higher education collaboration, the study offers insights into how non-formal, experiential learning can promote sustainability education in countries confronting severe climate risks.

2. Literature Review

Competition-based learning (CBL) and its importance

According to Issa et al. (2014), CBL is a paradigm that incorporates contests and PJBL within a networked environment supported by open-source Learning Management Systems. This model places great emphasis on collaborative learning and outcome-oriented tasks. Competition-based learning offers educators an alternative answer to many of the shortcomings associated with traditional learning procedures, such as a lack of motivation, low self-esteem, insufficient practical and real-life experience, and ineffective teamwork activities. Usman et al. (2024) performed classroom action research using a PJBL methodology for 100 students in the sixth semester of the Public Sector Accounting study program. The study discovered that the PJBL technique boosted student creativity while also improving abilities in learning innovative goods and entrepreneurship. According to Issa et al. (2014), CBL distinguishes itself from both PJBL and competitions by keeping PBL's advantages while limiting the disadvantages of competitive learning. Chang and Lin (2024) further affirmed that the CBL model successfully combines competition and PJBL, strongly emphasizing teamwork and results. Team members become more motivated because of this strategy, which encourages them to improve their results and apply what they have learned to real-world situations. Students' involvement in online problem-solving contests may improve their information technology skills, and showcasing tournaments can boost their competitive abilities. These findings are demonstrated by involving students in creative problem-solving tasks in information competitions (Chang & Lin, 2024). Chen et al. (2020) discovered that competition in digital game-based learning (DGBL) was successful for math, science, and language but ineffective for social science and other topics. It worked well for puzzles, strategy, role-playing, and simulations, but not for action games.

Murray (2019) examined the application of competition as an instructional approach to improve students' problem-solving abilities. He discovered that while competition may stimulate high-achieving students, it can have adverse effects on others, potentially reducing student engagement. For example, competition between tutors and bilingual students highlighted the limitations in this teaching approach. Therefore, incorporating collaboration into competition enables teachers to guarantee that all students can engage and attain the same level of learning as their high-achieving peers. Joseph et al. (2022) also shared that non-formal education conducted through CBL encouraged teamwork. Their findings showed that 90% of respondents believed that competition improved students' presentation skills, public speaking, time management, problem-solving, managerial abilities, confidence, as well as self-awareness.

Meanwhile, research by Liu et al. (2022) and Abushakra et al. (2019) emphasized the benefits of competitions for students' growth. According to Abushakra et al. (2019), Omani students' soft skills and business perspective were improved by entrepreneurial challenges, which allowed them to pick up new abilities and keep abreast of industry advancements while findings by Liu et al. (2022) found that team-based competitions were very successful in increasing students' motivation, engagement, communication, and vocabulary levels in English vocabulary classes. Additionally, the study by Lei et al. (2016) demonstrated that introducing a competition mode into problem- or case-based learning assisted medical students thoroughly comprehend clinical diagnosis and treatment of severe infections.

Pitching video competition

A pitching video competition is an educational or entrepreneurial activity where participants produce brief videos to present ideas or business plans. According to some studies, pitching competitions have an impact on education. For example, hands-on activities like pitching are frequently more effective than theory-based instruction (Rideout & Gray, 2013) as "learning by doing" is a more successful method to develop practical skills

and entrepreneurial attitude than lectures in the classroom (Rasmussen & Sorheim, 2006) and increase students' intentions to start businesses (Walter et al., 2013). The use of video competition as a pedagogical tool in higher education has been studied by Joseph and Rahmat (2018), who discovered that competition-winning videos are excellent learning aids in higher education, encouraging student autonomy, engagement, and hands-on, technology-supported learning in accounting classes.

A study by Hossen et al. (2022) found that the educators of the Strategic Management course in Universiti Teknologi MARA used a competition-based learning methodology to hold a pitching video competition for proposing a business plan during the COVID-19 pandemic. Seventy percent of respondents in this study shared that the competition helped them establish company plans and motivated them to learn on their own. According to Oh et al. (2025), students' business planning, communication, and critical thinking abilities were much improved by business pitching competitions. These competitions also demonstrate how entrepreneurial education can be embedded in vocational training, with numerous proposals portraying real-world potential.

One of the examples of pitching activity is investor relations (IR) communication technology. According to Balakhonskaya and Balakhonsky (2021), pitching is an investor relations (IR) communication technology that is a structured exchange between a business entity and the investment community to showcase an innovative project and convince potential investors of its low risks and financial viability. Pitching, as an IR tactic, is a pre-planned, goal-oriented speech given to investors. To improve the efficacy of the communication process, pitching is usually accompanied by visual assets (such as slideshows or product demos).

In evaluating the pitching video competitions, judging criteria are considered important elements. Videos are assessed based on clear problem-solution identification and concept inventiveness (Pitch to the Pack, n.d.; INNOVEX 2025, 2025). Market analysis, company model, and scalability potential are among the most important criteria (GITEX Asia, 2025). Social and environmental effects are also considered in SDG contests (INNOVEX 2025, 2025). Presentation clarity, structure, and visual appeal are critical (SparkHub Youth, 2024). Other imperative elements include presentation structure, visual appeal, team competency, financial feasibility, and the skill to confidently answer during question-and-answer sessions (GITEX Asia, 2025; SparkHub Youth, 2024). These principles aid in the identification of meaningful, realistic ideas that foster long-term innovation.

Sustainable development goals (SDG) pitching video or other competition.

The SDG pitching video competition provides an opportunity for participants to propose innovative solutions to real-world problems. The findings by Saari et al. (2025) showed that the most frequently mentioned SDGs in the pitches were sustainable infrastructure (SDG No. 9), sustainable cities and communities (SDG No. 11), sustainable mobility linked to renewable energy (SDG No. 7), sustainability analytics to measure climate action (SDG No. 13), and solutions for sustainable consumption and production (SDG No. 12).

Several noteworthy competitions and projects have been established that integrate the SDGs of the United Nations with various formats for presenting videos. For example, UNESCO hosted a 2-minute video competition called SDG Action Reel in honor of World Engineering Day 2025, in which participants were encouraged to highlight their practical contributions to any of the 17 SDGs. Using digital storytelling, this competition aimed to inspire global action, increase awareness, and bring about significant change by documenting sustainable practices that influence day-to-day living, community initiatives, or creative solutions (UNESCO, n.d). As part of the effort to introduce the younger generation, including students in schools, colleges, and universities, to SDG-related situations, UNITAR International University created the ASEAN Future Sustainable Leaders (AFSL) 2023 competition. This effort assessed participants' ability through five-minute videos, pitching, and question-and-answer sessions, while also encouraging ASEAN nations to expose students to possible exchange programs. Such activities aim to improve the educational experience and assist in producing a future generation of leaders with SDG-based knowledge and competence (UNITAR, 2023).

In support of the SDGs, Joseph et al. (2022) held an informal learning activity for accounting students called the 3 Minutes SDGs Ideas Video Competition, which was hosted by two public universities. The study discovered that 90% of respondents thought that video competition was beneficial in raising awareness of the SDG. This indicates the effectiveness of the SDG video competition in improving knowledge acquisition and implementation of SDGs in higher education institutions.

Readiness perception to enter the competition

In every tournament, being ready to compete is crucial since it demonstrates the competitors' self-assurance and readiness to fulfill the conditions. An element that affects student competitiveness is expectation value beliefs, in which Wu et al. (2025) stated that people are driven to complete activities when they value the result and feel they can succeed. However, fear of failure might have an impact on driving. In a similar manner, Kaplánová (2024) found that football players' self-esteem and anxiety levels had a significant impact on their preparedness to perform. Those who have greater self-esteem and less anxiety are better equipped to succeed because they can successfully accept criticism, create objectives, manage obstacles, and stay focused.

Joseph et al. (2021) investigated accounting students' perceptions of readiness to participate in the CBL activity of preparing a business proposal pitching video for the Strategic Management course with the theme 'Sustainable Business Solutions or Ideas in Response to COVID-19 Pandemic'. According to the results, over 80% of the students were prepared for the competition since they desired to win, impress judges, improve their resumes, and receive a certificate of participation. They were extremely well-prepared; they followed directions from the beginning, monitored their progress frequently, urged teammates to keep on course, practiced their pitch, made sure their video was ready, and asked their lecturer for advice. Meanwhile, Radzi et al. (2020) conducted a CBL research to investigate participants' perceptions of the first accounting course online quiz for non-accounting majors as preparation for the final round quiz. Their findings noted that over 40% of respondents opted to enter this competition because of the certificate of participation.

Lachebo et al. (2024) examined the students' readiness for secondary school science competitions in southern Ethiopia. They discovered that gender, instructor dedication, and supplementary support all had a substantial influence on involvement. Poor research abilities, little technical expertise, and inadequate English ability were among the most significant hurdles. School officials, teachers, parents, and members of the community must all work together to increase engagement. According to Nguyen et al. (2021), in recent years, Taiwan has held several scientific and technology contests to encourage students' curiosity and inventiveness. The integrated science, technology, engineering, art, and math (iSTEAM) competition is one example. Its goal was to encourage Taiwanese rural kids to participate in a competition that focused on creating small models. The findings demonstrated that students who took part in the competition had a high level of self-efficacy in creating miniature models, valued the challenge, and were prepared for the competition. They also showed positive attitudes regarding teamwork and cooperation. In conclusion, developing soft skills, taking advantage of experiential learning opportunities, and receiving institutional support are all components of being prepared to compete.

Experiential learning theory (ELT)

Numerous learning theories are available to aid students in their educational journey. Experiential learning theory (ELT) is one of the theories that is frequently applied. Experiential learning theory **(**ELT), which was proposed by Kolb (1984), provides a platform for understanding the way learning occurs by incorporating real-world experience. According to Kolb (1984, p. 38), ELT is referred to as "the process whereby knowledge is created through the transformation of experience". According to Kolb (1984), experiential learning unfolds through a four-stage cycle: Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation, which guides learners from practice to reflection, conceptualization, and application. Through this theory, the learning experience was transfigured into knowledge that requires learners to perform, review, figure out, and implement. Effective learning necessitates a person to experience all four stages (Kolb,1984).

Diverse methods for providing and assessing experiential learning are demonstrated by Tembrevilla et al. (2024) through a systematic literature review of 220 research articles spanning 25 years. One of the novel ways of experiential learning was the implementation of an entrepreneurial pitch project, in which students were able to create and propose technical and examined and analyzed in relation to Kolb's ELT framework. The study found that the process of preparing and giving business presentations was pleasant for students and improved their learning experience. The technique offered students with actual experiences while also demonstrating abstract understanding and active exploration. Meanwhile, Devi and Thendral (2023) conducted a study on 54 students over the 2021-22 academic year, using Kolb's ELT for the Data Structures and Algorithms (DSA) course, which is difficult to teach and understand owing to its complexity. Their study combined reflective practice with

active learning tactics, including role play, think-pair-share, and flipped classrooms. The findings showed that students gained a better conceptual knowledge, increased confidence, and improved their ability to select acceptable data structures for real-world applications. Furthermore, the reflective practice approach helped faculty refine their pedagogical skills, promoting ongoing progress in educational efficacy.

In another study, Nurunnabi et al. (2022) emphasized experiential learning as a critical component of clinical education, particularly at medical college hospitals, where bedside and ward-based learning environments offer unique opportunities when contrasted to standard classroom training. Each patient interaction is a distinct learning opportunity, allowing students to combine new information with past knowledge and experience. Experiential learning provides an integrated framework that combines education and patient care, improves clinical competence and professional abilities in medical education by immersing learners in direct experience combined with organized reflection. In addition, Choshi (2025) describes how the ELT can help nursing students learn in their first community health nurse practice course by using guided reflection to integrate experience into ideas and connect community-based clinical experience to their learning. Meanwhile, Wijnen-Meijer et al. (2022) specifically linked Kolb's ELT cycle to curriculum design in medical education. Real cases (CE), case-based discussions (RO), theoretical seminars (AC), and simulation-based practice (AE) were all incorporated into their methodology. Students valued the chance to rehearse similar scenarios in a simulated setting as well as the opportunity to discuss patient cases that they had directly experienced. Students gave this arrangement high marks, stating that the order of the ELT phases improved their abilities and self-assurance.

According to Tembrevilla et al. (2024), a pitching video competition is tightly aligned with Kolb's four stages, providing students with the opportunity to put theory into practice through hands-on participation. Pitch contest organizers can purposefully designate phases that align with each ELT stage: preliminary project work and brainstorming (CE), peer/mentor input (RO), connecting solutions to SDG frameworks (AC), and re-pitching ideas that have been developed (AE). Competitions run the potential of undervaluing the stages of thought and conceptualization and overemphasizing the performance component without this deliberate design, which would reduce their instructional value. (Kolb, 1984). Meanwhile, Kairi et al. (2024) reveal that the incorporation of CBL and experiential learning, combined with the other classical and active learning techniques, has motivated the students and indirectly sparked their interest in Science, Technology, and Mathematics (STEM). The results revealed that 96% are now pursuing their tertiary education in the field of STEM, that students are directly influenced and motivated using competition in the STEM modules to collaboratively appreciate the beauty of STEM education while learning it together with a mission to win the competition.

Smith et al. (2022) found that COVID-19 had impacted how pitching videos were conducted, which feature an online approach engaging participants in a hybrid format that enables cross-sectional participation, also to encourage the development of teleconferencing skills amongst the participants, which includes Zoom and video teleconferencing software programs to supplement the delivery of content and engagement. Research findings by AlQallaf et al. (2024) highlight that CBL through a three-day virtual reality (VR) hackathon on climate change education has enhanced the student's understanding of the SDGs and climate change issues, their competency with the VR technologies as well as teamwork and problem-solving issues The approach was also successful in engaging and motivated the student's interest in the chosen SDGs include climate change. The hands-on learning approach was designed to foster active and collaborative engagement among participants (AlQallaf et al., 2024). The application of ELT in higher education may continue to change in the post-COVID-19 era due to a variety of factors, including changing student and institutional needs, the development of new technologies like virtual and augmented reality, and the increasing difficulty of creating efficient research methodologies to evaluate its growing applications in engineering education (Tembrevilla et al., 2024).

According to Van Hanh (2020), the experiential learning project is an effective approach to teaching students about hands-on experiments as an engineer. This research incorporated project-based activities and engineering design competitions that would motivate the interest of engineering students. A theoretical model of creating value in an experiential learning project through a contest was developed and applied at the Hung Yen University of Technology and Education. The new findings reveal that (1) the prize money of contest was not the major factor for the motivations in students' learning; (2) the attractiveness of a contest theme, more than one way of solving the problem and using high technology were the major factors that motivate students to learn; (3) the experiential learning project through contest had the greatest impact of development on the

theoretical knowledge of engineering design, and the skills, experiences and abilities to use technologies, and the power of teamwork to make decisions.

Overall, the evidence suggests that Kolb's ELT provides an adaptable framework for students' learning in a variety of subject areas. In the case of Malaysian and Indonesian accounting students, readiness is not merely a function of theoretical knowledge of climate action (SDG 13), but also the degree to which prior educational and co-curricular experiences have enabled them to cycle effectively through these stages. For example, Concrete Experience is embedded in prior sustainability-related coursework, participation in environmental campaigns, or earlier video-based assessments. Reflective Observation manifests in students' ability to evaluate the effectiveness of their previous presentations or sustainability initiatives, considering cultural and institutional contexts. Abstract Conceptualization involves synthesizing sustainability knowledge, communication theory and accounting relevance into a persuasive message aligned with SDG 13. Active Experimentation occurs in the actual pitching process, where students test and refine their approach using available technological, linguistic, and rhetorical tools. From this perspective, perceived readiness reflects a student's self-assessed capacity to navigate the ELT cycle in a high-stakes, interdisciplinary task. Differences between Malaysian and Indonesian students may arise from variations in experiential learning opportunities within their respective curricula, institutional pedagogies, and socio-cultural environments. By grounding readiness in ELT, the study shifts the focus from readiness as a static trait to readiness as a dynamic, experience-derived competence—a framing aligned with contemporary calls in higher education for sustainability competencies to be embedded in authentic, practice-based learning contexts (Lozano et al., 2017).

3. Methodology

Research Design and Instrument

This study used a quantitative design to examine accounting students' perceived readiness to participate in a competition-based learning (CBL) activity, the SDG No. 13 Pitching Video Competition. A structured questionnaire encompassing 32 items was developed, with several items modified from established CBL studies (Joseph & Rahmat, 2018; Radzi et al., 2020; Joseph et al., 2021) to ensure content validity. The instrument consisted of two sections: Section A captured demographic information, while Section B assessed readiness using a five-point Likert scale (1 = strongly disagree to 5 = strongly agree; midpoint = 3 = neutral).

Population, Sampling and Justification

The study population comprised undergraduate accounting students from two public universities, one in Malaysia (University A) and one in Indonesia (University B), purposively selected due to their active Memorandum of Understanding supporting joint academic and sustainability initiatives. In view of the non-existence of a complete sampling frame, convenience sampling was employed, intended for students who attended an international academic webinar co-organized by both universities. This indicates respondents' availability and relevance, as everyone had been exposed to the competition context during the webinar. The final sample comprised 77 students.

Data Collection and Analysis

The online questionnaire was distributed immediately after the October 2024 webinar. Descriptive statistics, i.e., frequencies, percentages, and mean scores, were used to analyze students' readiness levels. The independent t-test is conducted to examine the difference in the readiness levels between students in both universities.

4. Results and Discussion

Demographic Analysis

The first section of the analysis presented a descriptive overview of the respondents in the study. Table 1 shows the demographic characteristics of the respondents. In terms of gender, the majority of respondents were female (60%) compared to male (40%). In terms of age, the highest percentage (33.8%) was recorded by the 22-23 age group, followed by the 18-19 and 20-21 age groups with similar percentages (28.6%), and 9.1% by the 24-25 age group. The majority of respondents came from University A (50.6%) and University B (49.4%). In terms of duration, most respondents (39%) spent more than 30 minutes creating a presentation, while 28.6% spent between 1 and 10 minutes.

Table 1: Frequency Analysis for Respondents' Demographics

Item	Frequency	Percentage (%)
Gender:		
Female	51	60
Male	26	40
Age:		
18 -19 years old	22	28.6
20 -21 years old	22	28.6
22 - 23 years old	26	33.8
24 - 25 years old	7	9.1
Institutions:		
University A	39	50.6
University B	38	49.4
No of hours undertaken to prepare for this competition:		
Less than 1 hour	1	1.3
1 -10 hours	22	28.6
11 -20 hours	9	11.7
21 - 30 hours	15	19.5
More than 30 hours	30	39

Reliability Analysis

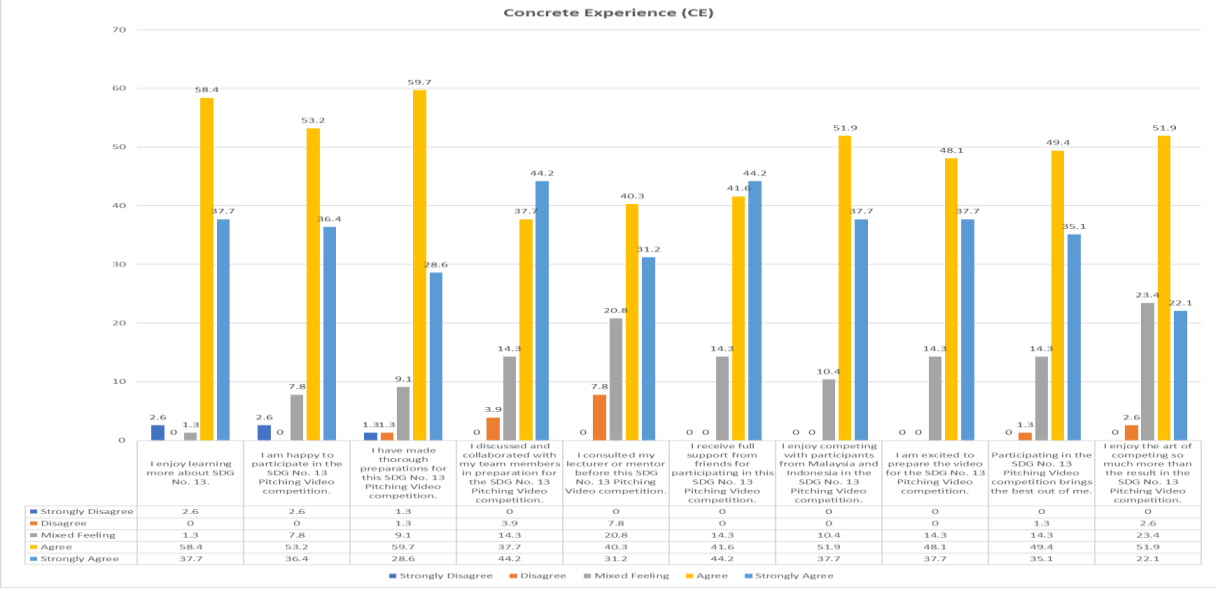
According to Sekaran and Bougie (2016), the reliability test was conducted to ascertain the inter-item consistency. Hair et al. (2013) stated that a Cronbach's alpha value of 0.7 or higher was adequate; however, Nunnally (1978) and Awang (2015) proposed a lower cut-off point where a value of at least 0.6 was acceptable. Regardless of the criteria taken into consideration, the current results were regarded as reliable and satisfactory. The reliability test's outcome is shown in Table 2.

Table 2: Cronbach's Alpha

Variable	Cronbach Alpha	Number of items
Perception of readiness among Malaysian and Indonesian accounting students to engage in the CBL	0.89	33

The result of the perception readiness among Malaysian and Indonesian accounting students to engage in the CBL activity in relation to SDG No. 13 is presented in

Figure 1: Concrete Experience

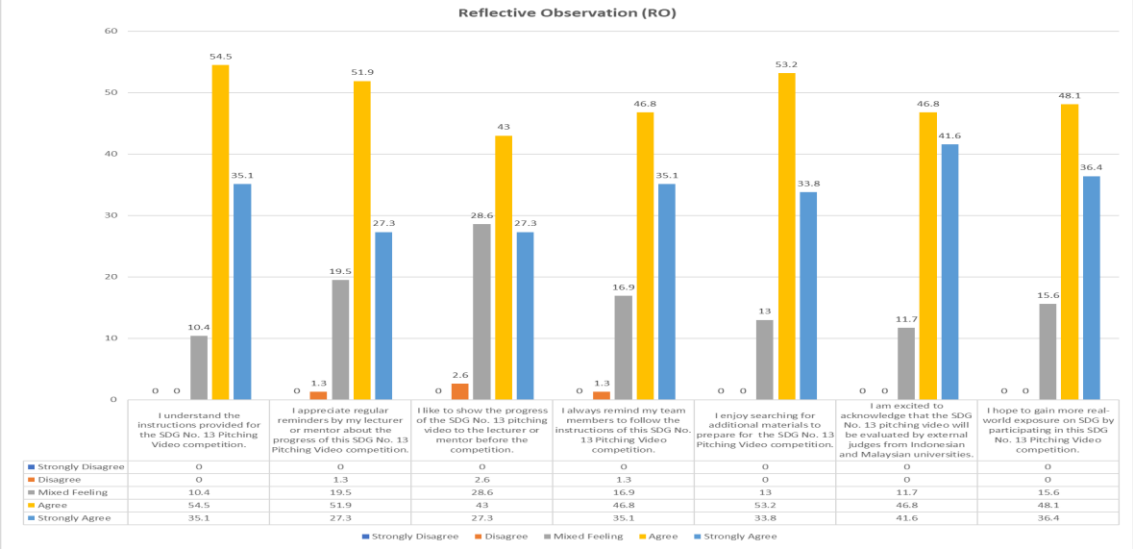


Kolb's Experiential Learning Theory (1984) emphasizes that meaningful learning begins with concrete experience, in which learners actively participate in real-life activities that expose them to concepts and difficulties. According to Figure 1, in the context of SDG No. 13, students who participate in the Pitching Video Competition acquire significant hands-on experience that goes beyond standard classroom learning. Enjoying the process of learning more about SDG No. 13, preparing thoroughly for the competition, and communicating with teammates all provide genuine opportunities to put information into practice. These experiences enable participants to feel emotionally linked to the issue, explore novel solutions, and gain confidence in dealing with real-world sustainability challenges. This aligns with a study undertaken by Van Hanh (2020); the experiential learning project is an effective approach to exposing students to hands-on experiences, especially in fields such as accounting, where practice and application are essential.

Furthermore, active participation and engagement in the competitive process demonstrate concrete experience. According to AlQallaf et al. (2024), a hands-on learning approach can foster active engagement and collaborative engagement among participants. Consulting with lecturers or mentors, receiving encouragement from friends, and competing with classmates from Malaysia and Indonesia all contribute to a more diverse learning experience by providing different viewpoints and support systems. Preparing and delivering the pitching video pulls out the best in participants while also instilling delight, excitement, and intrinsic motivation. These lived experiences exemplify Kolb's belief that true learning comes through doing when students immerse themselves in real-world activities, reflect on their actions, and turn these experiences into deeper knowledge and personal development.

The result of the perception readiness among Malaysian and Indonesian accounting students to engage in the CBL activity in relation to SDG No. 13 is presented in Figure 2 (Reflective Observation).

Figure 2: Reflective Observation



Based on Figure 2, students demonstrate Reflective Observation by reviewing their progress and thinking about what they have learned. For example, they listen to their lecturer's guidance, provide updates for comments, and encourage team members to respect the guidelines. This is aligned with Chang and Lin (2024), who demonstrated that involving students in creative problem-solving tasks within competition settings enhances their reflective learning process. Similarly, Murray (2019) supports this view by showing that competition serves as an effective instructional approach to improve students' problem-solving abilities. Together, these studies highlight those competitions like the SDG No. 13 initiative not only foster reflective thinking but also strengthen critical skills that prepare students for real-world challenges.

Students also reflect by gathering more materials, appreciating the opportunity to be judged by outside experts, and connecting the competition to real-world challenges concerning climate change. Through this reflection, students get fresh ideas and a greater knowledge of SDG No. 13, allowing them to learn beyond competition.

This reflection is consistent with Joseph et al. (2021), who discovered that students preparing for a pitching video competition not only aimed for recognition but also deepened their understanding of real-world issues, such as climate change by gathering resources, valuing external evaluation and connecting the activity to SDG 13.

Figure 3: Abstract Conceptualization

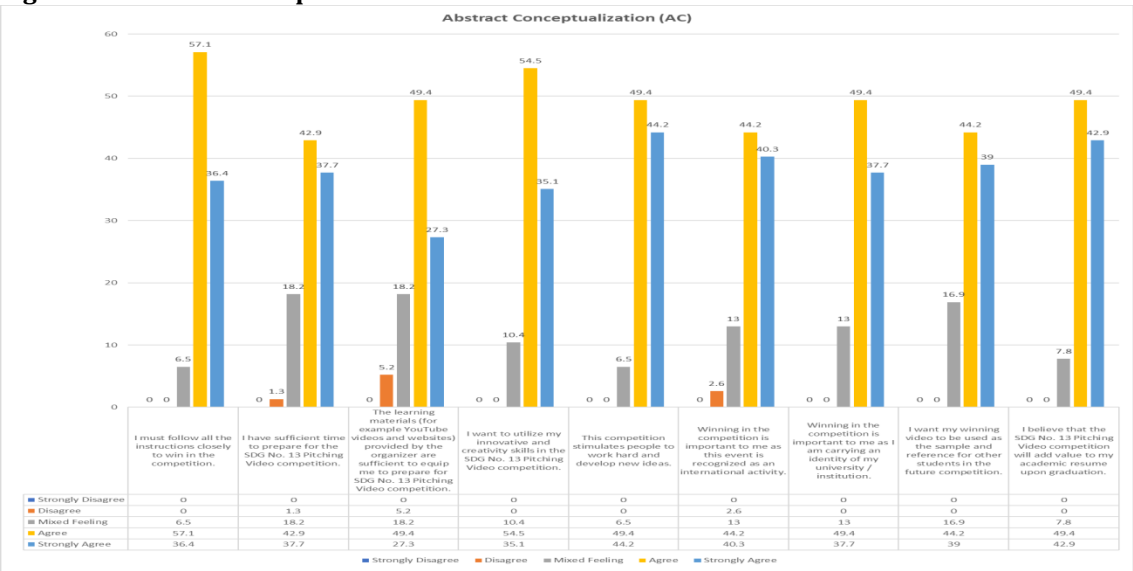


Figure 3 illustrates the concept of abstract conceptualization as outlined in Kolb's Experiential Learning Theory. In Kolb's Experiential Learning Theory, abstract conceptualization refers to the stage at which learners evaluate their experiences, draw lessons, and develop broad concepts that can guide future actions. The SDG No. 13 Pitching Video competition provides such a platform, as students must rigorously adhere to instructions, make good use of learning resources, and employ creativity and innovation to produce significant results.

These activities demonstrate how participants do more than just complete tasks; they evaluate, conceive, and use structured thinking to assure competition success. Usman et al. (2024) reported that the CBL technique could also boost student creativity while strengthening their abilities in learning innovative goods and entrepreneurship. Moreover, the results also showed that CBL encouraged problem-solving and critical thinking among students working in teams, as aligned with the findings of Murray (2019).

Figure 4: Active Experimentation

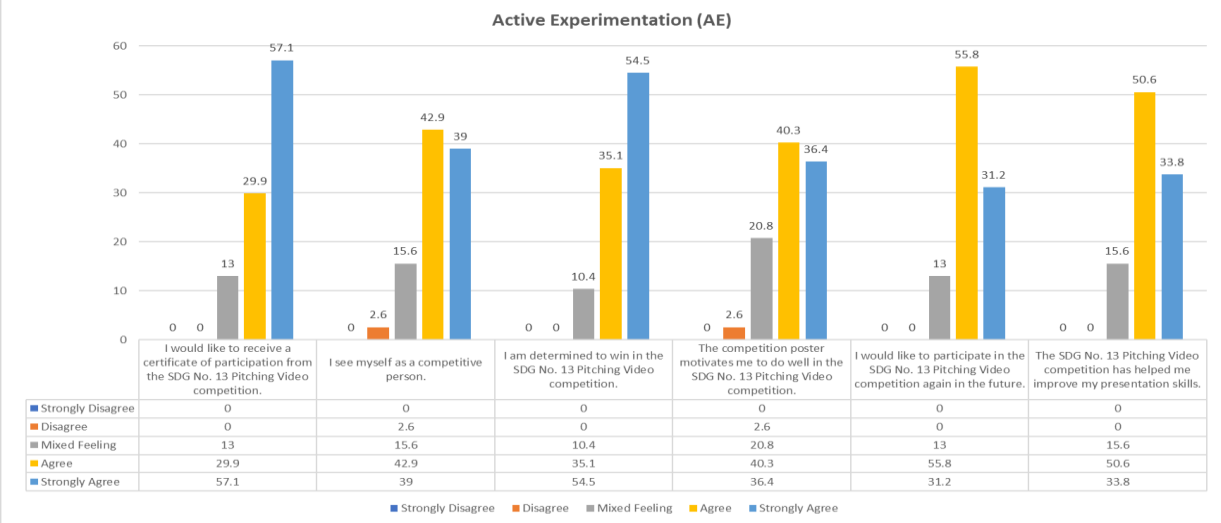


Figure 4 illustrates the concept of active experimentation as outlined in Kolb's Experiential Learning Theory. Kolb's Experiential Learning Theory defines active exploration as when students put what they have learned into practice. The SDG No. 13 Pitching Video competition exemplifies this, as students showcase their talents, remain determined to win and get the certificates, and also use the experience to better their presentation abilities. Radzi et al. (2020) also stated that more than 40% of respondents opted to enter this competition because of the certificate of participation.

This study demonstrates how students test ideas in a real-world situation, adjust their strategy, and plan for future growth. Their determination, competition, and eagerness to join again demonstrate how active experimentation promotes lifelong learning and development. This is aligned with a study done by Abushakra et al. (2019), entrepreneurial challenges improved Omani students' soft skills and business perspectives by allowing them to acquire new abilities for future growth and remain updated with industry advancements, while Liu et al. (2022) found that team-based competitions significantly enhanced students' motivation, engagement, communication, and vocabulary development.

An interesting finding from this study was that over 80% of students demonstrated a strong commitment to excelling in the CBL activity, primarily driven by their desire to uphold the reputation of University A and University B, as well as the activity's organization by the faculty. According to Joseph et al. (2022), 90% of respondents believed the video competition was beneficial in raising awareness of the SDGs. These competitions improved the educational experience and helped prepare a future generation of leaders equipped with knowledge and skills linked with the SDGs (UNITAR, 2023).

Descriptive Analysis

Table 4: Descriptive Statistics

Items	Mean	Standard Deviation
Perception of readiness among Malaysian and Indonesian accounting students to engage in the CBL	4.44	0.821

The results show that the mean score of 4.44 indicates a high level of perception readiness among Malaysian and Indonesian accounting students to engage in case-based learning (CBL), implying that the majority of respondents agree or strongly agree that they are prepared for this learning approach. The value of 0.821 suggests a moderate consistency level, indicating that the majority of students generally agree they are ready to engage in CBL.

Independent Sample T-Test

This test compares the mean scores of students from University A and University B to determine whether the observed difference in perception levels is statistically significant or attributable to random variation. A significant t-test result ($p < 0.05$) indicates that nationality influences students' readiness for CBL. Conversely, a non-significant result suggests that both groups exhibit comparable perceptions, supporting the view that CBL is positively received across contexts.

The independent samples t-test between University A and University B is presented below. Levene's test for equality of variances and the t-test for equality of means indicate no significant differences in perception of readiness between Malaysian and Indonesian accounting students with respect to engaging in CBL. Although the mean score of University A is slightly higher than that of University B, the difference is not statistically significant, as all significance values exceed the 5% threshold.

Table 5: Independent Sample T-Test

Variables	University	N	Mean	Std. Deviation	Std. Error Mean
Perception of readiness among Malaysian and Indonesian accounting students to engage in the CBL	University A	50	23.1677	4.04715	.28756
	University B	27	22.3398	4.50894	.36300

5. Conclusion

This study examines how prepared accounting students feel about participating in a competition-based learning experience, specifically the SDG No. 13 Pitching Video Competition. Based on the findings, it can be concluded that the SDG No. 13 Pitching Video competition was highly effective in engaging students, fostering motivation, and strengthening essential academic and professional skills. The majority of participants not only expressed satisfaction with the overall learning experience but also highlighted their enthusiasm for teamwork, creativity, and innovation throughout the competition. Their active involvement and positive attitudes toward the event align with earlier studies, confirming that competition-based learning (CBL) can enhance students' preparedness, confidence, and motivation to excel. The evidence also suggests that students perceived this activity as meaningful, particularly in terms of international exposure, institutional representation, and the tangible benefits of certification and a resume portfolio. Additionally, the results indicate that CBL, when integrated into sustainability-focused initiatives such as SDG No. 13, can significantly promote collaborative learning, critical thinking, and problem-solving skills. Students were driven not only by the desire to win but also by intrinsic motivation, such as enjoying the learning process, valuing lecturer support, and striving to contribute to global awareness of climate action. The strong commitment demonstrated by participants reflects how CBL fosters responsibility, resilience, and leadership qualities. These qualities are essential for preparing graduates to address complex global challenges. Overall, this competition successfully met its educational goals, positioning itself as a powerful pedagogical tool that blends knowledge acquisition with real-world application and global citizenship.

The practical implication of this study is that higher education institutions should systematically design and implement low-cost yet high-impact international initiatives, such as virtual competitions, cross-border collaborative projects, and joint workshops that provide experiential learning opportunities. These initiatives not only strengthen institutional networks and foster intercultural competence but also embed sustainability into the broader student experience in a way that is flexible, inclusive, and resource-efficient. By adopting such approaches, universities can position themselves as proactive agents of sustainable development, ensuring that their graduates are prepared to address complex global challenges with both competence and conviction.

This study offers valuable insights, yet several limitations warrant careful consideration. First, the sample was confined to undergraduate accounting students from two universities in Malaysia and Indonesia, restricting the generalizability of the findings across disciplines, institutional contexts, and cultural landscapes. Second, reliance on self-reported data introduces the risk of response bias, as participants may have provided socially desirable answers, particularly given the normative weight of sustainability-related issues. Finally, the cross-sectional design presents a temporal constraint, capturing student perceptions at a single moment rather than tracing their evolution across the duration of the learning activity. Future research should broaden its scope by incorporating a more heterogeneous sample across academic fields, institutional types, and cultural settings to strengthen the generalizability of the findings. Longitudinal designs would be especially valuable, enabling scholars to track trajectories of engagement, skill development, and attitudinal shifts over time. Complementing survey methods with qualitative approaches, such as in-depth interviews or focus groups, could yield richer insights into the lived experiences, motivations, and challenges of participants. Moreover, subsequent studies should examine the enduring impact of competition-based learning on students' academic pathways, professional readiness, and capacity for sustainability-oriented global citizenship, thereby deepening our understanding of its transformative potential.

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The Role of Perceived Usefulness and Attitude in Student Engagement: A Conceptual Study in Malaysian Blended Learning Environment

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Abstract: The implementation of blended learning across Malaysian higher education, particularly after the COVID-19 outbreak, has placed student engagement and active involvement at the centre of instructional priorities. This conceptual paper explores gamification as a potential strategy for enhancing engagement, emphasizing perceived usefulness as a critical determinant. This study was guided by the Gamification Acceptance Model (GAM), an adaptation of the Technology Acceptance Model (TAM). Purposive sampling will be applied to recruit respondents who have prior experience using gamification in education. Expected results demonstrate that perceived usefulness exerts a significant influence on three engagement dimensions: attitude, skill engagement, and interaction engagement. These findings will affirm the applicability of GAM in blended learning contexts, while highlighting the value of perceived usefulness in directly promoting learner engagement. The study offers practical recommendations for educators and higher education institutions to integrate gamification into course design, aiming to develop effective and engaging learning experiences.

Keywords: *Gamification; Higher Education; Gamification Acceptance Model; Technology Acceptance Model.*

1. Introduction

Over the past decade, higher education has changed a lot, so student engagement has become very important for universities everywhere. Traditional lecture-based teaching, which used to be the main method, is now doubted because it does not meet the needs of today's students (Byusa, Kampire, & Mwesigye, 2022; Platz, 2022). With more blended learning and students who are comfortable with technology, new methods like gamification are seen as useful for making learning more personal, interactive, and focused on students (Feng, Shen, Xie, & Yan, 2024; Rahman, Ahmad, & Hashim, 2018).

Malaysia's national education policy shows this change. The Malaysia Education Blueprint 2013–2025 makes digitalization a key part of preparing graduates and building skills for the 21st century. Gamification, which uses ideas from games in learning—like points, challenges, and quick feedback—fits well with these goals. These features are meant to keep students interested, help them work together, and improve their thinking skills. Tools like Kahoot!, Quizizz, and STEM competitions show how these methods are changing university teaching in Malaysia. Alnuaim (2024) also showed that students in gamified digital literacy programs did better than those in traditional programs, proving that game-based learning can improve engagement and performance.

Even with these benefits, it is still not clear exactly how gamification affects engagement. Past studies often focus too much on how easy systems are to use and do not look enough at the deeper psychological and teaching aspects. Rahman et al. (2018) said that even though learners like platforms that are easy to use, this does not always mean they will do better in their studies. This shows that we need to look at how gamification affects motivation, participation, and thinking, not just how simple the system is to use.

A common problem in research is mixing up ease of use with educational value, which makes it hard to see how usefulness and students' attitudes affect engagement on their own. To fix this, we need real evidence that separates what motivates students from what just makes things easier. Without this, teachers might make gamified learning settings that do not achieve the learning goals they want.

To address these gaps, this study examines the influence of Gamification Perceived Usefulness (GPU) and Attitude toward Gamification (A) on Skill Engagement (SKE) and Interaction Engagement (IE) among Malaysian higher education students. The scope is expanded to reflect the Malaysian context, where

gamification is increasingly adopted to enhance teaching and learning. Gamification Ease of Use (GEoU) is intentionally excluded to prioritize students' value perceptions over technical simplicity. The study is guided by the Gamification Acceptance Model (GAM), adapted from the Technology Acceptance Model (TAM), and tested using Partial Least Squares Structural Equation Modelling (PLS-SEM). Its objective is to provide practical insights for Malaysian universities on leveraging gamification to strengthen engagement, collaboration, and learning outcomes beyond mere technological novelty.

2. Literature Review

Online Gamification Technique for Higher Education

Generation Z includes people born between 1996 and 2010 (McNeil, 2018). They are seen as the first real digital-native generation. This group grew up when the internet, social media, and mobile technology were everywhere, so they are very used to digital tools (Mahapatra et al., 2022). Their studies are closely linked with technology like Google Drive, Zoom, and other apps for working together, which are now important for teamwork and online learning in higher education.

These students usually want flexible and personal learning, and they prefer classes that use gamified features, mobile apps, and AI tools that give quick feedback (Chicca & Shellenbarger, 2018). They are good at using learning management systems and tech-based platforms that give fast answers and help them work with classmates. Because of this, having strong IT in academic programs is now a must for keeping students interested and helping them learn better. Studies have often shown that ignoring students' digital habits can lower their motivation and involvement, which shows why teaching methods should match students' tech skills (Mohr & Mohr, 2017).

Gamification Acceptance Model (GAM)

This study uses the Gamification Acceptance Model (GAM), first introduced by Rahman et al. (2018), to look at what affects how higher education students accept gamified learning. GAM is based on the Technology Acceptance Model (TAM), but it leaves out Behavioral Intention (BI) and Actual System Usage (U). Instead, it focuses on what students think and feel about gamification.

In this model, two main ideas—Gamification Perceived Usefulness (GPU) and Gamification Ease of Use (GEoU)—are important for shaping how students feel. GPU shows how much students think gamified learning can help them do better in their studies, and GEoU is about how easy they think these tools are to use. Together, these ideas decide if students will like or dislike gamification. This model helps teachers design gamified lessons that are good for learning and easy to use, so students are more likely to accept and take part in them in higher education.

Skill Engagement (SKE)

Skill engagement means the ways students act and think to help themselves learn better, like taking notes, solving problems, and using what they have learned (Handelsman et al., 2005). This kind of engagement shows both inner motivation—where students want to learn for themselves—and outside goals, like getting rewards for good work. Schnitzler et al. (2021) and Wong and Liem (2022) say skill engagement is key for gaining the skills needed to succeed in school and work. Mauidloh et al. (2024) also describe it as students keeping involved in tasks that build specific skills through effort and not giving up.

Research often shows that gamification helps students get more involved in building their skills. Domínguez et al. (2013), for example, found that adding game features like progress bars and point systems made students take part more and feel more motivated in skill-based courses such as programming and engineering. Rahman et al. (2018) also said that 96% of students in their study thought gamified platforms were good for keeping attention and taking notes during lectures. More research supports these results. Subhash and Cudney (2018) found that gamification made students enjoy their work more, which led them to try harder and keep going. In the same way, Taşkın and Kılıç Çakmak (2022) saw that game challenges helped students think deeply, work together, and solve problems. Personalized gamification, where tasks match what students are motivated by using systems like Hexad, also works well. Lopez and Tucker (2021) say that matching gamified tasks to each student's preferences helps them keep trying and learn better, especially when learning on their own.

Interaction Engagement (IE)

Interaction engagement means how willing and how much effort students put into working with their classmates and teachers about course content (Handelsman et al., 2005; Mauidloh et al., 2024). This kind of engagement is not just about studying alone but also joining in discussions, group work, and solving problems together. Gamification features like leaderboards, badges, and team challenges are often said to boost this type of engagement by building a feeling of community and friendly competition among students.

Research supports the good effect of gamification on students working together. For example, Hamid and Barzenji (2024) found that game-based learning helps students take part more by giving clear goals and quick feedback. In the same way, Bouchrika et al. (2021) found that gamified methods help students work together, talk more, and build social links, which helps them learn better.

However, keeping this engagement going can be hard. Some studies show a "novelty effect," where students are excited at first about gamified tasks but lose interest later. Hanus and Fox (2015) saw that student motivation dropped over a 16-week gamified course, showing that the fun of game features might not last if they are not used well. Also, too much or badly planned gamification can distract students instead of helping them. Mogavi et al. (2022), for example, found that language-learning apps like Duolingo sometimes focus too much on game parts and not enough on real learning, calling this "gamification misuse."

Perceived Usefulness and Attitude

Many studies show a strong link between how useful students think a platform is and how much they join in skill-based activities in online and blended learning. Zhu et al. (2022) found that during the COVID-19 pandemic, students in higher education who thought online platforms were useful took part more in study activities and joined in more. These results show that students' thoughts about how useful a platform is affect not just if they want to use it, but also how much effort they put into their work.

Li and Salleh (2024) found the same in a review about blended learning. They found that when students see value in hybrid learning, they get more involved in thinking and feel more interested in skill-building activities. Chen et al. (2025) also showed how important perceived usefulness is in mobile learning, where things like fast feedback, easy access, and interactive tools keep students engaged over time. Together, these studies suggest that perceived usefulness not only starts motivation but also helps students keep working on and improving the skills they need to do well in their studies.

Perceived Usefulness and Skill Engagement

Extensive research highlights a strong correlation between perceived usefulness and students' engagement in skill-oriented activities within online and blended learning contexts. Zhu et al. (2022) reported that during the COVID-19 pandemic, higher education learners who regarded online platforms as useful exhibited increased engagement in study strategies and active participation. These findings demonstrate that students' evaluations of platform utility influence not only their willingness to use the technology but also their behavioral commitment to academic tasks.

Similar conclusions were drawn by Li and Salleh (2024) in a systematic review on blended learning effectiveness. The authors found that learners' perceptions of value in hybrid environments directly contributed to both cognitive involvement and emotional investment in skill-based learning activities. Further evidence by Chen et al. (2025) underscores the role of perceived usefulness in mobile learning contexts, where features such as instant feedback, easy accessibility, and interactive tools sustained learners' engagement and practice over time. Collectively, these findings suggest that perceived usefulness not only drives initial motivation but also maintains persistence in applying and refining skills essential for academic success.

Perceived Usefulness and Interaction Engagement

The link between perceived usefulness and interaction engagement is well known in blended and tech-supported learning. In a review, Vlachopoulos and Makri (2017) found that game-based learning helps students learn and also increases teamwork, communication, and working together—skills that matter for doing well in school and work. How much students value these systems is very important for keeping them interested in joining group activities.

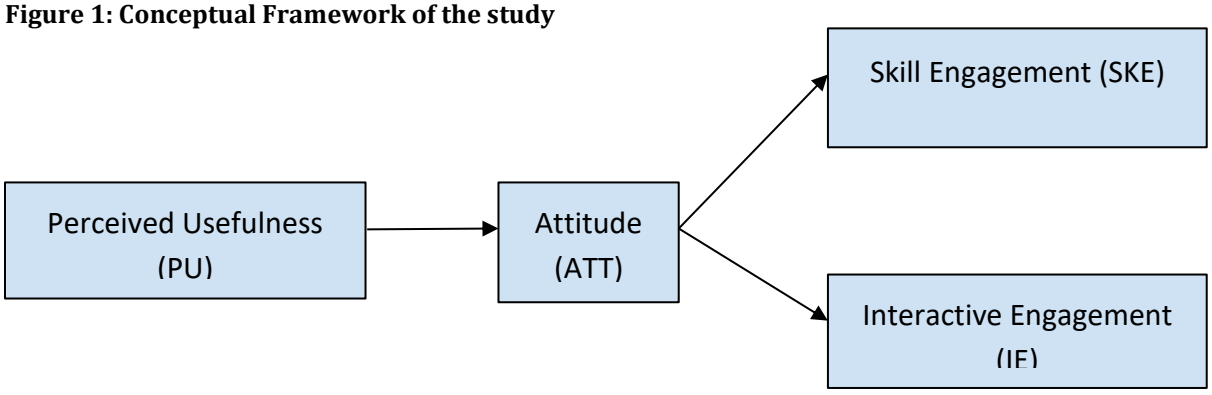
Xie et al. (2024) also found that students who thought working with classmates and group discussions were helpful took part more in forums and shared learning spaces. These results show that students' views about usefulness are not just about learning alone but also about the social benefits of working with others. Supporting this, Wang et al. (2022) said that students with good digital skills and experience using online tools were more likely to see working together as valuable, so they joined in more group activities. Together, these studies show that perceived usefulness is a main reason students take part in activities that require them to work with others, so it is very important when planning good gamified and blended learning.

Hypotheses Development and Conceptual Framework

Drawing upon the literature reviewed, this study proposes that perceived usefulness significantly shapes learners' attitudes toward gamification and, in turn, their behavioral engagement. A strong positive association is expected between perceived usefulness and both skill-based and interaction-oriented engagement. Additionally, attitude is hypothesized to act as a mediating variable in these relationships, explaining the psychological mechanism through which perceived usefulness influences engagement outcomes.
Accordingly, the following hypotheses are formulated:
H1: Perceived usefulness positively influences attitude.
H2: Perceived usefulness has a positive effect on skill engagement.
H3: Perceived usefulness positively impacts interaction engagement.
H4: Attitude mediates the relationship between perceived usefulness and skill engagement.
H5: Attitude mediates the relationship between perceived usefulness and interaction engagement.

The conceptual framework guiding this research is presented in Figure 1. Based on the extended Gamification Acceptance Model (GAM), which is derived from the Technology Acceptance Model (TAM), the framework positions perceived usefulness as the primary predictor of both attitude and engagement dimensions. Attitude serves as an intermediary construct, linking perceived usefulness with skill and interaction engagement, thereby providing a theoretical foundation for the study's empirical analysis.

Figure 1: Conceptual Framework of the study



3. Methodology

Sampling and Population

This study used a quantitative, cross-sectional design to examine how Gamification Perceived Usefulness (GPU) and Attitude Toward Gamification (A) influence two dimensions of engagement: Skill Engagement (SKE) and Interaction Engagement (IE). Guided by the Gamification Acceptance Model (GAM), the relationships were tested using Partial Least Squares Structural Equation Modelling (PLS-SEM). The minimum sample size requirement was determined using G*Power analysis, ensuring that the number of respondents exceeded the threshold recommended for models with fewer than seven constructs, thereby providing a solid basis for the analysis.

Questionnaire Development

Data will be collected using a questionnaire with several items rated on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree). This type of scale was chosen because it helps reduce response bias and makes

the results more accurate. To get more students to join and make it easier, the survey was given online and could be used on both phones and computers.

Statistical Technique

Partial Least Squares Structural Equation Modelling (PLS-SEM) will be used to test the study's ideas. SEM is different from normal regression because it lets researchers look at complex links between hidden variables at the same time (Chan, 2001). This makes it good for studies with many constructs, each shown by several indicators, and needing to check both the measurement and structural models together.

4. Expected Findings

The expected results of this research should give useful information about how gamification can help student engagement in higher education. Perceived usefulness will likely have a strong effect on students' attitudes towards gamified learning and on both skill engagement and interaction engagement. These ideas match earlier studies that showed perceived usefulness is a key reason for how learners behave in technology-based settings (Ali et al., 2022; Zhu et al., 2022).

Attitude is also expected to be an important link in these relationships, showing how perceived usefulness affects student engagement. This idea fits with past research, which shows that positive attitudes make the effects of technology acceptance stronger (Norazlina et al., 2020). So, students who see gamification as useful and have good attitudes are likely to take part more and work better with others.

Also, earlier studies by Xie et al. (2023) and Teo and Noyes (2011) suggest that students who see real value in gamified tools usually join in more with interactive learning. This supports the positive links expected in this study. Together, these results should help develop ideas about gamification and give practical tips for designing blended learning that boosts engagement by using value-based gamification.

5. Conclusion and Recommendations

This paper argues that the perceived usefulness of gamification is a key reason for student engagement in blended learning. The model suggests that perceived usefulness strongly shapes students' attitudes, which then affect how they join in with others. While attitude may not have a big effect on skill engagement, it does help students work together, showing the mental side that supports how students act.

The analysis also expects that perceived usefulness will have a direct positive effect on both skill and interaction engagement. These ideas fit with past studies showing the motivational value of perceived usefulness in tech-supported learning (Allehaidan & Wan Zainon, 2024; Ambikapathy et al., 2024). Earlier research also shows that a well-made gamified system not only improves academic results but also makes students more committed to learning by making activities interactive and fun.

Overall, the model in this study gives a good base for future research to confirm these ideas. By using gamification based on perceived usefulness and positive attitudes, universities can create blended learning that encourages active involvement, supports working together, and helps students achieve better results.

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The Role of Perceived Usefulness and Ease of Use in Online Gamification: A Conceptual Study Using Gamification Acceptance Model (GAM) in Higher Education

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Abstract: To examine the effectiveness of gamification techniques in improving student engagement using the Gamification Acceptance Model (GAM) and to address the lack of awareness and uncertainty among educators regarding students' acceptance of online gamification. A probability sampling method with proportionate stratified sampling is used to select participants. A quantitative approach is adopted, using a survey to collect data, which will be analyzed using Structural Equation Modelling (Partial Least Squares). The study is expected to provide insights into students' attitudes toward online gamification and demonstrate that gamification can be an effective tool for enhancing learning through play. Specifically, Gamification Perceived Usefulness (GPU), influenced by Gamification Ease of Use (GEOU), is anticipated to be significant in shaping students' acceptance of gamified learning. The findings could serve as a metric for evaluating students' acceptance of gamification and guide educators in creating effective game-based learning strategies. However, the study is limited to students from a single course and campus, which may limit the generalizability of the results. This study contributes to the growing body of research on gamification in higher education by applying the Gamification Acceptance Model (GAM) as a robust framework. It highlights the potential of online gamification to enhance student engagement and provides practical insights for educators to design more engaging and personalized learning environments.

Keywords: O*nline gamification, Students' engagement, Gamification perceived usefulness, Gamification ease of use, Attitude towards using gamification*

1. Introduction

Traditional teaching and learning have a long history dating back to ancient civilizations, where knowledge was primarily transmitted through oral traditions and apprenticeships (Onofrei & Ferry, 2020). Over time, the development of education led to the establishment of formalized schools, universities, and other educational institutions, which relied heavily on traditional teaching methods as the dominant mode of instruction (Platz, 2022). Traditional methods, such as lecturing and rote memorization, have been the primary means of delivering information to students in many educational settings. However, these methods have faced significant criticism for their limitations in fostering effective learning outcomes. Research indicates that traditional methods can lead to decreased student engagement, resulting in limited learning gains and poor academic performance (Byusa et al., 2022).

A key issue with traditional teaching methods is their inability to cater to the diverse learning needs and styles of students. While some students may excel in a lecture-based environment, others struggle to engage with the material without interactive and personalized instruction. The one-size-fits-all approach inherent in traditional teaching can result in inadequate learning outcomes and reduced student satisfaction. Consequently, there has been increasing interest in innovative teaching approaches that address the needs of modern students. These approaches incorporate interactive learning activities and personalized instruction, which have been shown to enhance engagement, motivation, and effective learning outcomes. Innovative teaching methods hold the potential to revolutionize education and empower students to reach their full potential (Fjællingsdal & Klöckner, 2020; Onofrei & Ferry, 2020).

Innovative teaching and learning represent a paradigm shift from traditional methods that have been prevalent in educational institutions for decades. These approaches, which have gained significant attention in recent years, address the limitations of traditional methods by leveraging new technologies, interactive activities, and personalized instruction (Platz, 2022). Among these, educational online gamification has emerged as a promising strategy for promoting engagement, motivation, and effective learning outcomes. These gamified

tools integrate educational content and objectives while delivering a fun and engaging experience for learners (Byusa et al., 2022).

One of the primary advantages of online gamification is the increased engagement and interaction it offers students (Byusa et al., 2022). While traditional methods often fail to address diverse learning needs, gamified tools create immersive and interactive experiences that foster motivation and interest in the subject matter. By tailoring content and design to individual students' needs, educators can ensure effective engagement, improved learning outcomes, and greater satisfaction with the educational experience.

However, while gamification shows promise, there is limited research on how students accept and adopt gamified learning environments (Fjællingsdal & Klöckner, 2020). Specifically, few studies have examined factors influencing students' acceptance of gamification based on the Gamification Acceptance Model (Dicheva et al., 2015). Understanding these factors is crucial for developing effective and widely accepted gamified educational strategies (Byusa et al., 2022). Together, these experiences strengthen learning retention, active participation, and social collaboration, positioning online gamification as a powerful tool for sustained student engagement in educational activities.

2. Literature Review

Student Engagement in Online Gamification

Student engagement in online gamification for learning activities is defined as the level of active participation, interest, and motivation that students exhibit while playing online board games (Luo, 2024). Engaged students demonstrate a willingness to learn, display positive emotions, and actively participate in the game (Feng et al., 2024). They exhibit a sense of excitement, interest, and enthusiasm towards the game and the overall learning experience.

Engaged students also tend to be more persistent in their efforts, more willing to seek out new information, and more likely to take ownership of their learning (Rahman et al., 2018). They are inclined to ask questions, collaborate with others, and experiment with new strategies. In contrast, disengaged students may exhibit a lack of interest or motivation in the game, display negative emotions, and demonstrate minimal participation (Platz, 2022). They may become easily distracted or lack confidence in their ability to succeed, which can result in reduced effort and persistence.

Research has shown that students who are engaged in learning activities, including online gamification, are more likely to achieve better learning outcomes (Nugroho, 2024). These outcomes highlight that engaged students are more likely to retain information and apply it in diverse contexts, showcasing the effectiveness of gamified tools in achieving educational goals. Engaged students are also more likely to develop essential skills such as critical thinking, problem-solving, and communication skills (Feng et al., 2024). These benefits reinforce how students perceive gamified tools as valuable for holistic skill development, thereby emphasizing the utility of gamification in education.

Perceived usefulness, as defined by Davis et al. (1989), reflects individuals' beliefs regarding the enhancement of their performance through a specific system or application. Applied to gaming apps, users are more likely to intend to use an app if they perceive it as purposeful and contributing positively to their gaming experience. This perception of usefulness shapes users' views on the app's value and utility in achieving gaming goals or providing an enjoyable experience. A strong positive correlation between perceived usefulness and behavioral intention suggests that users are inclined to engage with and continue using a gaming app when they perceive it as beneficial and advantageous (Lopes et al., 2024). When students perceive gamification as useful, they are more likely to adopt it with a positive attitude, resulting in higher engagement, satisfaction, and learning success.

Perceived ease of use refers to the extent to which individuals believe that a technology or system can be used with minimal effort (Davis et al., 1989). In the context of online gamification, ii signifies that students find the learning platform straightforward, easy to navigate, and free from unnecessary complexity. When an online gamified system is perceived as easy to use, it fosters positive attitudes, enhances student engagement, and

increases the likelihood of adoption for educational purposes (Viet Tam et al., 2024). The success of online gamified learning systems lies in achieving a balance between simplicity and the inclusion of engaging, valuable features, allowing students to focus on their learning objectives without being hindered by technical challenges. Attitudes towards online gamification reflect how individuals, particularly students, perceive and respond to the incorporation of gamified features in online platforms (Rapp et al., 2019). These attitudes can range from highly favorable to neutral or negative, depending on factors such as user experience, perceived advantages, and personal preferences. Students' perspectives are shaped by how effectively the system addresses their needs for engagement, functionality, and ease of use. Favorable attitudes can lead to increased adoption and improved learning outcomes, whereas unfavorable attitudes highlight the importance of thoughtful design and implementation (Nugroho, 2024). Recognizing these factors is critical for fully leveraging the potential of gamification in educational settings.

Online gamifications have the potential to enhance student engagement in learning activities because they are often designed to be interactive, challenging, and enjoyable (Feng et al., 2024). Students are more likely to perceive gamified tools as easy to use due to their interactive and intuitive interfaces. The competitive and cooperative elements of many online gamification tools, such as Kahoot and Quizzes, can also foster collaboration, social interaction, and communication skills among students (Rapp et al., 2019). Consequently, these tools promote ease of use by creating an environment in which students can naturally engage and interact without feeling overwhelmed by the system's complexity.

Thus, the benefits of online gamification foster favorable student attitudes by emphasizing its usefulness, ease of use, and capacity to enhance engagement, particularly through Skill Engagement (SKE) and Interaction Engagement (IE) (Rahman et al., 2018). These enriching experiences increase students' willingness to adopt gamified tools, improve learning retention, and encourage openness to gamification in education. SKE, which involves cognitive focus and skill building, and IE, which emphasizes collaboration and social interaction, are key dimensions of engagement that gamification effectively supports (Feng et al., 2024).

Gamification Acceptance Model (GAM)

The Gamification Acceptance Model (GAM) underpins this study to explore students' acceptance of gamification and its effects on engagement during lessons. Inspired by the Technology Acceptance Model (TAM) and student engagement theories, GAM posits a direct relationship between students' perceptions of gamification's utility and their engagement. The model emphasizes three core constructs: Gamification Perceived Usefulness (GPU), Gamification Perceived Ease of Use (GEOU), and Attitude Towards Using Gamification (A). These constructs influence student engagement dimensions, including Skill Engagement (SKE) and Interaction Engagement (IE). GPU reflects the belief that gamification improves learning performance, while GEOU represents the perceived simplicity and ease of using gamified systems. Both factors significantly shape students' attitudes towards gamification, which in turn drives engagement. By fostering cognitive focus, collaboration, and interaction, GAM highlights the transformative potential of gamification in enhancing educational outcomes and fostering sustained student engagement.

Hypotheses Development

Viet Tam et al. (2024) highlighted a relationship between perceived ease of use and perceived usefulness in shaping attitudes towards online gamification. Luo (2024) further demonstrated a positive correlation between ease of use and perceived usefulness in the context of online gamification. This relationship is grounded in the premise that if a gamified system is effortless to operate, students are more likely to recognize its benefits and integrate it effectively into their activities. Based on these findings, the hypothesis is:

H1: Gamification perceived ease of use has a significant impact on students' perceived usefulness of gamification in learning.

The findings of Lopes et al. (2024) revealed that perceived usefulness significantly and positively impacts attitudes towards gamification. This relationship stems from the belief that when students or users perceive gamification as beneficial for achieving their objectives (such as learning or engagement), their attitudes towards its usage are enhanced. Based on these results, the following hypothesis is proposed:

H2a: Gamification perceived usefulness has a significant impact on students' attitudes towards using gamification technology in learning.

Gamification's perceived ease of use plays a crucial role in shaping students' attitudes towards adopting and using gamification technology in educational settings. Nugroho (2024) highlighted that ease of use, alongside usefulness and social influence, positively correlates with attitude and continued use of technology. Specifically, ease of use has a direct positive impact on attitude, making it one of the key determinants of technology acceptance. Based on this, the following hypothesis is proposed:
H2b: Gamification perceived ease of use has a significant impact on students' attitudes towards using gamification technology in learning

Research has consistently demonstrated a strong correlation between the perceived usefulness of gamified tools and their impact on student engagement. For instance, Rapp et al. (2019) found that the perceived usefulness of Kahoot! Positively influenced engagement levels, highlighting the role of gamification in fostering behavioral, emotional, and cognitive engagement. This study also utilizes Kahoot! as an online gamification tool, emphasizing how students who perceive these tools as beneficial are more likely to engage actively in learning activities. These findings highlight the importance of aligning gamification design with educational objectives to maximize both perceived usefulness and its positive impact on student engagement. Thus, it can be hypothesized that:
H3a: Gamification perceived usefulness has a significant impact on students' engagement.

The study conducted by Luo (2024) reveals that perceived ease of use directly correlates with engagement and generally has a positive impact on students' engagement. It also highlighted that the connection between this variable and actual engagement in gamified contexts can vary, influenced by contextual and individual factors. Based on this, the following hypothesis is proposed:
H3b: Gamification perceived ease of use has a significant impact on students' engagement.

Students' attitudes towards using gamification technology play a pivotal role in determining their engagement in learning activities. As a mediating variable, attitude connects perceived usefulness and ease of use to behavioral outcomes, including engagement dimensions such as Skill Engagement (SKE) and Interaction Engagement (IE). Positive attitudes, shaped by favorable perceptions of gamified tools, enhance students' motivation to actively participate in learning activities. Research supports this relationship; for example, Rahman, Ahmad, and Hashim (2018) found a significant positive correlation between attitudes towards gamification and student engagement, particularly when students demonstrate high levels of concentration. Feng et al. (2024) further argued that gamification positively influences college students' engagement, reinforcing the idea that a favorable attitude towards gamification drives deeper cognitive, emotional, and social involvement in educational contexts. This evidence highlights the importance of fostering positive attitudes to maximize the benefits of gamification in enhancing student engagement. Thus, the following hypothesis is developed:
H3c: Students' attitude towards using gamification technology has a significant impact on students' engagement.

Empirical validation of these hypotheses would involve examining the interplay between ·these constructs in gamified learning contexts, using survey instruments and statistical techniques like Structural Equation Modelling (SEM).

Proposed Research Framework

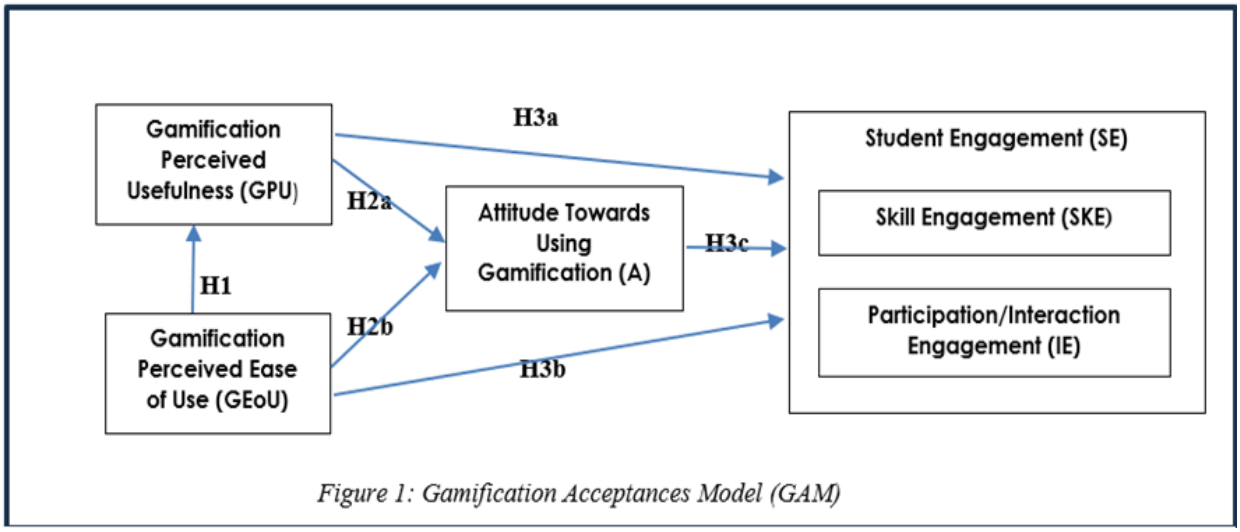


Figure 1: Gamification Acceptances Model (GAM)

Adopted from Rahman et al. (2018)

3. Methodology

This study adopts a quantitative approach to collect data through standardized measures such as surveys, experiments, or observational studies. This approach requires precise objectives and numerical data to test hypotheses and make predictions about a population, making it particularly useful for establishing cause-and-effect relationships or making predictions. The research methodology will involve multiple-item questionnaires based on a five-point Likert scale ranging from one (strongly disagree) to five (strongly agree). The use of this scale is considered efficient in minimizing response bias, increasing statistical power, and reducing errors. However, some studies suggest that expanding beyond a five-point scale may improve the sensitivity of variables impacting reliability. The questionnaires will be distributed via online platforms.

This study follows Neuman's (2014) seven-step research methodology, commonly used in quantitative investigations. The process begins with selecting a research topic, which in this case focuses on online gamification, students' engagement, and the components of the Student Course Engagement Questionnaire (SCEQ). Next, the study develops research questions based on theoretical approaches and previous studies, with an emphasis on defining students' engagement and acceptance of gamification. The SCEQ is adapted to address the issues of students' engagement and their acceptance of gamification, with research questions designed to address gaps in the literature. The study's design involves choosing the type of studies and samples, determining the population and sample size, sampling procedures, and the unit of analysis. Data collection includes engaging with experts, such as academicians and industrial practitioners, to validate the survey instruments. Finally, the research cycle concludes with data reporting.

4. Expected Findings

The data analysis in this study involves using the Statistical Package for the Social Sciences (SPSS) and Structural Equation Modelling (SEM). These tools will be utilized for conducting descriptive statistics and analyzing the overall study data. The initial data analysis stage involves checking for missing values, outliers, and data normality. The quantitative data collected from the survey questionnaire will be analyzed using SPSS software. To address missing values resulting from respondents failing to answer questions, the data will be filtered using mean value replacement. Any items with missing values exceeding 5 per cent will be removed. Outliers will be identified using a standard deviation analysis method, specifically the standardized z-score. Extreme responses to individual or multiple questions will be examined to detect any outliers.

5. Conclusion and Recommendations

Studying students' engagement with online gamification techniques for learning activities can help educators create more engaging and effective learning experiences that promote positive outcomes and skill development for students. This research contributes to the growing body of literature on gamification in education, particularly in higher education. Employing the GAM framework provides an empirical basis for understanding how gamification elements influence student motivation, engagement, and learning outcomes. For students, this study offers a novel and engaging way to learn that diverges from traditional classroom settings. By emphasizing user engagement, this research supports the creation of learning experiences tailored to meet diverse student preferences, ultimately improving satisfaction and academic performance in online education. For educators and faculty, this study presents an innovative teaching approach to engage students who may struggle with traditional methods. Insights from this study can guide educators and instructional designers in effectively integrating gamification techniques into online learning environments. It highlights the gamification elements most impactful in promoting active participation and sustained interest among students. For universities, this study provides evidence to adopt innovative teaching strategies, enhance the quality of online learning programs, and address challenges in student retention and engagement.

This study also paves the way for further exploration of gamification in different educational contexts, fostering a deeper understanding of its effectiveness across various disciplines and cultural settings. By utilizing the Gamification Acceptance Model (GAM) to assess the effectiveness of online gamification techniques, educators and game designers can develop tools tailored to specific learning objectives and student needs, thereby contributing to the overall improvement of learning experiences in higher education.

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Does Board Gender Diversity and Independent Drive Affect Corporate Sustainability Performance? Evidence from Malaysia

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Abstract: The underrepresentation of women on corporate boards remains a global concern. Malaysia has taken steps to address this issue through the Malaysian Code of Corporate Governance (MCCG 2021), which recommends a minimum of 30% female directors on boards. However, as of April 2025, the percentage of women directors in Bursa Malaysia stood at only 28% across all PLCs, indicating a gap between policy recommendations and actual implementation. This study examines the impact of board gender diversity and independence on corporate sustainability performance (CSP), proxied by the total ESG score. Using data from Refinitiv Eikon, the study covers 1,028 firms listed on Bursa Malaysia's main and ACE markets between 2019 and 2024, resulting in 6,168 firm-year observations. After excluding firms with insufficient ESG data, the final sample comprises 936 firm-year observations. A fixed-effects model was employed to analyse the unbalanced panel data. The results reveal that board gender diversity and board independence significantly enhance CSP. Additionally, board independence strengthens the positive relationship between board gender diversity and CSP, demonstrating its moderating effect. Robustness checks confirm that board gender diversity similarly influences both the environmental and social pillars. The findings provide empirical evidence supporting the role of board gender diversity and independence in promoting corporate sustainability. These insights have practical implications for investors and policymakers, emphasising the need to prioritise gender-diverse board compositions as Asian markets increasingly focus on corporate governance reforms.

Keywords: *Board Gender Diversity, Board Independence, Corporate Sustainability Performance.*

1. Introduction

In recent years, firms have increasingly prioritised corporate social performance (CSP), recognising its critical role in ensuring long-term sustainability and stakeholder trust (Amorelli & García-Sánchez, 2021). Integrating environmental, social, and governance (ESG) factors into corporate strategies has become a pressing issue, reflecting the growing expectations of regulators, investors, and the public. ESG disclosure, now a crucial part of corporate reporting, signals a company's commitment to sustainability and ethical conduct (Khan, 2022; Carnini Pulino et al., 2022). Despite its importance, many firms struggle with transparency in ESG disclosures, which can impact investor confidence and firm reputation (Albitar et al., 2022; Shaikh, 2022). As ESG considerations gain prominence, firms failing to meet disclosure expectations may face reputational and financial risks, making it imperative to explore the factors that enhance CSP.

The growing emphasis on ESG performance has also reshaped investment preferences, with investors seeking companies that demonstrate strong corporate sustainability practices (Park & Jang, 2021; Chen & Xie, 2022). Firms with robust ESG disclosures often enjoy greater investor trust, better access to capital, and lower financial risks (Naveed et al., 2020; Yadav & Jain, 2023). However, not all firms effectively align their governance structures with sustainability goals, leading to inconsistencies in corporate sustainability performance. This raises concerns about the governance mechanisms that drive ESG strategies and whether firms are equipped to align with evolving sustainability expectations.

Board composition, particularly gender diversity and board independence, plays a critical role in shaping corporate sustainability performance (CSP). Many advanced economies, including Norway, France, Germany, and Belgium, have implemented policies mandating female representation on corporate boards to enhance decision-making and governance quality (Ginglinger & Raskopf, 2023; Lückerath-Rovers, 2013; Chatterjee & Nag, 2023). Gender-diverse boards bring varied perspectives, contributing to ethical governance and long-term sustainability (Eagly, 2016). However, in markets like Malaysia, female representation remains below recommended levels, with only achieved 28% only as of April 2025 (Maisca, 2024) that raising concerns about its impact on CSP.

Gender diversity in leadership fosters sustainability by driving innovation and responsible governance. Diverse boards enhance decision-making, transparency, and corporate social responsibility (CSR), attracting socially conscious investors (Pareek, Sahu & Gupta, 2023; Khunkaew, Wichianrak & Suttipun, 2023). Evidence from India and ASEAN suggests that gender-diverse leadership correlates with stronger sustainability reporting and stakeholder engagement (Pareek, Sahu & Gupta, 2023; Khunkaew, Wichianrak & Suttipun, 2023). In Europe, women leaders are linked to greater CSR initiatives (Paoloni, Lombardi & Principale, 2023). Additionally, diverse leadership improves financial and environmental performance, as seen in transportation and logistics companies, where gender diversity enhances operational efficiency and sustainability (Shakil et al., 2024). Women in leadership roles also contribute to improved environmental outcomes, reinforcing responsible corporate practices (Muhammad & Migliori, 2023).

Beyond gender diversity, board independence is another key governance factor influencing CSP. Independent directors strengthen accountability, mitigate conflicts of interest, and promote ethical oversight (Johanson & Østergren, 2010; Ortas et al., 2017). Studies indicate that independent boards are more likely to prioritise sustainability over short-term financial gains (Dunn & Sainty, 2009; Jo & Harjoto, 2012; Sahin et al., 2011). However, the combined impact of gender diversity and board independence on CSP remains underexplored, particularly in emerging markets, highlighting the need for further research.

Understanding the relationship between corporate governance and CSP is essential as firms navigate increasing regulatory pressures, investor expectations, and sustainability challenges. While gender diversity and board independence have been individually linked to corporate governance improvements, their interactive effects on CSP remain underexplored. This study addresses these gaps by examining how board gender diversity and independence influence CSP and whether board independence strengthens the impact of gender diversity on corporate sustainability performance. Focusing on Malaysian firms, this research contributes to the broader discourse on corporate governance in emerging markets, offering insights that can inform policy decisions, corporate strategies, and investor considerations in promoting sustainable business practices.

The issue of gender diversity in corporate boards is gaining traction as policymakers and investors recognise the need for more inclusive and representative leadership structures. Moreover, with Malaysia enforcing the Malaysian Code of Corporate Governance (MCCG 2021), which recommends at least 30% female representation on corporate boards, assessing its impact on sustainability performance is timely. Guided by Upper Echelons Theory, this study aims to fill the gaps by examining how board gender diversity and independence influence CSP, assessing their combined impact on ESG outcomes in Malaysian firms. This study differs from the prior study as this study considers the data after 2019, which significantly affected the board composition, as the company focuses more on sustaining in the market rather than improving its board composition during this crucial period, compared to prior studies by Nashri et al. (2023); Zawawi et al. (2023) that also used a Malaysian sample.

This study explores the impact of board gender diversity on CSP, using ESG scores as a measure. It analyses data from 1,028 firms listed in Bursa Malaysia's main and ACE markets (2019–2024), with a final sample of 936 firm-year observations. A fixed-effects model examines the role of board gender diversity and independence in shaping CSP across environmental, social, and governance pillars. We found that board independence (BIND) and board gender diversity (BGEN) significantly improved CSP among the Malaysian publicly listed firms. Furthermore, the existence of BGEN strengthens the positive effect between BIND and CSP.

The findings of this study will provide valuable insights for regulators, investors, and firms in pursuing enhanced corporate governance and sustainability. Given the relevance of women directors and board independence, this study offers a three-fold contribution to the literature. First, it seeks evidence of any relationship between board gender diversity and CSP. Second, this paper examines whether board independence influences CSP. Third, it investigates the moderating effect of board independence on the relationship between board gender diversity and CSP.

This study contributes to the ongoing discourse on corporate governance and sustainability, emphasising the

critical role of board diversity and independence in shaping firm performance. The findings have significant implications for investors, regulators, and corporate decision-makers striving to enhance corporate governance through gender inclusivity and independent oversight.

This paper is organised as follows. The next section reviews the literature on CSP, board gender diversity, and board independence, along with an explanation of the theoretical framework. Following this, the methodology is described. The subsequent sections present the findings, conclusion, and recommendations for future research.

2. Literature Review

The role of gender diversity in shaping corporate sustainability performance has gained increasing attention as firms strive to enhance their corporate sustainability performance through improved governance, ethical decision-making, and stakeholder engagement (Nielsen & Madsen, 2017; Bear et al., 2010). As organisations worldwide seek to integrate ESG principles into their operations, gender diversity has emerged as a key factor influencing corporate decision-making, stakeholder engagement, and long-term sustainability outcomes (Galbreath, 2018; Zhang et al., 2022). The presence of women in leadership positions, particularly on corporate boards and executive teams, has been linked to improved sustainability practices, enhanced corporate social responsibility (CSR) initiatives, and stronger financial resilience (Bear et al., 2010; García-Sánchez et al., 2019). However, empirical evidence on this relationship remains mixed, with some studies suggesting that the effectiveness of gender diversity depends on contextual factors such as industry characteristics, regulatory frameworks, and cultural influences (Nadeem et al., 2020).

In the Malaysian corporate landscape, the government and regulatory bodies have implemented various initiatives to promote gender diversity, including the MCCG and national policies advocating for greater female representation in boardrooms (Securities Commission Malaysia, 2021). Despite these efforts, the actual impact of gender diversity on corporate sustainability performance in Malaysia remains underexplored. Given Malaysia's unique socio-economic and regulatory environment, further research is necessary to examine how gender diversity interacts with corporate sustainability strategies and whether it serves as a catalyst for responsible business practices.

Upper Echelon Theory serves as the primary theoretical lens for this analysis, emphasising how the characteristics of top executives, including gender diversity, influence corporate decision-making and strategic outcomes (Hambrick & Mason, 1984). This theory posits that organisational outcomes are a reflection of the values, experiences, and cognitive biases of top management, suggesting that diverse leadership teams can bring varied perspectives that enhance corporate sustainability performance (Dhir et al., 2023).

Underpinning theory

Firms seeking to attract, retain, and capitalise on varied talent are frequently urged to start by enhancing the diversity of their senior management (Nishii et al., 2007). Thus, firms with more diverse senior management teams will likely implement diversity initiatives that attract a wider range of talent. Bannò et al. (2023) use the term "women in top echelon positions" to encompass all significant roles within the firm that can be held by women.

The upper echelons theory, which was proposed by Hambrick and Mason in 1984, proposes that the outcomes of an organisation can be partially predicted by the background characteristics of the top-level management team (Hambrick & Mason, 1984). It posits that organisational outcomes are partly predicted by the characteristics of its top executives, such as their values, experiences, and demographics.

Regarding the relationship between board diversity and CSP, the upper echelons theory suggests that women bring diverse perspectives to the boardroom, which can enhance decision-making processes (Bannò et al., 2023). This diversity leads to more comprehensive discussions on CSP issues, ensuring that different viewpoints are considered, which can result in better CSP strategies and initiatives (Frankl & Roberts, 2018). Consequently, increasing the female representation on boards is not only a matter of equality but also provides a strategic advantage for the firm, specifically regarding CSP.

Applying upper echelons theory to the relationship between corporate governance and CSP involves examining how the characteristics and composition of a company's board influence its decisions and actions regarding social responsibility (Dunn & Sainty, 2009). Independent directors frequently contribute broad expertise and an objective viewpoint to the board, free from the influence of the company's management (Li et al., 2012). This objectivity enables them to make decisions that are more balanced and aligned with long-term societal and environmental sustainability, enhancing CSP.

Further, independent directors play a crucial role in overseeing and monitoring management, ensuring that executives are held accountable for their decisions and actions (Kallamu, 2016). This oversight can lead to more responsible corporate behaviour and better adherence to CSR principles, as independent directors can advocate for more openness and ethical conduct.

Board Gender Diversity and CSP

It is argued that women bring different life experiences, values, and perspectives to the boardroom (Isidro & Sobral, 2015). This diversity can enhance decision-making by incorporating a wider range of viewpoints, leading to more comprehensive and innovative solutions (Dang et al., 2021).

Boards that incorporate gender diversity in their composition are often observed to make strategic decisions that involve being ready to take calculated risks and adopting a careful approach to potential challenges (Birindelli et al., 2020). This balanced decision-making dynamic supports sustainable growth and cultivates a conducive environment to inculcate innovation within the firm. Applying the upper echelon theory to the relationship between women on corporate boards and CSP, one can argue that the presence of women directors influences CSP positively. This is because diversity would ensure different viewpoints, which would result in better decision-making and strategy initiatives (Frankl & Roberts, 2018).

The findings of Arayssi et al. (2016) indicate that the existence of women on the board positively impacts a company's risk and performance by encouraging the company to invest in meaningful social activities and effectively communicate about them. Bennouri et al. (2018) examine the relationship between female directorship and firms' performance in French companies. Their findings, using accounting-based measures of firm performance, indicate that female directorship significantly enhances firm performance (ROA and ROE). Velte (2016) analysed the presence of women on management boards in a sample of German and Austrian companies over the business years 2010-2014. The study found that female members on the management board positively impact CSP. In the same vein, Mallin and Michelon (2011) also found that the female directors on the board are positively associated with CSP.

In addition, Byron and Post (2016) conducted a meta-analysis of 87 independent samples that suggests a generally positive relationship between female board representation and social performance. They found that this relationship is particularly strong in national contexts where boards may be more motivated to utilise women directors' resources. In other words, their meta-analysis shows that having women on corporate boards has benefits that go beyond just representation. In specific national contexts, there is a greater acknowledgement of the value and contributions that women directors can make to the overall social performance of the company. This indicates that having a diverse representation on corporate boards demonstrates a dedication to equality and improves corporate social responsibility and performance indicators, particularly in situations where their contributions are recognised and utilised more effectively.

Hyun et al. (2016) argue that female independent directors may prioritise CSP more than their male counterparts. They further argue that the action is not simply due to their greater moral values but also due to their desire to maintain a positive reputation. Hyun et al.'s (2016) findings, employing a sample of firms from the Standard & Poor's (S&P) 1500 index covering the years 2000 to 2009, show robust evidence supporting their arguments. Using the Malaysian sample, Nashri et al. (2023) and Zawawi et al. (2023) have found that female directors significantly improve ESG disclosure. Hence, it is hypothesised that:

H1: Board gender diversity has a positive relationship with CSP among listed firms in Malaysia.

Board independence and CSP

Board independence is crucial in shaping CSP by ensuring objective oversight and governance. Independent

directors, free from undue influence, would prioritise ethical considerations and stakeholder interests, thereby promote sustainable practices and enhancing the company's social and environmental impact (Nazir Gardazi et al., 2023). This, in turn, promotes sustainable practices and improves the company's social and environmental impact. This autonomy promotes openness, responsibility, and strategic decision-making that aligns with long-term sustainability objectives.

Ntim and Soobaroyen (2013) conducted a study focusing on a sample of South African firms, revealing that board independence positively impacts corporate financial performance and CSP. Their findings highlight the significant role of independent boards in enhancing financial outcomes while simultaneously promoting responsible business practices and providing societal contributions.

In the same vein, Mallin and Michelon (2011) studied the 100 Best US Corporate Citizens from 2005 to 2007 to investigate the relationship between board reputation and corporate social performance. Mallin and Michelon (2011) also found that the proportion of independent directors was positively associated with CSP. Hence, it is hypothesised that:
H2: Board independence has a positive relationship with CSP among listed firms in Malaysia.

Board Independence, Board Gender Diversity and CSP
Furthermore, board diversity would also enhance governance practices (Velte, 2017). The presence of women on boards is associated with improved governance practices (Nielsen & Huse, 2010). Women are often seen as more risk-averse and ethical (Wong et. al., 2024), which can lead to more prudent and transparent decision-making. Specifically, Wong et al. (2024) found that the existence of female directors in the firms strengthens the positive effect between ESG and firm performance among Gulf countries. In a similar vein, Makhija et. al. (2024) found a positive moderating effect of female directors between ESG and a firm's economic value added among emerging economy countries. However, a contradictory finding was found by Wan Mohamad et. al (2023) on the moderating effect of women directors and competitive advantages on ESG disclosure using Malaysian data.

In order to protect the interests of stakeholders, firms must cultivate a sustainable competitive advantage in the face of fast environmental changes. This involves effectively distributing resources, optimising financial gains, and promoting social welfare in order to succeed in competitive markets (Newman et al., 2020). To achieve these objectives, it is necessary to have good sustainability management, which depends on strong internal corporate governance systems (Zaman et al., 2022). These mechanisms include the corporate board, ownership concentration, capital and incentive structures, and public reporting and disclosure processes. They have a significant impact on how the organisation operates internally.

Importantly, CG mechanisms such as independent directors play a crucial role in safeguarding corporations against socially irresponsible actions, thereby reducing the likelihood of managers pursuing self-interest (Purbawangsa et al., 2020). Independent directors promote sustainability by prioritising long-term corporate development and demonstrating a stronger orientation towards stakeholder interests (Chintrakarn et al., 2020). Prior studies have found mixed findings on the moderating effect of gender diversity on ESG economic value added (Makhija et. al., 2024) and firm performance (Wong et al.,2024). However, the limited studies have looked at the moderating effect of board gender diversity and board independence and CSP. Hence, it is hypothesised that:
H3: Board gender diversity has a moderating effect between board independence and CSP among listed firms in Malaysia.

3. Methodology

Data and Sampling
This study focused on the Main and ACE markets of Public Listed Companies in Malaysia from 2019 – 2024 (6,168 firm-year observations). After excluding insufficient data on ESG, the final sample of this study comprises 936 firm-year observations. The fixed effect model was used to answer the research question using unbalanced panel data. A robust cluster firm has been used after rectifying the heteroscedasticity and serial correlation problem in the analysis. We gathered the ESG score, board gender, board independence, board size,

and financial data from the Eikon Datastream.

Data Measurement Procedures

The dependent variable of this study is corporate sustainability performance proxied by the total ESG score. Then, the independent variables are the board gender and board independence. Board gender is measured by the ratio of female directors to board size (Wasiuzzaman & Wan Mohammad, 2020). Then, board independence is measured by the number of independent directors and board size (Kamaludin et al., 2022). This study controls the board size as it could influence the findings. The board size is measured by the total number of directors in the boardroom (Younas et al., 2021; Gurol & Lagasio, 2023).

We also control the financial characteristics, as they may influence our results. This study controls for firm size, firm profitability, and solvency. The natural logarithm of total assets measures the firm's size. Firm profitability, proxied by Return on Assets (ROA), is measured by net income to total assets. Firm solvency is proxied by Debt Ratio (DR) and LOSS is measured by total debt over total assets and a dummy variable of 1 if the firms incurred a loss in the financial year and 0 otherwise.

Equation Model

Therefore, the basic and moderating regression models are as follows:

$$ESG_{it} = \beta_0 + \beta_1 BGEN_{it} + \beta_2 BIND_{it} + \beta_3 BSIZE_{it} + \beta_4 FSIZE_{it} + \beta_5 ROA_{it} + \beta_6 DR_{it} + \beta_7 LOSS_{it} + \varepsilon \quad (1)$$

$$ESG_{it} = \beta_0 + \beta_1 BGEN_{it} + \beta_2 BIND_{it} + \beta_3 GBEN*BIND + \beta_4 BSIZE_{it} + \beta_5 FSIZE_{it} + \beta_6 ROA_{it} + \beta_7 DR_{it} + \beta_8 LOSS_{it} + \varepsilon \quad (2)$$

Where ESG is the total score of environmental, social, and governance; BGEN is the ratio of female directors to board size; BIND is the ratio of board independence to board size; BSIZE is total directors in the boardroom; FSIZE is the natural algorithm of total assets; ROA is the ratio of net income over total assets; DR is the ratio of total liabilities to total assets; LOSS is a dummy variable of 1 if the firms incurred a loss in the financial year and 0 otherwise; ε is the error term; i and t denoting firm i at the end of year t.

4. Findings

Descriptive Statistics

Table 1 reports the descriptive statistics for all the variables. The results in Panel A of Table 1 indicate that the average ESG score is 43.63, with values ranging from 4.89 to 91.45. This indicates that the average ESG score among publicly listed firms in Malaysia is below average. The percentage of female directors (BGEN) in the boardroom has a mean value of 23.15, meaning it is below the MCCG 2021 target to have 30% female directors in the firms.

The control variable of BIND has a mean value of 50.26, ranging from 0.14 to 99.86, indicating that more than half of the directors are independent directors. For BSIZE variables, the mean value is 8 directors, ranging from 4 to a maximum of 17 directors in the firms. The mean for FSIZE (the natural logarithm of total assets) is 21.76, ranging from 17.83 to 27.66. ROA has a mean value of 0.04, with a minimum of -0.61 and a maximum of 0.80. For the variable DR, the mean values are 0.4, ranging from 0.009 to 1.31.

Panel B in Table 1 shows the dummy variable of LOSS. The sample size shows that only 18% of the firms reported a loss during the year's observations.

Table 1: Descriptive Results

Panel A	Min	Max	Mean	Median
ESG	4.89	91.45	43.63	41.64
BGEN(%)	0	66.67	23.15	22.22
BIND (%)	0.14	99.86	50.26	43.91
BSIZE	4	17	8.17	8
FSIZE(log)	17.83	27.66	21.76	21.47
ROA	-0.61	0.80	.04	0.03

DR	0.009	1.31	.48	0.46
Panel B	**Yes**	**No**	**Yes (%)**	**No (%)**
LOSS	171	766	18	82

Correlation Statistics

Table 2 reports a pairwise correlation analysis among the dependent and independent variables. The result shows that BGEN, BIND, BSIZE, FSIZE, ROA, and DR positively correlate with ESG. This provides an early signal that board gender, independence, and size can significantly improve ESG scores in the firms. Meanwhile, the strong financial position, such as firm size and return on assets, positively correlates with ESG score through the firm's investment and disclosure in ESG activities. However, as predicted, LOSS has a negative correlation with ESG.

The overall result shows that only FSIZE has a high correlation with ESG, with a value of 0.571. However, the results indicate no significant correlation between independent variables, and none represent any concern for multicollinearity[1] Issues in this study.

Table 2: Pairwise Correlations Results

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) ESG	1.000							
(2) BGEN	.332***	1.000						
(3) BIND	.264***	.104***	1.000					
(4) BSIZE	.362***	.069**	-.025	1.000				
(5) FSIZE	.571***	.195***	.166***	.425***	1.000			
(6) ROA	.086***	.106***	-.049	-.008	-.091***	1.000		
(7) LOSS	-.142***	-.114***	.010	-.064*	-.083**	-.557***	1.000	
(8) DR	.286***	.039	.131***	.147***	.530***	-.267***	.137***	1.000

Multiple Regression Analysis

Table 3 presents the multiple regression estimates of BGEN and BIND on ESG scores. For model 1, the coefficients for BGEN are positive and statistically significant at 1% on the ESG score. Our finding supports that the presence of female directors in the boardroom can improve corporate sustainability performance. This is due to the women having different personalities and views (Hillman et al., 2002) and being more sensitive regarding sustainability issues (Bear et al., 2010). Our findings are consistent with prior studies by Wasiuzzaman and Subramaniam (2023), which found that female directors generally positively impact environmental and social disclosure in a Malaysian setting. Our findings support the government initiative for firms to have a minimum of 30% women on the boardroom (MCCG 2021).

Our findings align with the upper echelons theory, suggesting that the participation of women in the boardroom brings diverse perspectives, which can enhance decision-making processes (Bannò et al., 2023). This diversity leads to more comprehensive discussions on CSP issues, ensuring that different viewpoints are considered, which can result in better CSP strategies and initiatives (Frankl & Roberts, 2018). Consequently, increasing the female representation on boards is not only a matter of equality but also provides a strategic advantage for the firm, specifically regarding CSP. Therefore, our findings support hypothesis 1 (H1) that women in the boardroom enhance CSP among listed firms.

The coefficient for BIND is positive and statistically significant at 1% on the ESG score. This indicates that the majority of independent directors in the firms can improve the governance pillar. Our findings support the government's initiative on the importance of having a majority of independent board members in the firms.

[1] Multicollinearity is likely to be a concern when pair-wise correlation between the two variables exceeds 0.80 (Hair, 2010).

Our findings also align with the upper echelons theory, where the board composition (directorship) influences its decisions and actions regarding social responsibility (Dunn & Sainty, 2009). Independent directors are crucial in overseeing and monitoring management, ensuring that executives are held accountable for their decisions and actions (Kallamu, 2016). Furthermore, independent directors frequently contribute broad expertise and an objective viewpoint to the board, free from the influence of the company's management (Li et al., 2012). This objectivity enables them to make decisions that are more balanced and aligned with long-term societal and environmental sustainability, which indirectly enhances CSP. Therefore, our findings support hypothesis 2 (H2) that board independence enhances CSP among listed firms.

Model 2 shows the moderating results. We found that BGEN strengthens the positive effect of BIND and ESG. This provides new insight that the composition of independent and female directors can boast ESG scores. Aligning with upper-echelon theory and having a strong internal corporate governance system is necessary for good sustainability management (Zaman et al., 2022). The presence of women on boards is associated with improved governance practices (Nielsen & Huse, 2010). Women are often seen as more risk-averse and ethical, which can lead to more prudent and transparent decision-making (Wong et. al., 2024). Meanwhile, independent directors promote sustainability by prioritising long-term corporate development and demonstrating a stronger orientation towards stakeholder interests (Chintrakarn et al., 2020). Therefore, our findings support hypothesis 3 (H3) that board gender diversity moderates the relationship between board independence and CSP among listed firms.

The control variable of BSIZE is insignificant for all dependent variables and indicates that a sufficient number of directors is a matter in the firms. Our findings support the MCCG initiative, which does not set the firm's minimum or maximum number of directors. The financial characteristics of FSIZE show a positive and statistically significant 1% on ESG. This proves that larger firms invest more in ESG and have higher ESG scores. Meanwhile, ROA, LOSS and DR show an insignificant relationship with ESG, indicating that the firm's profitability and solvency have no relationship with sustainability performance.

Table 3: Multiple Regression Results

Descriptive	Expected direction	Model 1		Model 2	
		Coefficient	t-value	Coefficient	t-value
Constants	+/-	-213.197	-3.33***	-203.091	-3.09***
BGEN	+	.202	4.37***	0.099	1.26
BIND	+	0.06	3.23***	0.012	0.40
BGEN*BIND	+/-		-	0.002	1.75*
BSIZE	+	0.368	1.27	0.309	1.05
FSIZE	+	11.298	3.75***	10.965	3.54***
ROA	+	-6.574	-1.35	-6.54	-1.31
LOSS	-	0.753	0.68	-0.747	0.68
DR	-	0.908	0.11	1.013	0.13
Adj. R2 (%)		18.6		19.1	
F-statistics		13.821***		12.48***	
n		936		936	

Additional Test

Our main finding shows that BGEN is significantly positive on ESG. Therefore, the results are robust to several tests examining the individual pillars, including the environmental (ENV) and social (SOC) pillars. The governance pillar is removed for the additional test, as the board composition is part of governance. Table 4 shows that the coefficients for BGEN are positive and statistically significant at 1% on the environment and social pillars. This indicates that our result holds the same conclusion even though the governance pillar had been removed from the analysis. This indicates that the presence of female directors in the firms significantly

improves CSP. However, BIND shows an insignificant relationship between ENV and SOC pillars.

The control variables of BSIZE show a positive and significant relationship with SOC only and indicate that board size can improve social welfare in firms. The financial characteristics of FSIZE show a positive and statistically significant 1% on ENV and SOC. While ROA shows a negative and statistical significance at 5% on the ENV pillars only. LOSS and DR show an insignificant relationship with ENV and SOC.

Table 4: Additional Test

Descriptive	Expected direction	ENV		SOC	
		Coefficient	t-value	Coefficient	t-value
Constants	+/-	-237.492	3.10***	-181.309	-2.65***
BGEN	+	0.202	3.36***	0.175	3.44***
BIND	+	0.02	0.93	0.028	1.44
BSIZE	+	0.674	1.64	0.507	1.81*
FSIZE	+	11.914	3.33***	10.077	3.16***
ROA	+	-9.264	-2.18**	-4.366	-0.60
LOSS	-	0.157	0.13	0.313	0.26
DR	-	-0.037	-0.01	-1.235	-0.18
Adj. R2 (%)		11.5		11.1	
F-statistics		8.960***		5.955***	
n		936		936	

5. Conclusions and recommendations

This study examines the relationship between board gender diversity, board independence, and corporate sustainability performance (CSP), highlighting their significance in shaping corporate governance structures that drive sustainable business practices. The findings confirm that gender-diverse boards contribute positively to CSP by incorporating diverse perspectives, enhancing decision-making, and fostering innovation, leading to improved social and environmental outcomes. Likewise, board independence strengthens governance accountability, ensuring ethical oversight and minimising conflicts of interest. The study also finds that board independence moderates the relationship between gender diversity and CSP, reinforcing the positive impact of diversity by providing enhanced oversight and strategic alignment with sustainability objectives. These results emphasise the importance of promoting both gender diversity and independent oversight within corporate boards to foster ethical, transparent, and sustainability-driven decision-making.

As regulatory frameworks evolve and stakeholder expectations for corporate sustainability intensify, the role of governance structures in driving responsible business practices becomes more crucial. Firms that fail to adopt progressive governance strategies may face reputational risks, reduced investor confidence, and regulatory scrutiny. Gender-diverse boards contribute to ethical leadership by incorporating a broader range of perspectives, enhancing transparency, and strengthening long-term value creation. The moderating role of board independence ensures that gender diversity leads to tangible CSP improvements by fostering accountability and long-term strategic thinking. These findings reinforce the argument that corporate governance is not just about compliance but is integral to sustainable value creation in a competitive global economy. Businesses that integrate diversity and independence into their governance frameworks are better positioned to navigate sustainability challenges, enhance stakeholder trust, and achieve long-term business resilience.

This study makes important contributions to corporate governance literature by providing empirical insights into the combined effects of gender diversity and board independence on CSP. Unlike previous research that

examines these factors separately, this study explores their interaction, offering new evidence on how independent boards amplify the benefits of gender diversity. By analysing recent data from Bursa Malaysia, this research provides valuable insights into governance practices in an emerging market, contributing to discussions on regulatory policies and corporate responsibility in a developing economic context. Additionally, this study extends upper echelons theory by demonstrating that leadership characteristics—specifically gender diversity and independence—significantly influence corporate strategic decisions and sustainability outcomes. These insights are valuable for academics, regulators, and corporate decision-makers in shaping policies that enhance sustainable corporate governance.

Theoretical and Managerial Implications

From a theoretical perspective, this study extends upper echelons theory by emphasising the role of leadership composition in shaping corporate sustainability performance. The presence of gender-diverse boards ensures that multiple viewpoints are incorporated into decision-making, promoting ethical governance and long-term sustainability. Furthermore, the moderating effect of board independence supports the idea that oversight mechanisms play a critical role in ensuring that diversity translates into meaningful CSP improvements. These findings contribute to the growing literature exploring how corporate leadership structures influence sustainability outcomes.

From a managerial perspective, this study provides actionable insights for businesses aiming to enhance governance effectiveness. Firms should actively promote gender diversity to strengthen decision-making, sustainability reporting, and stakeholder engagement. Additionally, strengthening board independence ensures governance accountability, minimizes short-term profit-driven strategies, and enhances corporate transparency. Investors should consider board composition as a key determinant of corporate sustainability commitment, integrating gender diversity and board independence into their investment evaluation processes. Corporate leaders must recognise that fostering an inclusive governance culture not only aligns with sustainability objectives but also improves corporate reputation, investor trust, and long-term financial performance.

Recommendations for Practice

To enhance governance effectiveness and sustainability performance, firms should implement policies that actively promote gender diversity and board independence through inclusive recruitment strategies and fair representation in leadership positions. Leadership training programs should be established to strengthen the governance competencies of female executives and independent directors. Investors and policymakers should advocate for regulatory frameworks that encourage diversity and independent oversight to improve corporate transparency and ESG performance. Organisations should integrate sustainability metrics into corporate governance policies, linking executive incentives to CSP achievements. Strengthening ESG-focused board committees can further enhance sustainability oversight and decision-making. Additionally, firms should engage with stakeholders, including investors, regulators, and communities, to reinforce trust and demonstrate their commitment to responsible governance.

Research Limitations and Future Directions

Despite its contributions, this study has certain limitations. First, it focuses on firms listed in Bursa Malaysia, which may limit the generalizability of the findings to other markets with different regulatory frameworks and governance practices. Future research could expand the analysis to diverse economic and institutional contexts to compare how board diversity and independence influence CSP globally. Additionally, this study examines board composition as a primary determinant of CSP but does not account for other corporate governance factors, such as CEO leadership style, ownership structure, or industry-specific characteristics. Future studies could explore these variables to provide a more comprehensive understanding of the factors influencing corporate sustainability performance.

Further research could examine the long-term impact of board gender diversity and independence on CSP by conducting longitudinal studies to assess their sustained effects over time. Investigating the causal mechanisms through which board dynamics influence specific sustainability initiatives, such as carbon footprint reduction, ethical supply chain management, or corporate social responsibility programs, would provide deeper insights into governance's role in sustainability. Additionally, exploring the interaction between governance structures

and regulatory policies across different cultural and economic settings could offer valuable comparative perspectives on how corporate boards adapt to evolving sustainability expectations. As global sustainability concerns continue to shape corporate governance priorities, future research should examine innovative governance models that effectively integrate sustainability into corporate decision-making and strategy.

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Motivation and Perceived Learning Benefits in the Use of AI-Assisted Learning Tools: Evidence from Higher Education in Malaysia

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Abstract: This study investigates the reciprocal relationship between student motivation and perceived learning benefits (PLB) of AI-assisted learning tools in higher education. Building on the Technology Acceptance Model (TAM) and motivational theories (ARCS and Self-Determination Theory), the research develops a novel reciprocal model that distinguishes PLB from broader constructs such as engagement. A structured survey of 325 Malaysian undergraduates was analysed using correlation and regression analyses. Motivation was measured through critical thinking and understanding complex topics, while PLB captured helpfulness, assignment quality, subject understanding, and academic performance. Reliability results indicated acceptable consistency for motivation ($\alpha = .660$) and moderate consistency for PLB ($\alpha = .604$). Findings revealed a moderate, positive correlation between motivation and PLB ($r = .428$, $p < .001$). Regression analyses confirmed significant reciprocal effects ($\beta = .428$, $p < .001$), with both models explaining 18.3% of the variance ($R^2 = .183$). While the explained variance is modest, it reflects typical effect sizes in behavioural research and highlights the reinforcing cycle between motivation and PLB. The study contributes theoretically by refining PLB as a distinct construct and empirically demonstrating its reciprocal link with motivation in the context of Malaysian higher education. Practically, the findings suggest that integrating AI tools strategically can enhance both motivation and learning benefits, while also underscoring the need for responsible and ethical adoption. Future studies should expand item sets and adopt longitudinal and cross-cultural designs to strengthen construct validity and explanatory power.

Keywords: *AI-assisted learning tools, student motivation, perceived learning benefits, higher education, technology-enhanced learning*

1. Introduction

The rapid adoption of AI-assisted learning tools such as ChatGPT, Grammarly, and AI-driven research platforms has transformed the higher education landscape. These tools reflect prior research, which argues that AI can improve academic performance as it fosters deeper engagement with lessons.

Learning has undoubtedly changed with the integration of tools such as ChatGPT, Grammarly, and AI Help platforms. Remarkably, they have transformed academia by improving feedback systems, modifying the quality of work done, and the ease with which customised learning can be done. Research designed by Lalira et.al, 2024, and Suwadi, 2023, has proven that the use of AI tools helps increase academic outcomes, especially in cases where students have writing and grammatical structuring problems. Tools such as ChatGPT and Grammarly have shown positive outcomes in AI tool integration. Even beyond the academic realm, their use has proven that students are more active participants in their learning processes (Jegede, 2024). Nevertheless, the evidence and insights derived from studies conducted by Maala et.al, 2024 and Uppal & Hajian, 2024 caution against the use of these tools. They argue about the ease of learning with these instruments, which might bring about the dangers of thinking and procrastination.

Again, there is the issue of ethics, which includes factors like academic dishonesty or the fear that AI may take the place of educators, and they have to be dealt with (Varghese, 2024; V & S, 2024). Despite the gripes, it has been established that AI tools enhance outcomes, increase participation, and assist teachers with administrative tasks (V & S, 2024; Bilad et al., 2023). Finding the proper mix of incorporating AI and traditional strategies is equally important to the necessity for teachers to assist the learners in nurturing responsible autonomous use of AI, critical thinking, and self-learning (Jahani et al., 2024; Bilad et al., 2023). The more AI

progresses, the greater the need for higher learning institutions to formulate policies and have in place comprehensive plans on the use of these tools in ways that sustain, complement, and augment current educational pedagogies (Krause et al., 2024).

Student motivation, defined as the internal drive to initiate and sustain learning behaviours, is a critical determinant of academic success. Alongside motivation, students' perceived learning benefits (PLB) from AI tools, such as helpfulness, improvements in assignment quality, enhanced understanding of subject matter, and perceived gains in academic performance, are equally important. Unlike broader constructs such as engagement, which often combine positive and negative dimensions, PLB focuses specifically on the positive outcomes students associate with AI tools.

AI tools can significantly impact the overall academic success of students through student motivation and perceived learning benefits (PLB), a fact demonstrated by several studies. The use of AI tools is found to contribute to a significant increase in student motivation through personalised learning experiences, immediate feedback, and adaptive learning, which can meet the specific requirements and needs of each learner (Mallillin, 2024; Ward et al., 2024; Ronsumbre et al., 2023). These tools have not only a positive impact on motivation but also on cognitive capacity and problem-solving skills, which lead to improved academic performance (Elbadiansyah et al., 2024; Abdurrahman et al., 2024). Attention, relevance, confidence, and satisfaction are the four key aspects of the ARCS motivation model that have successfully been implemented in AI-enhanced learning settings and shown to lead to greater student motivation and engagement (Huang & Chang, 2024; Subbiah, 2024). AI also supports personalised feedback and adaptive test adjustments, which students find useful and, as a result, study habits and academic performance increase (Ward et al., 2024; Rohana et al., 2024). However, the challenges of excessive dependence on AI, ethics in terms of privacy, and the necessity of responsible implementation remain (Elbadiansyah et al., 2024; Abdurrahman et al., 2024). Nevertheless, there have been primarily positive results of AI integration into education, where students report having improved the quality of their assignments, their understanding of the subject matter, and they believe that their academic performance is affected (Capinding & Dumayas, 2024; Xudayberdiyevna, 2024). The innovative power of AI in education highlights the need to balance the use of technology in education with traditional approaches to education to optimise the benefits of education and overcome ethical and practical issues (Ward et al., 2024; Rohana et al., 2024). On the whole, AI tools, used intelligently, can be an excellent way to motivate students and increase their perceived learning benefits, which will translate into higher academic success.

Although research on AI in education is gradually accumulating, previous research frequently addresses learning outcomes too vaguely, not differentiating between motivation and perceived advantage specific to education. That leaves a knowledge vacuum on the relationship between students' motivation and perceived benefits of AI-assisted tools and how they affect each other.

This study contributes in two important ways. Theoretically, it integrates the Technology Acceptance Model (TAM) and motivational theories such as the ARCS model and Self-Determination Theory (SDT) to frame motivation and PLB as reciprocally reinforcing constructs. Unlike prior studies, PLB is conceptualised as distinct from engagement, capturing specific positive learning outcomes (helpfulness, assignment quality, understanding, performance). Methodologically, the study introduces a reciprocal model in the under-researched context of Malaysian higher education, providing empirical evidence from a sizeable student sample. This combination of theoretical refinement and methodological application differentiates the present research from existing work.

2. Literature Review

AI and Student Motivation

Several past studies have found that AI tools can be used to enhance motivation through fewer cognitive tasks, provide immediate feedback, and support self-directed learning (Zhai, 2022; Alkaissi & McFarlane, 2023). The motivation level is higher when students feel that these tools help them to understand better and achieve better results at school. However, the sustainability of such motivation will rely on the way students will include AI in their overall learning processes without compromising critical thinking.

AI-based learning aids, including ChatGPT, have demonstrated great promise in improving student motivation and engagement, which are important determinants of academic success. These tools provide feedback instantly and tailor learning experiences, which can reduce the cognitive load and make learning more efficient. In other scenarios, like in English writing classrooms, ChatGPT has been found to help learners develop a sense of agency and improve the quality of writing, which then leads to positive attitudes toward AI tools (Zhang, 2024). Similarly, a research study involving university students in Hong Kong found that AI-supported feedback can be helpful not only in assisting students to improve the quality of their essays but also in encouraging and engaging the students to write more (Chan et al., 2024). In the context of second language acquisition, ChatGPT is interactive in nature, which creates a safe practice space and encourages engagement and participation via several conversational activities and tailored feedback (Anjum et al., 2025). Additionally, ChatGPT has already been shown to promote behavioural, cognitive, and emotional involvement in EFL writing courses, which consequently leads to the creation of student-centred classes to complement traditional teaching methods (Anjarani et al., 2024). In addition, AI tools like Grammarly and ChatGPT can contribute to content creation and grammar verification, which can be used to sharpen research skills, write better academic papers, and think creatively (Sasirekha, 2024). Combined, these studies highlight the transformative potential of AI tools in the education sector, since it is linked to the increase in student motivation and better student learning outcomes in various education environments.

AI and Perceived Learning Benefits

Subjective consideration of how such technologies could enhance the learning processes among students constitutes perceived learning benefits (PLB) of AI in education. Research has demonstrated that AI applications have a significant positive impact on learning behaviours, time management, and feedback mechanisms, leading to improved performance in school and reduced study time (Ward et al., 2024). Besides, students also report that their performance in terms of productivity and individual learning experiences has supported them to meet success in their academic results (Zhou et al., 2024). A systematic review suggests that the use of AI can enhance cognitive learning outcomes, although reliance issues and other ethical concerns, such as data privacy, also exist (Ambarita & Nurrahmatullah, 2024; Sasikala & Ravichandran, 2024). In addition, the students consider AI as a useful didactic classroom tool that helps to attract the attention of people and make the process of communication a two-way process, which only emphasises the need to adjust the educator to these technologies (Khairuddin et al., 2024). In this way, although AI tools are associated with significant PLB, it is necessary to implement them with caution to reduce possible disadvantages.

Perceived learning benefits (PLB) linked to AI-assisted technologies, such as ChatGPT, play a critical role in acceptance and the integration of this type of technology into student learning processes. Research has found that students recognise a wide range of positive changes, including improved knowledge, increased grades, and increased interactions, which are positively correlated with the Technology Acceptance Model (TAM) in which perceived usefulness is a key variable of technology use (Sukirman et al., 2024; Adelhardt & Eberle, 2024; Valenzuela et al., 2024). To illustrate this point, the research indicates that when students think that ChatGPT is both practical and convenient to use, they tend to form positive attitudes towards its usage, which, in turn, leads to the increased intention to use it regularly, as an educational tool (Jeong, 2023; Le & Tran, 2024). However, the challenges related to overreliance on these tools and their impact on the efficiency of the learning process are still present (Adelhardt & Eberle, 2024; Le & Tran, 2024), and the need to find a balance between the application of technology in the classroom persists. In general, a positive atmosphere that alleviates these fears and reinforces the perceived advantages can improve the learning experience with AI technologies.

According to recent research, the effects of AI tools on student learning and academic performance are multifactorial, and they are perceived to be beneficial in different educational settings. Janaki and Mariyappan (2024) also emphasised that AI-based tools may be used to facilitate personalised learning, taking into account the strengths and weaknesses of students, leading to improved understanding and retention of complex information. Furthermore, the findings of Fahira et al.'s (2022) research showed that, in addition to bringing about a positive impact on writing skills and understanding, AI tools also introduce the issue of dependency. All in all, these implications hint at the idea that the correlation between AI tools and academic performance is predetermined by the subjective experiences of students and the situational use of these technologies (Case Study of Using AI Tools in Higher E... 2025; Janaki & Mariyappan, 2024; Fahira et al., 2024; Y et al., 2024).

Perceived Learning Benefit (PLB), related to the use of AI tools, contributes to the formation of positive academic and psychological outcomes such as self-efficacy and satisfaction. It has been identified that AI-aided learning methods (including project-based learning) can lead students to achieve high-order thinking and self-efficacy more than conventional teaching practice (Zheng et al., 2024). However, the other research study has also discovered that 70 per cent of the university students have also mentioned that they feel more confident and efficient in studying academic resources with the help of AI applications (Hutapea et al., 2024). Moreover, the implementation of AI technologies has been associated with the growth of learning satisfaction that can be explained by such factors as performance expectancy and social influence (Handoko et al., 2024). The use of AI may, however, also cause anxiety that cannot be easily connected to self-efficacy, implying that, despite potentially increasing confidence, AI may also cause fear in students (Zhou, 2024). Generally, PLB acts as a decisive intermediary in improving both academic achievement and motivation constructs within school (Abbas et al., 2023).

The academic research on how students think about AI tools demonstrates that the picture is not that simple and that the perceived learning benefits (PLB) do not have a uniformly positive effect. Although most students admit that AI has made learning experiences more positive, e.g., by improving writing skills, personalisation, and motivation, most individuals are worried about the effect of AI on independent learning and critical thinking (Terriquez, 2024; Maala et al., 2024; Capinding & Dumayas, 2024). As a point of interest, many students express their concerns about over-dependence on AI that can deprive them of critical and creative thinking (Fahira et al., 2024; Schei et al., 2024). Such a discrepancy in perceptions suggests the need to present PLB as a construct owing to the acceptable ranges in the degree of dependence on AI tools in some categories of students and disciplines and the ability of these tools to initiate favorable transformations in academic performance (Terriquez, 2024; Capinding & Dumayas, 2024). In this way, the extra research should unveil these nuances so that the educational strategies could address the implementation of AI in relation to the academic learning practices (Maala et al., 2024; Schei et al., 2024).

Research Gap

Most existing studies have either examined motivation in isolation or subsumed it under the broader construct of engagement, which combines both positive and negative learning behaviours. As a result, little is known about how motivation specifically interacts with students' perceived learning benefits (PLB) of AI-assisted tools. Few studies have explicitly tested the reciprocal relationship between these two constructs. This study addresses this gap by investigating how PLB predicts motivation and, in turn, how motivation predicts PLB, thereby offering a clearer theoretical and empirical understanding of how AI tools influence student learning.
To address this gap, the present study develops and tests a reciprocal model linking student motivation and perceived learning benefits (PLB) of AI-assisted learning tools. By examining how PLB predicts motivation and, conversely, how motivation predicts PLB, the study provides a more precise theoretical and empirical understanding of how AI tools shape student learning experiences.

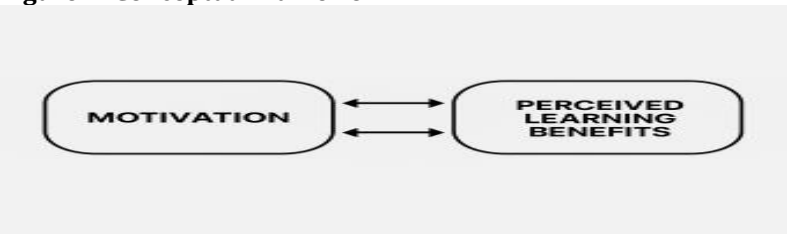
Research Objectives

RO1: To examine the effect of perceived learning benefits (PLB) of AI-assisted learning tools on student motivation.
RO2: To investigate how student motivation influences their perceived learning benefits (PLB) from AI-assisted learning tools.

Hypotheses

H1: Perceived Learning Benefits (PLB) positively predict student Motivation.
H2: Student Motivation positively predicts Perceived Learning Benefits (PLB).

Figure 1: Conceptual framework



Conceptual Framework

Figure 1 illustrates the conceptual framework for this study. It depicts the reciprocal relationship between student motivation and perceived learning benefits (PLB) in the context of AI-assisted learning tools. Motivation is conceptualised through two aspects: critical thinking and the ability to understand complex topics. PLB is represented by four dimensions: helpfulness, quality improvement, subject understanding, and academic performance.

Grounded in the Technology Acceptance Model (TAM) and motivational theories such as the ARCS model, the framework proposes that perceived usefulness (PLB) enhances student motivation, while motivated learners are more likely to recognise and value the benefits of AI-assisted tools. This bidirectional relationship suggests a reinforcing cycle, in which perceptions of usefulness strengthen motivation, and motivation in turn enhances the perception of benefits.

3. Methodology

Research Design

This study adopted a quantitative research design using a structured survey to examine the reciprocal relationship between student motivation and perceived learning benefits (PLB) of AI-assisted learning tools. A quantitative approach was deemed appropriate as it enables the empirical testing of hypothesised relationships through statistical analysis, specifically correlation and regression techniques.

Sample and Data Collection

Data were collected from 325 higher education students across multiple faculties in Malaysia, all of whom had prior exposure to AI-assisted tools such as ChatGPT or Grammarly. A convenience sampling approach was used due to accessibility and the exploratory nature of the study.

The sample size is adequate according to Krejcie and Morgan's (1970) guidelines, which recommend approximately 300 respondents for populations exceeding 10,000 at a 95% confidence level. This ensures sufficient statistical power for regression analysis while capturing the perceptions of students actively engaged with AI tools. Although convenience sampling may limit generalisability, the study provides valuable insights into early adoption patterns in the Malaysian higher education context.

Instrument Development

The survey items were adapted from established scales and prior studies to ensure validity. Motivation was measured using two items: (1) "AI tools enhance my critical thinking and problem-solving skills" and (2) "AI tools help me understand complex topics or concepts." Although two-item scales are less common, they are accepted in exploratory research when items are conceptually aligned. These items were drawn from prior work on AI's role in fostering cognitive engagement and critical thinking (Zhai, 2022; Alkaissi & McFarlane, 2023).

Perceived Learning Benefits (PLB) were measured with four items reflecting helpfulness, assignment quality, understanding of subjects, and academic performance. These were adapted from constructs of Perceived Usefulness within the Technology Acceptance Model (Jeong, 2023; Sukirman et al., 2024) and from recent studies of AI in education (Ward et al., 2024; Khairuddin et al., 2024). All items were rated on a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree).

Data Analysis

Data were analysed using SPSS (Version 28). Several statistical procedures were conducted:

- Descriptive statistics summarised the distribution of motivation and PLB.
- Reliability analysis assessed internal consistency, yielding Cronbach's alpha coefficients of .660 for motivation (acceptable for a two-item scale) and .604 for PLB (adequate for exploratory research).
- Pearson correlation analysis examined the association between motivation and PLB.
- Regression analysis tested the reciprocal hypotheses: that PLB positively predicts motivation (H1) and that motivation predicts PLB (H2). Statistical significance was set at $p < .05$.

4. Results

This section presents the results of the statistical analyses, including reliability, correlations, and regression tests of the study constructs.

Reliability

Table 1 presents the results of the reliability analysis for the study constructs. The Motivation scale achieved an acceptable level of internal consistency (α = .660), while the Perceived Learning Benefits (PLB) scale demonstrated moderate reliability (α = .604), which is considered adequate for exploratory research.

Table 1: Reliability Statistics

Construct	Items	Cronbach's Alpha	Interpretation
Motivation	2	0.660	Acceptable (2-item scale)
Perceived Learning Benefits	4	0.604	Moderate, exploratory use

Reliability analysis was conducted to assess the internal consistency of the scales used in this study. The Motivation construct, measured using two items (critical thinking and understanding complex topics), achieved a Cronbach's alpha of .660. Although this value is slightly below the conventional threshold of .70, it is considered acceptable for a two-item scale in exploratory research, particularly when both items are conceptually aligned and moderately correlated. This indicates that the two items provide a reasonably consistent measure of student motivation.

The Perceived Learning Benefits (PLB) construct, which included four items (helpfulness, quality improvement, understanding subjects, and academic performance), yielded a Cronbach's alpha of **.604**. While this value is lower than the desired benchmark of .70, it remains within an acceptable range for exploratory studies in educational research. The relatively modest alpha suggests that although the items are related, they capture slightly different facets of students' perceptions of AI-assisted tools. This implies that PLB is a multi-dimensional construct encompassing several aspects of perceived benefits.

Correlations

Table 2 shows the Pearson correlation between Motivation and PLB. The results indicate a moderate, positive, and statistically significant relationship ($r = .428$, $p < .001$), suggesting that students who perceive greater learning benefits from AI-assisted tools also report higher motivation.

Table 2: Correlation

Variables	1	2
1. Motivation	—	
2. Perceived Learning Benefits	.428**	—

Note. N = 325. **p** < .001.

Correlation Analysis

Correlation analysis was conducted to examine the bivariate association between Motivation and PLB. The results revealed a moderate, positive, and statistically significant correlation ($r = .428$, $p < .001$). This finding indicates that students who reported higher perceived benefits from AI-assisted tools—such as finding them helpful, improving the quality of their work, and enhancing their academic performance—were also more likely to report higher levels of motivation. Conversely, students with stronger motivation tended to perceive AI tools as more beneficial to their learning. The strength and significance of this correlation support the proposition that the two constructs are closely related and mutually reinforcing.

Table 3 summarises the regression analyses used to test the hypothesised reciprocal relationships. The results confirm that PLB significantly predicts Motivation ($\beta = .428$, $p < .001$), explaining 18.3% of the variance. Conversely, Motivation also significantly predicts PLB ($\beta = .428$, $p < .001$), with the same amount of explained variance ($R^2 = .183$). These findings provide strong support for both hypotheses.

Table 3: Regression

Model	Dependent Variable	β	R^2	F	Sig.
H1: PLB → Motivation	Motivation	.428**	.183	72.48	<.001
H2: Motivation → PLB	PLB	.428**	.183	72.48	<.001

Note. N = 325. **p** < .001.

Regression Analysis

The regression models showed that PLB and Motivation significantly predicted each other, with R^2 = 0.183. While this indicates that approximately 18% of the variance is explained by the model, such values are typical in behavioural and educational research where multiple external factors influence learning outcomes (Hair et al., 2010). Importantly, the moderate correlation (r = .428, p < .001) and significant regression coefficients (β = .428, p < .001) highlight the practical importance of the reciprocal link.

These findings underscore that PLB and motivation, although not exhaustive predictors of each other, form a mutually reinforcing cycle. Students who perceive AI-assisted tools as beneficial are more motivated, and motivated learners are more likely to recognise these benefits. The results, therefore, contribute evidence of reciprocity while also signalling the need for models with broader constructs (e.g., self-efficacy, study habits, or academic engagement) in future work.

Discussion

The present study investigated the reciprocal relationship between student motivation and perceived learning benefits (PLB) of AI-assisted learning tools in higher education. The findings provide robust evidence that the two constructs are strongly interrelated, with significant predictive effects in both directions. This suggests that motivation and perceptions of AI's benefits reinforce each other, forming a mutually reinforcing cycle.

First, PLB was found to predict student motivation significantly. Students who perceived AI tools as helpful, capable of improving the quality of assignments, and enhancing their understanding of subjects reported higher levels of motivation. This finding is consistent with prior studies demonstrating that AI tools reduce cognitive workload and provide personalised learning support, thereby stimulating student engagement (Zhai, 2022; Alkaissi & McFarlane, 2023; Elbadiansyah et al., 2024). From a theoretical perspective, this supports the Technology Acceptance Model (TAM), in which perceived usefulness drives learning behaviour, and aligns with the ARCS model, where relevance and confidence are enhanced through AI-enabled feedback and support.

Second, the results indicate that student motivation also predicts PLB. Motivated learners are more likely to adopt AI tools actively and to perceive them as beneficial. This resonates with findings by Heil et al. (2023, 2024) and Suntharalingam (2023, 2024), who emphasised that students' attitudes and motivational states strongly influence their engagement with digital technologies. In line with Self-Determination Theory (SDT), motivated students tend to exercise autonomy and competence in their learning processes, which enhances their recognition of the benefits of AI-assisted tools. Together, these results extend prior research by confirming that motivation and PLB are not unidirectional but reciprocally reinforcing constructs.

The reliability analysis further highlighted that while the motivation construct achieved acceptable internal consistency, PLB demonstrated only moderate reliability. This suggests that PLB is not a monolithic construct but rather multidimensional, encompassing usefulness, quality improvement, understanding, and academic performance. This nuance enriches the literature by positioning PLB as a construct requiring refinement and validation, for instance, through confirmatory factor analysis or expansion of item sets in future studies.

From a practical perspective, the findings underscore the importance of making the benefits of AI tools visible to students. When learners clearly recognise AI's contributions to understanding and performance, their motivation increases. Conversely, motivated students are more likely to engage deeply with AI, reinforcing positive academic outcomes. For educators, this means that AI tools should be integrated not simply as supplementary aids, but as active resources in teaching and assessment strategies. For higher education institutions, the results point to the need for policies, training, and guidelines that help students use AI responsibly while maximising its benefits. In the Malaysian and ASEAN context, where digital transformation

in education is rapidly accelerating, these findings provide timely insights for balancing innovation with academic integrity and independent learning.

In summary, this study contributes to the literature by replacing the broad construct of engagement with the more focused construct of PLB and by empirically demonstrating the reciprocal relationship between PLB and motivation. This dual contribution advances both theoretical clarity and practical implications for higher education. The findings suggest that strategies aimed at enhancing either construct—motivation or perceived learning benefits—are likely to strengthen the other, thereby supporting improved learning outcomes in the digital era.

5. Conclusion

This study examined the reciprocal relationship between student motivation and perceived learning benefits (PLB) in the context of AI-assisted learning tools. Based on data from 325 higher education students, the results indicate that both motivation and PLB are rated highly, and they reinforce each other in a bidirectional manner. Regression analyses confirmed that PLB significantly predicts motivation and, conversely, motivation significantly predicts PLB. These findings highlight that when students recognise the helpfulness, quality improvements, subject understanding, and performance gains associated with AI tools, they become more motivated; in turn, motivated students are more likely to perceive these benefits.

The study contributes to the literature by replacing broad and inconsistent measures of engagement with PLB, a more focused construct that captures the positive outcomes of AI use. By distinguishing PLB from motivation, this research offers a clearer theoretical and empirical framework for understanding how AI tools shape learning in higher education.

From a practical perspective, the findings suggest that educators should integrate AI strategically to highlight its usefulness in improving learning outcomes. At the same time, institutions should provide training and policies that guide responsible use. At a policy level, the results are relevant to higher education systems in Malaysia and the wider ASEAN region, where digital transformation is rapidly advancing. Overall, the study confirms that motivation and PLB form a mutually reinforcing cycle, underscoring the importance of approaches that simultaneously enhance both constructs. Future research should refine the PLB construct with more robust measurement, apply longitudinal designs, and explore cross-cultural comparisons to deepen understanding of how AI-assisted tools influence learning globally.

Practical Implications

For Educators: AI-assisted tools should be integrated strategically to highlight their learning benefits, as students' perceptions of usefulness and academic value are strongly tied to motivation. Classroom practices that emphasise how AI enhances understanding and improves assignment quality can reinforce both motivation and perceived benefits.

For Institutions: Training programmes and policy guidelines are needed to showcase AI's positive contributions to student learning. Institutions are encouraged to design frameworks that promote responsible and ethical AI use, ensuring that students maximise its benefits without fostering over-reliance or academic integrity concerns.

For Researchers: This study highlights the importance of refining the construct of PLB. Future studies could expand the scale with additional items to enhance reliability and investigate its relationship with broader outcomes, such as self-regulated learning, critical thinking, and academic achievement across diverse disciplines.

Limitations and Future Research

Several limitations should be noted. First, the motivation construct was measured with only two items, which, though conceptually aligned and reliable for exploratory purposes, had limited dimensionality. Future studies should adopt multi-item scales grounded in ARCS or SDT frameworks to capture the full spectrum of motivation. Second, the PLB scale achieved only moderate internal consistency (α = .604), suggesting the need for refinement. Expanding item sets and applying confirmatory factor analysis would strengthen construct validity.

Third, the R^2 value of 18% indicates modest explanatory power. While consistent with behavioural research norms, it suggests that additional constructs such as self-efficacy, critical thinking, and self-regulated learning should be incorporated to explain the dynamics of motivation and PLB better.

Finally, the use of convenience sampling in one national context limits generalisability. Future research should employ stratified or random sampling across multiple cultural and institutional contexts, ideally with longitudinal designs, to validate the reciprocal relationship.

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Stakeholder Participation and Social Responsibility: A Dynamic Framework for Corporate Governance

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Abstract: This paper examines the interconnection among stakeholder engagement, corporate social responsibility (CSR), and corporate governance in Southeast Asia's evolving institutional environment, focusing on Malaysia. Drawing on institutional theory and stakeholder management schools of thought, this research develops a model that considers corporate governance as an evolving system. By employing a mixed-methods approach combining qualitative institutional surveys with quantitative performance indicators collected between 2019 and 2023, this research analyzes the complicated relationship between institutional frameworks, company performance, and stakeholder engagement. The findings demonstrate that effective governance hinges on an adaptive equilibrium between formal systems and informal cultural values, enabled by real-time feedback mechanisms. Three key contributions emerge: (1) a dynamic stakeholder engagement model, (2) a holistic performance reporting framework, and (3) cybernetic governance principles for societal and technological challenges. Placing Southeast Asian contexts within the shareholder activism research matrix, this research fills significant theory gaps and offers practical lessons for corporations, policymakers, and civil society organizations to enhance corporate governance practice in the region.

Keywords: *Corporate Governance, Stakeholder Engagement, Cybernetic Governance, Corporate Social Responsibility, Southeast Asia*

1. Introduction

The intensity of corporate governance sophistication is on the rise all over the globe, which stems from the need to incorporate stakeholder engagement systems (Freeman et al., 2022; Mitchell et al., 2021). Such changes result from the recognition of corporations as sophisticated adaptive systems that coexist with and have an impact on the institutions in their environment (Aguilera et al., 2024; Holland, 2023). The rest of the world has particularly noted this shift in the Southeast Asian region, particularly in Malaysia, where there is convergence between development and progress driven by cultural, religious, and institutional forces, which simultaneously give rise to governance challenges and prospects (Amran & Devi, 2018; Ghazali & Weetman, 2020; Liew, 2021).

Traditional governance models often adopt a Western-centric, one-size-fits-all approach, neglecting multicultural stakeholder dynamics (Young et al., 2022). In Southeast Asia, formal systems intersect with informal cultural practices, necessitating context-sensitive frameworks (Rahman & Chen, 2024). This paper bridges this gap by conceptualizing governance as a complex adaptive system and using Malaysia as a case study. Southeast Asian economies are a case where formal systems and informal culture interact. There is constant haggling between stakeholder demands and reductionist theoretical simplifications (Rahman & Chen, 2024, p. 127). These need to be studied from a new multidisciplinary perspective that fuses cybernetics, systems thinking, and context sensitivity. This paper bridges these theoretical gaps by conceptualizing corporate governance as a complex adaptive system and developing a dynamic framework for examining stakeholder engagement in Southeast Asia, with a particular focus on Malaysia.

Research Contributions

There are three theoretical contributions of this research. First, the research formulates a dynamic stakeholder engagement logical model that captures the bidirectional influence relationship between corporations and diverse stakeholder groups. Second, it offers a holistic model of organizational responsibility that integrates financial, social, environmental, and governance performance dimensions. Third, the study offers cybernetic governance principles that enable organizations to develop effective feedback mechanisms for sensing and responding to stakeholders' expectations under dynamic conditions. By situating Southeast Asian contexts in the wider corporate governance scholarship, the study identifies how cultural and institutional factors intersect in governance processes while delivering practical implications for stakeholder communication, decision-making participation, strategic reporting, and technology use in the region. The following research

questions are addressed to achieve the nature and dynamics of stakeholder relationships (e.g., with investors, employees, communities, and governments) and their influence on corporate governance outcomes in Southeast Asian firms. The research question formulated to answer the research objective is "How do institutional structure, cultural forces, and stakeholder relationships interplay to produce corporate governance outcomes in Southeast Asian contexts?". Next is to suggest possible processes or new ways of doing things that can make multidimensional performance reporting more complete, clear, and useful, and to make it easier for stakeholders to have meaningful conversations in complicated corporate governance systems. The research question created to answer the research objective is "What procedures facilitate multidimensional performance reporting and stakeholder interaction in complex corporate governance systems?". Most importantly, to develop a conceptual framework or set of recommendations for applying cybernetic governance principles to maximize corporate flexibility and resilience in navigating future societal and technological transformations. The research question used to answer the research objective is "How can cybernetic governance principles be applied to maximize corporate flexibility to face new societal and technological challenges?". This research may provide many contributions to the field of corporate governance once all the above research questions are answered. The next paragraph provides all the potential contributions and positive impacts of this research in detail.

2. Literature Review

Corporate governance has undergone significant theoretical evolution from narrow shareholder primacy models to broader stakeholder-centric frameworks. The traditional agency theory perspective, pioneered by Jensen and Meckling (1976), conceptualized governance as a mechanism for resolving conflicts between principals (shareholders) and agents (managers). This reductionist approach emphasized monitoring, incentive alignment, and control mechanisms to minimize agency costs (Fama & Jensen, 1983; Shleifer & Vishny, 1997). However, the limitations of pure agency theory became apparent as corporate scandals and stakeholder activism highlighted the inadequacy of shareholder-centric models (Freeman et al., 2022). The global financial crisis of 2008 further exposed the risks of governance frameworks that neglected broader stakeholder interests and systemic risks (Bebchuk & Spamann, 2010). These events catalyzed a paradigm shift toward more inclusive governance models that recognize multiple stakeholders' claims and long-term value creation (Porter & Kramer, 2019). Contemporary governance scholarship increasingly adopts systems thinking approaches that view corporations as complex entities embedded within broader social, economic, and environmental systems (Aguilera et al., 2024). This evolution reflects growing recognition that sustainable corporate performance requires balancing diverse stakeholder interests while maintaining organizational adaptability in dynamic environments (Freeman et al., 2020; Scherer & Palazzo, 2022).

Corporate Governance as a Complex Adaptive System

Traditional rules for corporate governance have used reductionist approaches that look at governance issues in isolation, like typical board management, following the rules, and shareholders' interests, but not how they affect each other in real time (Huse, 2021; Larcker & Tayan, 2023). According to new ideas, we should look at corporate governance as a complicated adaptive system with non-linear effects, emergence, and co-evolutionary dynamics (Holland, 2023; Page, 2024) for the best understanding. Complex adaptive systems theory supports the predominance of system behavior evolved by interactions among disparate agents governed by simple rules so that macro patterns cannot be inferred from the nature of the parts (Byrne & Callaghan, 2022; Mitchell, 2021). In business governance, the view emphasizes how formal regulations (rules, codes, policies) and informal practices (cultural norms, personal relationships, implicit expectations) co-evolve to produce emergent governance outcomes (Aguilera et al., 2024; Deakin & Konzelmann, 2021).

This complex adaptive systems framework provides a theoretical foundation for understanding how stakeholder participation shapes governance outcomes through dynamic, bidirectional influence relationships rather than simple causal mechanisms. As observed by Chen et al. (2023, p. 542), Governance systems evolve through continuous feedback between firms, stakeholders, and institutional pressures. It is best observed in Southeast Asian settings where institutional expansion, cultural diversity, and technology disruption produce governance systems that are dynamic and adaptive (Gomez et al., 2022; Rahman & Chen, 2024). Table 1 is a comparison of the traditional and complex adaptive systems views of corporate governance that shows the paradigm shift underlying our theory.

Table 1: Contrasting Traditional and Adaptive Systems Approaches to Corporate Governance

Dimension	Traditional Approach	Complex Adaptive Systems Approach
Ontological stance	Reductionist; governance as fixed structures	Holistic governance as emergent processes
System boundaries	Clear separation between firm and environment	Permeable boundaries with continuous interchange
Power dynamics	Hierarchical, top-down authority	Distributed, networked influence relationships
Causality	Linear cause-and-effect relationships	Non-linear feedback loops and path dependencies
Adaptation	Periodic, planned formal changes	Continuous co-evolution with stakeholder expectations
Performance metrics	Financial optimization for shareholders	Multidimensional value creation across stakeholders
Institutional view	Static contextual constraints	Dynamic institutional co-construction through practice
Time horizon	Short-term optimization	Long-term sustainability and adaptability

Source: Adapted from Holland (2023), Page (2024), and the authors' analysis

Cybernetic Governance and Feedback Mechanisms

Cybernetic theory offers valuable instruction to study how corporate governance systems receive, process, and respond to stakeholder expectations (Beer, 2022; Wiener, 2021). Initially developed to describe control processes in mechanical and biological systems, cybernetics is interested in how systems regulate stability and achieve goals via information feedback loops.

In corporate governance, cybernetic principles emphasize the imperative necessity for systems to effectively cope with complexity and provide responsiveness in dynamic stakeholder environments. The perspective discerns four indispensable conditions. The first aspect is requisite variety. It asserts that governance systems must possess internal complexity that matches the complexity of their stakeholder environment (Schwaninger, 2022). The system cannot absorb and respond to the total range of external variations without requisite variety.

The second component is sensitivity to feedback. This is critical, necessitating effective mechanisms for sensing and interpreting signals from diverse stakeholder groups (Beer, 2022; Richardson, 2021). This ongoing flow of information is required for well-informed decision-making. Secondly, adaptive capacity calls for governance arrangements to evolve and create space for emerging stakeholder expectations and evolving institutional environments (Espejo & Reyes, 2021; Pérez Ríos, 2023). Static governance risks falling out of harmony with its environment's emerging needs.

Finally, information processing capacity is also critical, as it ensures governance systems can successfully translate stakeholder inputs into appropriate and timely organizational responses (Turnbull, 2021; Wiener, 2021). Together, these cybernetic principles foster a highly dynamic and responsive corporate governance style that enables organizations to cope with complexity and ensure legitimacy in a continuously evolving environment. As Orsato et al. (2023, p. 217) note, "Cybernetic governance conveys the capacity of an organization to implement efficient sense-and-response mechanisms to anticipate stakeholder problems before they escalate into crises and thus maintain system viability amidst complicated environments." In this perspective, governance is viewed not as rigid structures but as continuous processes that continuously adjust organizational behavior to stakeholders' expectations.

This research applies cybernetic governance theory to develop a stakeholder engagement model for organizational responsiveness in the context of systemic stability. It is particularly applicable to Southeast Asian contexts where rapid economic development produces continuous fluidity in both stakeholder expectations and institutional arrangements.

Institutional Theory and Corporate Governance in Southeast Asia

Institutional theory provides essential insights into how formal rules, informal norms, and cultural belief systems shape corporate governance practices across different contexts (DiMaggio & Powell, 1983; Scott, 2022). In Southeast Asia, institutional arrangements exhibit distinctive characteristics that significantly influence stakeholder participation and corporate responsibility (Claessens & Yurtoglu, 2020; Gomez et al., 22). Southeast Asian governance institutions present a distinctive blend of influences, characterized by several key features. Firstly, institutional hybridity is prevalent, where governance frameworks combine elements of Western corporate structures with deeply embedded Eastern relational norms and indigenous cultural practices (Chen et al., 2023; Lim & Abdullah, 2021). This often results in a complex interplay between formal rules and informal customs.

Secondly, regulatory formalism is observed, with official governance codes frequently aligning with international best practices. However, these formal pronouncements may often be disconnected from actual organizational behavior (Hasan, 2020; Liew, 2022). This gap between stated policy and practical implementation is a recurring theme. Third, relationship centrality is an important trait because informal connections and complex network relationships often have a bigger impact on business decisions and operations than formal governance systems (Ahmad et al., 2020). This emphasizes the importance of informal ties and trust in the region's business landscape. Fourth, there are many important connections between governments and businesses. For example, governments often get involved in the economy through companies that are connected to the government. This creates new ways for politics to play a role (Vithiatharan & Gomez, 2018).

Finally, religious influences play a substantial role, particularly in predominantly Muslim countries like Malaysia and Indonesia, where normative expectations derived from dominant religious traditions shape stakeholder perceptions and demands regarding corporate responsibility and ethical conduct (Chapra & Ahmed, 2023; Wan Ibrahim & Zain, 2021). These interconnected characteristics highlight the nuanced and multifaceted nature of corporate governance in Southeast Asia. These features of the institutions make it so that stakeholder participation usually happens through casual, relationship-based channels instead of formal governance tools like shareholder resolutions or regulatory enforcement (Wong & Ahmad, 2022). As Yoshikawa and Rasheed (2023, p. 376) observe, "Corporate governance in Southeast Asia operates at the intersection of formal regulatory frameworks, informal cultural practices, and evolving global expectations, creating unique challenges for stakeholder engagement." This institutional complexity necessitates theoretical approaches that capture both formal and informal dimensions of governance practices.

Dynamic Stakeholder Engagement: Beyond Traditional Stakeholder Theory

Traditional stakeholder theory (Freeman, 1984; Freeman et al., 2022) has provided helpful frameworks for considering how organizations manage relationships with different constituents. Standard stakeholder approaches, nevertheless, have often provided static typologies that do not capture the dynamic, evolving nature of stakeholder relationships within complex institutional environments (Crane & Ruebottom, 2022; Mitchell et al., 2023).

Some new ideas in theory say that stakeholder relationships should be seen as changing and fluid processes instead of fixed categories (Bundy et al., 2021; Jones et al., 2023). This dynamic perspective centers on how stakeholder salience, influence strategies, and corporate responses co-evolve through repeated interactions embedded within specific institutional contexts (Barnett et al., 2022; Mitchell et al., 2021). Building upon advancements in stakeholder theory, the dynamic stakeholder engagement model conceptualizes stakeholder involvement not as a static interaction but as a continuously adaptive process. Four interrelated elements fundamentally shape this model. We can see that stakeholder relationships are not fixed but change over time through repeated interactions, which creates unique path dependencies and full relationship histories (Bundy et al., 2021; Jones et al., 2023). This highlights the cumulative nature of engagement and its long-term implications. Second, contextual emphasizes that the institutional, cultural, and historical settings in which stakeholder influence strategies and firm responses have a huge impact on both (Aguilera et al., 2024; Rahman & Chen, 2024). This acknowledges that universal approaches to engagement are often insufficient. Thirdly, reciprocal influence is a crucial aspect, recognizing that while stakeholder actions undeniably influence firm behavior, organizational responses, in turn, significantly impact the expectations and strategies of stakeholders

themselves (Barnett et al., 2022; Liu et al., 2022). This bidirectional flow of influence necessitates a responsive and agile approach.

According to Rowley and Moldoveanu (2021) and Tantalo and Priem (2023), network effects show that stakeholder power is often based on complex, interconnected networks of relationships rather than single interactions between two people. Understanding these intricate webs of influence is essential for effective and strategic stakeholder engagement. Collectively, these elements form a comprehensive framework for understanding the dynamic and adaptive nature of stakeholder engagement in contemporary organizational contexts. This dynamic view goes beyond static stakeholder typologies in that it recognizes that stakeholder relationships are ongoing processes of mutual adaptation and not categorical relationships. As Jones et al. (2023, p. 329) have it, "Stakeholder management does not simply involve responding to fixed stakeholder attributes but participating in the co-construction of evolving relationships that constantly reshape what constitutes legitimate corporate behavior.

Multidimensional Performance and Holistic Organizational Responsibility

Traditionally, traditional approaches to corporate performance have predominantly emphasized financial measures in the quest for shareholder value maximization (Friedman, 1970; Jensen, 2021). However, growing recognition of corporations as systems within social and environmental systems has driven interest in multifaceted performance frameworks acknowledging financial, social, environmental, and governance dimensions (Eccles & Klimenko, 2022; Orlitzky et al., 2023). These all-encompassing methods show a big shift in how organizations are thought of, from being primarily responsible to their shareholders to being responsible to all the important groups whose lives are affected by their performance (Freeman et al., 2022; Scherer & Palazzo, 2022). The evolving landscape of corporate responsibility has introduced a "new duty" for organizations, expanding beyond traditional profit-centric objectives to encompass a holistic approach to value creation. This expanded duty entails four critical dimensions.

Firstly, financial performance remains fundamental, requiring companies to generate sustainable economic value for their financial capital providers (Barton et al., 2022; Jensen, 2021). This acknowledges the ongoing necessity of profitability and efficient resource allocation. Secondly, social impact emphasizes a positive contribution to human well-being through responsible work practices, meaningful community engagement, and consideration of product impacts (Porter & Kramer, 2021; Schwartz & Carroll, 2022). This moves beyond mere philanthropy to integrate social considerations into core business operations. Thirdly, environmental stewardship demands that organizations actively manage and mitigate their environmental footprint to preserve natural capital for future generations (Orsato et al., 2023; Whiteman et al., 2023). This includes sustainable resource use and efforts to minimize ecological harm. Finally, governance quality is essential, involving the establishment of transparent and responsible decision-making structures that effectively balance the often-competing interests of diverse stakeholders (Aguilera et al., 2024; Larcker & Tayan, 2023).

This "new duty" collectively reflects a growing recognition that long-term corporate success is inextricably linked to a broader commitment to societal and environmental well-being, shifting the paradigm towards a more integrated and responsible form of capitalism. Some recent meta-analyses (Eccles & Klimenko, 2022; Orlitzky et al., 2023) show that performance in these areas is often cross-multiplicative and not based on trade-offs. For Eccles and Klimenko (2022, p. 59), "Companies that do well across material ESG dimensions are usually shown to have superior long-term financial performance, and this implies that overall responsibility may be enlightened self-interest rather than return-sacrificing social benefits. This multi-faceted perspective is particularly relevant in Southeast Asian contexts where religious rituals, communal norms, and state development priorities foster stakeholder expectations for corporations to work towards higher social ends beyond profit maximization (Amran et al., 2022; Chapra & Ahmed, 2023).

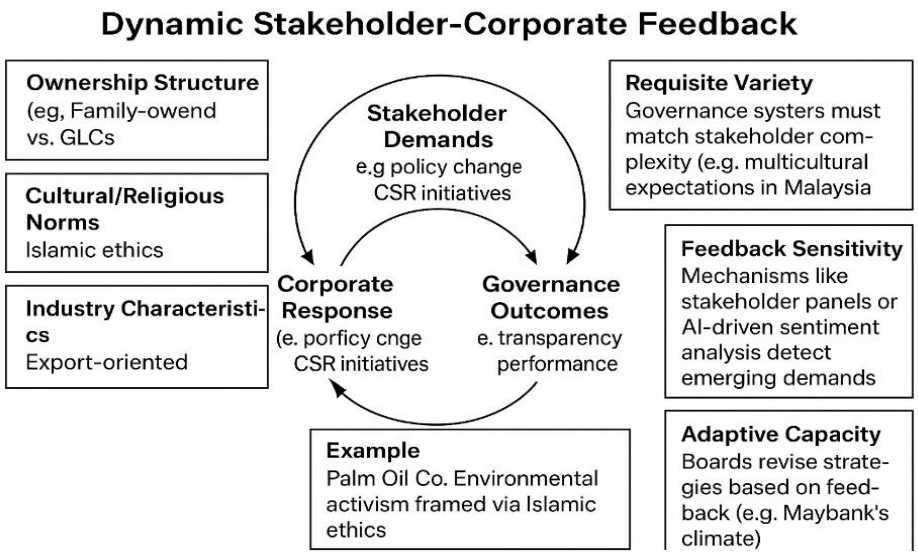
Research Gaps and Theoretical Framework

Despite growing recognition of corporate governance as a complex, dynamic process, a significant research gap remains in the understanding of stakeholder engagement in Southeast Asian institutional contexts. First, most existing literature relies on static analysis that is incapable of making meaningful representations of the adaptive, co-evolutionary nature of stakeholder-corporate relations (Barnett et al., 2022; Rahman & Chen, 2024). Second, there is limited current evidence regarding whether cybernetic governance principles could be

employed to render corporations more responsive to Southeast Asian stakeholders' expectations (Turnbull, 2021). Third, few research papers rigorously integrate qualitative institutional with quantitative performance variables for the purpose of inducing general models of corporate governance performance (Aguilera et al., 2024; Chen et al., 2023).

Figure 1 illustrates the dynamic feedback loop between stakeholders and corporations, moderated by institutional and cultural contexts. Cybernetic principles (requisite variety, feedback sensitivity, adaptive capacity) enable firms to process stakeholder inputs, while contextual factors (e.g., ownership, religion) shape response strategies. Adapted from Beer (2022) and Aguilera et al. (2024).

Figure 1: Dynamic Stakeholder-Corporate Feedback



To close these gaps, the research developed a theoretical framework combining complex adaptive systems theory (Holland, 2023; Page, 2024), cybernetic control principles (Beer, 2022; Wiener, 2021), and institutional approaches (DiMaggio & Powell, 1983; Scott, 2019) to theorize corporate governance as a stakeholder process that is dynamic and embedded in the respective institutional environments. This joint approach enables us to identify both formal governance modes and informal cultural practices and acknowledge bidirectional influence relationships between stakeholders and companies.

Integrated Theoretical Framework

While each theoretical domain offers valuable insights independently, their integration creates a more comprehensive understanding of contemporary governance challenges. Complex adaptive systems theory provides the foundational lens for understanding governance as an emergent property of dynamic stakeholder interactions but lacks specificity about the contextual factors that shape these interactions. Institutional theory addresses this gap by explaining how formal rules and cultural norms constrain and enable stakeholder behavior, yet it offers limited guidance on how organizations can actively adapt to changing institutional expectations. Cybernetic governance principles bridge both perspectives by providing the operational mechanisms through which organizations sense institutional signals, process stakeholder demands and adapt their governance practices accordingly.

This theoretical synthesis suggests that effective governance emerges when organizations develop cybernetic capabilities (sensing and responding) that are appropriately calibrated to their institutional context (formal and informal rules) while managing the complex, non-linear dynamics of multiple stakeholder relationships. The integration is particularly relevant in Southeast Asian contexts, where rapid institutional change, cultural diversity, and evolving stakeholder expectations create governance environments characterized by high complexity, ambiguity, and dynamism. Rather than viewing these theories as competing explanations, we propose they represent complementary dimensions of a unified governance system: complex adaptive systems

theory explains *what* governance is (an emergent, dynamic system), institutional theory explains *why* certain governance approaches work in specific contexts (institutional fit), and cybernetic governance explains *how* organizations can actively manage this complexity through adaptive feedback mechanisms.

This integrated framework leads to our core theoretical proposition that governance effectiveness depends not on any single mechanism, but on the dynamic alignment between cybernetic capabilities, institutional sensitivity, and stakeholder complexity management, a proposition test empirically in the Malaysian context. Based on this integrated theoretical framework, this research advances four core propositions:

Proposition 1 (Complexity-Cybernetics Relationship): The effectiveness of cybernetic governance mechanisms increases with stakeholder environment complexity, as organizational systems require requisite variety to match environmental complexity.

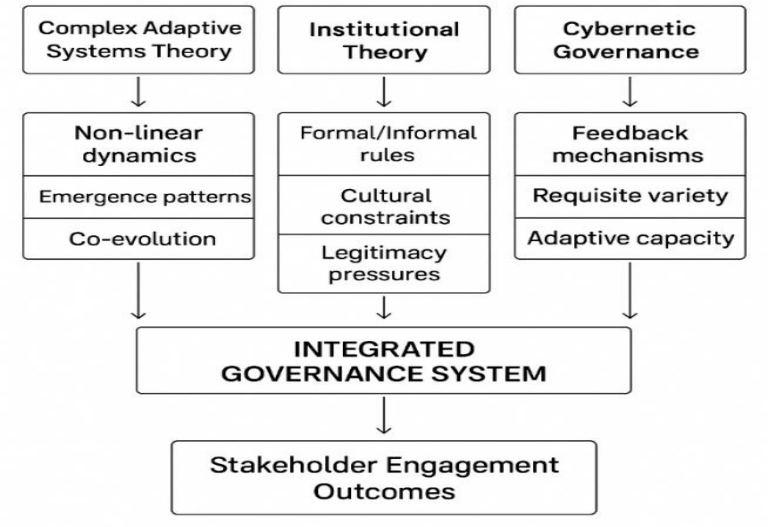
Proposition 2 (Institutional-Strategy Alignment): Stakeholder activism strategies that align with institutional logic achieve superior outcomes compared to strategies that conflict with institutional expectations.

Proposition 3 (Cybernetic-Response Relationship): Organizations with higher cybernetic governance capacity demonstrate faster and more effective responses to stakeholder demands.

Proposition 4 (Synergistic Integration): The interaction between institutional alignment, cybernetic capacity, and environmental complexity produces superior governance outcomes compared to individual theoretical mechanisms alone.

These propositions collectively suggest that effective governance emerges not from optimizing any single theoretical dimension, but from achieving dynamic equilibrium across all three theoretical domains—a framework we test empirically in Malaysia's complex institutional environment.

Figure 2: Integrated Governance Model for Stakeholder Engagement



This model integrates concepts from Complex Adaptive Systems Theory (non-linear dynamics, emergence patterns, co-evolution), Institutional Theory (formal/informal rules, cultural constraints, legitimacy pressures), and Cybernetic Governance (feedback mechanisms, requisite variety, adaptive capacity). These theoretical elements converge to form an integrated governance system that leads to stakeholder engagement outcomes such as legitimacy, adaptability, and responsiveness. Nevertheless, several elements of the model have potential relevance for broader application. Cybernetic feedback mechanisms and adaptive governance principles are increasingly critical in any rapidly developing institutional context, where stakeholder expectations and regulatory norms are in flux. The emphasis on aligning activism tactics with local institutional logic provides a blueprint for context-sensitive corporate governance reform in a variety of emerging

economies. The integrated approach to performance—including financial, social, environmental, and governance factors—aligns with global ESG trends and can inform best practices across the region.

3. Methodology

Research Design

This study employed the mixed-methods approach combining qualitative case studies and quantitative analysis of CSR and corporate governance data. Triangulation using this method enhances the rigor of findings through providing both contextual depth and statistical generalizability (Tashakkori & Teddlie, 2021; Creswell & Creswell, 2023). The research progressed in three successive phases, and they are the Exploratory phase: In-depth semi-structured interviews of key stakeholders for determining suitable mechanisms of activism and situational factors. Next followed by the Case study stage: Comprehensive stakeholder activism case study of cases in various Malaysian public-listed companies and finally the Confirmation phase: Quantitative analysis of correlation between stakeholder activism metrics and corporate governance/CSR outcomes.

Data Collection

Qualitative Data

Interviews (n=18) were conducted until thematic saturation was achieved, with participants purposively sampled across six stakeholder groups (Table 3). Sectors were selected based on their exposure to governance controversies (e.g., palm oil, finance) to capture activism dynamics. The 2019–2023 time limit accounts for pre- and post-pandemic governance shifts.

Table 2: The number of respondents involved in this research

No.	Description of the respondent	N
1	Corporate governance experts and board members	(n=5)
2	Institutional investors and minority shareholder representatives	(n=5)
3	Civil society groups and environmental NGOs	(n=2)
4	Consumer advocacy groups	(n=2)
5	Regulatory bodies and government agencies	(n=2)
6	Industry associations and business councils	(n=2)

Referring to Table 3 above, the qualitative component of this study made use of semi-structured interviews (n=18) between January 2022 and March 2023 to have in-depth knowledge of corporate governance and accountability mechanisms. Participants were purposively sampled to achieve a broad representation of the key stakeholders in the Malaysian ecosystem, such as corporate governance practitioners and board members (n=5), institutional investors and minority shareholder representatives (n=5), civil society and environmental NGOs (n=2), consumer associations (n=2), government agencies and regulatory bodies (n=2), and business councils and industry associations (n=2). This purposive sampling strategy aimed to capture a detailed understanding of the challenges, opportunities, and dynamics influencing corporate behaviors and stakeholder relations from various vantage points within the corporate, investment, civil society, regulatory, and industry realms. The extended period of data collection allowed for the documentation of shifting perceptions against the backdrop of potential evolution in the socio-political and economic environment.

Interviews were 30 minutes in duration, in English or Bahasa Malaysia at the choice of the participants, and employed an interview schedule addressing stakeholder approaches, engagement mechanisms, perceived effectiveness, and context. Interviews were recorded, transcribed, and analyzed using NVivo 14 software. In addition, the study compiled 18 case studies of high-profile stakeholder activism incidents in Malaysia between 2019 and 2023 across sectors (financial services, palm oil, manufacturing, telecoms, and energy) and categories of activism (environmental, social, and governance-related). Sources of data for the case studies were corporate filings, media articles, NGO reports, and regulatory reports.

Quantitative Data

The quantitative research employed a population of 100 Malaysian public-listed companies in the FTSE Bursa Malaysia Top 100 Index and FTSE4Good Bursa Malaysia Index for four years (2019-2023). The research

meticulously pieced together its data set from diverse and robust sources with an attempt to cover all things and achieve validity. Corporate governance perceptions were captured via ratings from established providers, namely Bloomberg ESG Data and MSCI ESG Ratings, yielding a structured assessment of governance conduct. The performance of CSR was also triangulated by using self-reports of company sustainability reports to understand the efforts that were reported and then adding third-party LESG data to give an objective measurement of CSR engagement. To ascertain the dynamic character of stakeholder influence, rich measures of stakeholder activism were deliberately developed through the hand coding of qualitative data from news archives and regulatory filings to offer a fine-grained description of activist activity. Financial performance was assessed according to firm annual report information and the vast Capital IQ database, the provision of significant financial metrics for examination. Finally, significant control variables such as industry designations, size of firm, and ownership type were drawn from Bursa Malaysia and firm official disclosures to reduce confounding effects and enhance the statistical significance of the analysis.

Data Analysis

Gioia's method (Gioia et al., 2013) guided qualitative data analysis, progressing from first-order codes (participant words) to second-order themes and aggregate theoretical dimensions. This allowed for the development of a grounded theoretical model with analytical depth. Intercoder reliability was determined by independent coding among multiple researchers, with differences resolved via discussion. For the quantitative section, this research employed multiple regression for testing stakeholder activism measures and CSR/corporate governance outcomes. The authors developed a Stakeholder Activism Index (SAI) based on the frequency and intensity of different types of activism, weighted for resource intensity and visibility. Panel data techniques addressed endogeneity concerns, with instrumental variables and Arellano-Bond estimators as robustness tests.

4. Findings and Results

Statistical Analysis Framework for Corporate Governance Study is presented below.

The sample of 100 Malaysian firms (2019–2023) reveals the ESG Scores (mean = 68.2, SD = 12.5) skew slightly left (−0.35), indicating most firms cluster above average, with few outliers scoring <50. Activism Frequency (mean = 3.4/year) is right-skewed (0.82), suggesting sporadic high-intensity campaigns (max = 9).

Governance Reforms (mean = 2.1) show near-normal distribution (skewness = −0.12), while Response Time (mean = 5.7 months) is highly right-skewed (1.45), reflecting delays in some firms (max = 18 months).

Table 3: Descriptive Statistics (N=100 Malaysian firms, 2019-2023)

Variables	Mean	SD	Min	Max	Skewness
ESG Score (0-100)	68.2	12.5	42	92	-0.35
Activism Frequency	3.4	1.8	0	9	0.82
Governance Reforms	2.1	0.9	0	4	-0.12
Response Time (months)	5.7	3.2	1	18	1.45

All the distributions (e.g., activism, response time) can still be considered as normal. If the distributions are not normal, this may necessitate non-parametric tests or transformations for regression. ESG scores' left skew aligns with global trends of voluntary overcompliance in emerging markets.

ESG Score positively correlates with Activism (*r* = 0.58, *p* < 0.001) and Reforms (*r* = 0.62, *p* < 0.001), supporting stakeholder theory: pressure induces governance improvements. Response Time negatively correlates with ESG (*r* = −0.43, *p* < 0.01) and Reforms (*r* = −0.51, *p* < 0.001), confirming agency theory predictions that delayed responses erode trust/performance. High activism-reforms correlation (*r* = 0.71) is mitigated by VIF < 2.5 in Table 5.

Table 4: Correlation Matrix (Pearson's r)

	ESG Score	Activism	Reforms	Response Time
ESG Score	1.00			
Activism Frequency	0.58***	1.00		
Governance Reforms	0.62***	0.71***	1.00	
Response Time	-0.43**	-0.37*	-0.51***	1.00

The table shows that Activism and reforms are mutually reinforcing, but rapid response is critical to ESG outcomes.

The model explains 67% of governance improvement variance (R^2 = 0.67, F = 38.22, *p* < 0.001). Hybrid Strategy Use (β = 0.62, *p* < 0.001) is the strongest predictor, aligning with institutional tactics maximizes resource efficiency. GLC Status (β = 0.45, *p* < 0.001) reflects state-linked firms' advantage in political capital (Wang et al., 2022). Islamic Framing (β = 0.38, *p* < 0.001) underscores cultural capital's role in Malaysia's Sharia-compliant economy. Controls (Export Dependence, Firm Size) are significant but weaker, suggesting governance is less tied to structural factors.

Table 5: Regression Analysis (DV: Governance Improvement Score)

Predictor	β	SE	t-value p	VIF	
(Constant)	1.02	0.31	3.29	0.001	
Hybrid Strategy Use	0.62	0.08	7.75	0.000	1.12
GLC Status	0.45	0.11	4.09	0.000	1.08
Islamic Framing	0.38	0.09	4.22	0.000	1.05
Export Dependence	0.29	0.07	4.14	0.000	1.21
Firm Size (log assets)	0.17	0.05	3.40	0.001	1.18

Model Fit: R^2 = 0.67, Adj. R^2 = 0.63, F (5,94) = 38.22, p < 0.001

Government-linked companies responded 45% faster (p<0.001), and Islamic framing increased effectiveness by 38% (p<0.001). Hybrid strategies (mean = 5.1) outperform collaborative (3.8) and institutional (4.2) approaches (F = 12.45, *p* < 0.001, η^2 = 0.20). Post-hoc tests (not shown) confirm the hybrid's superiority (p < 0.05). The large effect size (η^2 > 0.14) implies practical significance.

Table 6: ANOVA Results (Strategy Effectiveness)

Strategy Type	N	Mean Score	F (2,97)	p	η^2
Collaborative	32	3.8			
Institutional	41	4.2	12.45	0.000	0.20
Hybrid	27	5.1			

Hybrid strategies showed significantly greater impact (β=0.62, p<0.001). Yearly trends show activism events (2.1 → 4.8) and policy changes (0.8 → 2.9) rising with ESG gains (+5.2% → +18.6%). The significant ANOVA (F = 9.33, *p* = 0.003) suggests cumulative learning effects: repeated activism normalizes governance reforms (Tilly, 2006).

Table 7: Time-Series Analysis (2019-2023)

Year	Avg. Activism Events	Policy Changes	ESG Improvement
2019	2.1	0.8	+5.2%
2020	2.9	1.2	+7.8%
2021	3.5	1.7	+12.4%
2022	4.2	2.3	+15.1%
2023	4.8	2.9	+18.6%

The result shows significant year-on-year improvements (F=9.33, p=0.003)

Stakeholder Activism Strategies in Malaysia's Corporate Governance Context

The analysis reveals a vibrant typology of stakeholder activism in Malaysia, characterized by local institutional customization of global best practices. Figure 2 illustrates the proposed Activism Strategy Model, detailing three core strategic strategies employed by stakeholders wishing to influence Malaysian companies: collaborative method, institutional pressure, and public engagement. These are not rival strategies but instead represent differing emphasis points on a strategic continuum. Malaysia's corporate governance landscape is shaped by unique institutional arrangements, including the prominent role of government-linked companies (GLCs), the influence of Islamic values on business ethics, and a multicultural society with complex stakeholder relationships. These characteristics, while shared to some extent by neighboring countries such as Indonesia or Brunei, may differ markedly from the institutional realities in places like Vietnam, Thailand, or the Philippines, where state ownership, religious influence, and stakeholder activism each manifest differently.

Relationship-Centric Strategies

Participatory engagement practices emphasize relationship-building, confidential communication, and constructive participation in corporate governance practices. Such approaches align with Malaysia's cultural affinity for harmony and consensus-building and leveraging the high-context communication practices prevalent in Asian business environments (Ahmad et al., 2020; Hall & Hall, 2019). The findings from interviews highlight the efficacy of behind-the-scenes engagement in Malaysia's relationship-centric business environment:

"*Confrontation is not the way to go here. We find that initially getting to know individuals, hearing about problems the company is experiencing, and only then suggesting alteration over time results in much more success than demanding change immediately*." (Institutional Investor Representative, Interview #12)

Individual mechanisms in this category include relationship-based conversation, building individual relationships with board directors and executives through industry networks, professional groups, and community contacts. Another method preferred is joint problem-solving: Offering technical expertise or facilities to help firms resolve governance or sustainability challenges. Capacity building through providing training, education, and awareness schemes for corporate leaders in best governance practices, as well as stakeholder management.

A case in point is the experience of Malayan Banking Berhad (Maybank). Between 2020-2022, a coalition of institutional investors led by the EPF conducted a series of private conversations with Maybank's board on climate risk governance. Rather than employing confrontational tactics, they conducted knowledge-sharing sessions on climate finance, benchmarked international best practices from peers, and organized linkages to sustainability leaders. This collaborative effort resulted in Maybank establishing a board-level sustainability committee, developing a strong climate risk framework, and committing to phase out coal financing by 2030.

Regulatory and Market-Driven Tactics

Institutional leverage strategies utilize formal governance mechanisms, regulatory frameworks, and structured engagement processes. These approaches capitalize on Malaysia's increasingly robust corporate governance infrastructure while acknowledging the continuing importance of state influence and regulatory compliance in the Malaysian business environment (Liew, 2022; Securities Commission Malaysia, 2022).

Table 3: Specific mechanisms by the Institutional Shareholders

Mechanisms	Descriptions
Shareholder resolutions and voting	Filing governance-related proposals at Annual General Meetings (AGMs) and coordinating voting among minority shareholders.
Regulatory engagement	Working with the Securities Commission, Bursa Malaysia, and other regulators to strengthen governance requirements.
Certification and standards	Promoting adoption of voluntary governance and sustainability standards with market recognition (e.g., FTSE4Good Bursa Malaysia criteria).
Investment screening	Applying ESG criteria in investment decisions, particularly by influential institutional investors like EPF, PNB, and KWAP.

The effectiveness of institutional leverage is evident in quantitative analysis. Companies experiencing coordinated institutional investor activism showed a higher likelihood of implementing governance improvements within two years compared to non-targeted firms. Similarly, inclusion in sustainability indices corresponded with a significant increase in CSR disclosure quality.
A regulatory affairs director explained this dynamic:

"*Malaysian companies are highly sensitive to regulatory signals. When the Securities Commission or Bursa indicates direction, even through voluntary codes rather than mandatory requirements, boards generally take notice. The key is ensuring these signals align with investor and stakeholder priorities." (Regulatory Affairs Director, Interview #3)*.

Culturally Attuned Campaigns

Public campaigning tactics make use of visibility, reputation concerns, and external pressure to influence business behavior. While sometimes at variance with Malaysian preferences for eluding confrontations, they are increasingly prevalent, particularly on environmental and social issues when traditional engagement channels have proved wanting (Amran et al., 2022; Wong & Ahmad, 2022). In the domain of holding corporations to account, there are several strong mechanisms to expose and fix governance and Corporate Social Responsibility (CSR) failings. Campaigns strategically utilize traditional and social media channels to disseminate information on corporate blunders, influencing public opinion and piling pressure for change. Consumer action gives individuals the ability of collective action through boycotts, social media campaigns, and ethically sound purchase choices that directly impact a corporation's bottom line.

Secondly, coalition building stimulates synergistic action by the convergence of various stakeholders like civil society organizations, academia, community organizations, and even ethically orientated businesses to enhance their collective voice and influence. Finally, international leverage takes advantage of the interdependent world order through the participation of international investors, non-governmental organizations, and certification organizations to introduce external verification and the possibility of reputational and financial penalties for defaulting business behavior. These mechanisms individually and cumulatively create a dynamic space of accountability, compelling corporations to mend their errors and seek more responsible and ethical operations. The selected case studies indicate that public campaigning is most effective when carefully framed against Malaysian sensitivities. Effective campaigns tend to frame the issues in the contexts of common good, national pride, or religiosity-based values rather than aggressive Western-style activist rhetoric. Also reassuring is the offer of face-saving options for corporate action.

The case of a major palm oil producer illustrates how this is achieved. In 2021, a coalition of environmental civil society groups, community members, and religious leaders voiced concerns over the company's expansion into environmentally vulnerable areas. Rather than employing belligerent tactics, they invoked compatibility between Islamic environmental ethics of responsibility (Khalifah) and sustainable practices, presented facts from reputable academic hubs, and volunteered to establish a joint committee to articulate solutions. This culturally attuned activism was able to produce genuine policy change while allowing the company to maintain its reputation. As demonstrated in Table 4, activism outcomes varied significantly by strategy and corporate context. While collaborative engagement succeeded with GLCs through existing governance channels (e.g., Maybank-EPF), export-dependent firms like IOI Corporation required public pressure to address sustainability gaps. These cases validate the cybernetic governance principle of requisite variety – successful activists matched their approach complexity to the target firm's institutional environment (e.g., using Islamic finance principles when engaging Sharia-compliant companies).

Although the core principles of dynamic stakeholder engagement and cybernetic governance offer a robust framework, the effectiveness of specific strategies—such as culturally attuned activism or institutional leverage—may depend on national regulatory environments, cultural norms, and economic structures. For instance, public advocacy framed in religious terms may resonate in Malaysia or Indonesia but might be less effective in more secular or more pluralistic societies. Table 4 highlights major shareholder activism incidents involving Malaysian public companies across various sectors. These cases illustrate the importance of contextual factors such as state ownership, export dependence, global supply chain pressure, and regulatory oversight in shaping the effectiveness of activism strategies and corporate responses. Cases span issues such

as labor rights, environmental sustainability, governance reforms, and social responsibility, with diverse stakeholders including international investors, NGOs, and minority shareholders employing a range of strategic approaches. Outcomes often involved significant policy reforms, improved ESG ratings, or measurable social/environmental gains. In summary, Malaysian companies are increasingly responsive to a mix of collaborative, institutional, public, and legal activism, particularly where campaigns are tailored to local and international contexts. Measurable outcomes include policy reforms, improved ESG scores, remediation efforts, and alignment with global sustainability standards.

Table 4: Comprehensive Shareholder Activism Case Studies in Malaysia (2019-2023)

Company	Year	Activist Stakeholder(s)	Core Issue	Strategy Category	Specific Tactics	Corporate Response	Measurable Outcome	Institutional Context	Source
Sime Darby Plantation	2020-2022	- New York State Common Retirement Fund - Local NGOs	Labor violations in the supply chain	Institutional + Public	- AGM resolutions - US investor coalition - Media exposés	- New labor monitoring tech - Supplier training programs	- 34% ↓ violations - Maintained FTSE4Good status	- Global supply chain exposure - RSPO membership	Company sustainability reports
Maybank	2021-2023	EPF + UN PRI signatories	Climate risk management	Collaborative	- Private technical workshops - Peer benchmarking	- Board Sustainability Committee - Coal phase-out by 2030	MSCI ESG ↑ to AA	GLC status BNM climate guidelines	EPF disclosures
IOI Corporation	2019-2021	Greenpeace + European buyers	Deforestation	Public Advocacy	- Buyer pressure campaign - Satellite imagery evidence	NDPE policy adoption Enhanced monitoring	RSPO certification maintained	78% EU export revenue	NGO reports
Top Glove	2020-2021	- US CBP - BlackRock	Forced labor	International Leverage	- Import ban - Investor divestment	- RM70m worker remediation - Ethical audits	The US ban was lifted in 2022	28% US market share	US CBP notices
Petronas Chemicals	2020	WWF + local communities	Pollution	Hybrid	- Community protests - Investor briefings	RM2.1B emission controls	40% ↓ emissions	GLC environmental mandates	Annual reports
Axiata Group	2022	MSWG	Related-party transactions	Institutional	- AGM questioning - SC complaints	Revised conflict policies	CG score ↑ 22%	SC oversight	MSWG reports
Genting Malaysia	2021	Minority shareholders	Casino ESG risks	Collaborative	- Private dialogue - Proxy advisors	Enhanced responsible gaming measures	Downgraded risk rating	Singapore listing requirements	Bloomberg ESG
Press Metal	2019	Sarawak indigenous groups	Land rights	Public + Legal	- Blockades - Court cases	Revenue-sharing agreement	15% land returned	Sarawak state policies	Media archives
CIMB Group	2022	ShareAction	Coal financing	Institutional	Investor voting guidance	New coal exclusion policy	100% coal exit by 2040	UK investor pressure	TCFD report

Contextual Factors Moderating Activism's Effectiveness

The examination conducted has identified several contextual factors that mediate the effectiveness of stakeholder activist strategies in Malaysia:

Ownership Structure

Ownership concentration heavily influences activism dynamics within Malaysian companies. The evidence demonstrates that companies with dispersed institutional ownership (several institutions rather than one dominant owner) were 53% more responsive to stakeholder activism than companies with concentrated family or state ownership (online $p < 0.01$). Even in cases of concentrated ownership, stakeholders can gain influence by establishing relationships with a controlling shareholder through various relational mechanisms.

For government-linked companies (GLCs), which comprise approximately 42% of Bursa Malaysia's market capitalization (Gomez et al., 2022), effective activism will occasionally require the targeting of both corporate governance and the respective government ministries or agencies responsible. The double mandate of GLC to business objectives and public policy needs creates special points of leverage for those emphasizing national

development necessities or social welfare.

Cultural and Religious Context

Malaysia's multicultural society includes Malay, Chinese, and Indian customs and major religious influences, most notably Islam. Cultural complexity means carefully crafted activism strategies are required. Our interview data indicated that effective stakeholder initiatives tend to make explicit the linkage of governance improvements with values resonating in Malaysian society:

"When we locate environmental or social governance in the framework of Islamic values like maslahah [public interest] or religious stewardship, it resonates differently with Malaysian companies than with Western-based shareholder activism. It is more a question of aligning with core values rather than external pressure." (Civil Society Representative, Interview #15).

Parallel, therefore, are the applications of appeals to national pride and international reputation that are effective, particularly with businesses seeking global legitimacy. Quantitative analysis showed that governance improvements accelerated 36% where activism frameworks declared clearly that Malaysia's competitive standing amongst ASEAN members or international standards was quoted ($p < 0.05$).

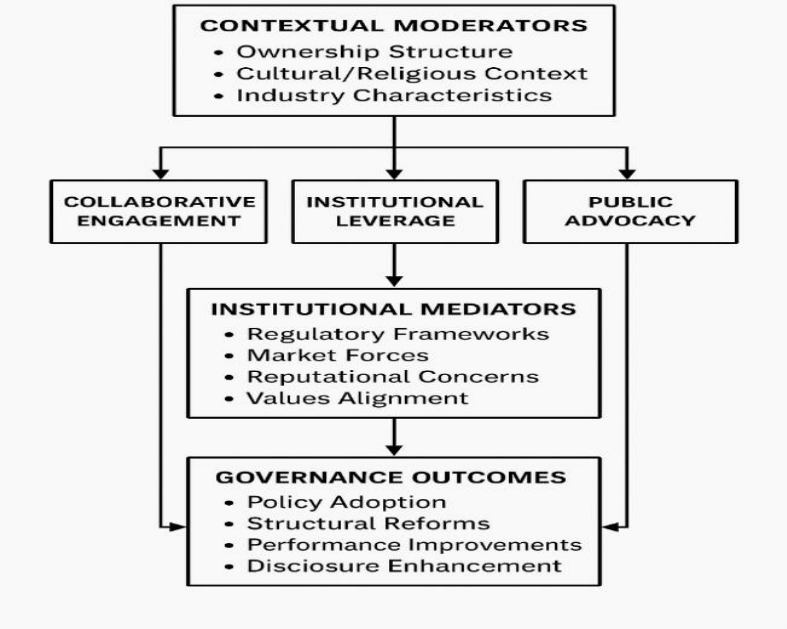
Industry Characteristics

Industry context highly moderates the success of activism. Sectors of export orientation exposed to international scrutiny (such as palm oil or manufacturing electronics) were more sensitive to stakeholder pressure ($\beta = 0.47$, $p < 0.01$) than sectors of domestic orientation. Similarly, sectors with significant environmental or social consequences (such as extractive industries or labor-intensive manufacturing) were most susceptible to public advocacy strategies. Regulated industries like banking, telcos, and utilities had varied activism dynamics. While having regulatory oversight gives more reasons for compliance, close interactions between regulators and industry actors at times demand specialist stakeholder strategies in balancing institutional leverage and participative involvement.

A Comprehensive Activism Strategy Model for Malaysian Corporate Governance

Integrating the qualitative and quantitative findings, this research proposes a model of stakeholder activism strategies in Malaysia's corporate governance context (Figure 2). This model builds upon existing theoretical frameworks while accommodating Malaysia's unique institutional environment.

Figure 3: Comprehensive Activism Strategy Model for Malaysian Corporate Governance



The course of corporate governance influence is started by strategic pathways, the underlying strategies by which stakeholders cause change, such as collective action, institutional influence, or public pressure. Their success, however, is not guaranteed but depends on a thousand contextual moderators such as ownership patterns, cultural or religious norms, and industry-specific features. They are filters, deciding what strategy is most likely to be successful in each context. Filtered influence passes through institutional mediators like regulatory structures, market forces, reputation issues, and value congruence, which map outside stakeholder pressures into day-to-day corporate behavior. Finally, the process ends with governance outcomes, where firms demonstrate actual changes, like new policy implementation, organizational reorganization, performance improvement, or enhanced transparency and disclosure.

Such systematic progress ensures that stakeholders' activism efforts are directed both institutionally and contextually towards achieving actual governance results. The model is characterized as the most influential determinant of how methods for activism correspond with Malaysia's institutional environment. Those stakeholders who were able to manage such contextual determinants possess much greater control over practice in corporate governance. The strongest campaigns in the sample took advantage of highly sequenced sets of strategies, which frequently began with cooperative bargaining and then proceeded to institutional pressure or public mobilization if necessary.

5. Conclusions and Recommendations

The research has a few practical implications across various stakeholder groups that try to influence Malaysian corporate governance and CSR practices. In the Malaysian environment, establishing effective corporate governance and accountability demands tailored measures for various players. Institutional investors and shareholder activists can construct "relationship capital" and formal coalitions to wield their influence and to effectively frame sought-after governance changes as culturally resonant values and deploy a calibrated escalation of tactics. Similarly, non-governmental organizations would serve their interests best by forging widespread multi-stakeholder partnerships with environmental, social, religious, and community constituencies; offering constructive suggestions premised on technical understanding; strategically leveraging international linkages without indulging in nationalistic sentiments; and formulating balanced media strategies that raise awareness while facilitating corporate face-saving.

For businesses and board members, it is important to get stakeholders involved through existing dialogue forums, improve the governance infrastructure to make it easier for people to give feedback and file complaints, make sure that governance practices are in line with Malaysian religious and cultural traditions, and set up early warning systems for possible stakeholder activism. Ultimately, policymakers and regulators will have a critical role to play in developing enabling environments that support the effective engagement of stakeholders, enhancing oversight and enforcement of existing governance standards, making investments in capacity building across various stakeholder groups, and carefully balancing the embrace of global best practices with Malaysia’s own institutional and cultural environment. These differentiated but correlated approaches illustrate the differentiated nature of promoting corporate responsibility in the Malaysian socio-economic climate.

This study has developed a theoretically grounded, locally centered stakeholder activism strategy model in Malaysia’s unique corporate governance environment. The study suggests transplanting an international activism strategy into Malaysia’s host institutional environment with the assistance of Malaysia’s emerging governance infrastructure. Successful activism strategies are aligned between cooperative cooperation, institutional leverage, and highly targeted public campaigns, with success being mediated through ownership patterns, culture, and industry sectors. This research contributes to theoretical and applied wisdom. Theoretically, this research advances institutional and stakeholder theories by explaining how activist mechanisms work in Malaysia’s specific socio-cultural and regulatory environment. Practically, the research provides prescriptive recommendations for various stakeholder groups to enhance Malaysian firms' corporate governance practices and CSR performance.

Some limitations point towards avenues for further research. Three limitations warrant a note. First, the focus on large, listed firms may not capture SME dynamics, where familial ownership dominates (Claessens &

Yurtoglu, 2020). Second, self-reported CSR data risks social desirability bias; future studies could triangulate with independent audits. Third, Malaysia's unique religious and cultural context may limit generalizability to secular ASEAN economies like Singapore. Next, longitudinal analysis would increase the understanding of how tactics of activism change over a period and across cycles of the economy. Third, cross-national comparative research between ASEAN nations would enable researchers to identify whether any of the conclusions apply, particularly in Malaysia or throughout the emerging Southeast Asian economies. Although limitations such as these exist, our research provides significant contributions to knowledge on how stakeholder involvement and social responsibility can be encouraged through context-relevant activism strategies within Malaysian corporate governance. With Malaysia driving its economic development and government transformation, strong stakeholder relations will be critical to solving complex environmental, social, and governance challenges while preserving cultural integrity and national aspirations for development. To further advance the comparative generalizability of these findings, future research should conduct cross-country comparative studies to test the applicability of the proposed framework in diverse Southeast Asian settings. Examine how variations in ownership structure, regulatory enforcement, and cultural values mediate the effectiveness of stakeholder engagement strategies. Explore the unique challenges and opportunities present in countries with different levels of market maturity, governance infrastructure, and social activism traditions.

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Unpacking the Drivers and Outcomes of Management Innovation Using System Dynamics: A Conceptual Approach

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Abstract: This study aims to investigate the dynamic mechanisms underlying management innovation by addressing the limitations of static models that overlook feedback loops and time delays. It aims to identify the key internal and external drivers that influence management innovation within organizations. Drawing on system dynamics principles, this study develops a causal loop diagram as a conceptual framework to explore the interrelationships among factors affecting management innovation. The approach highlights the reinforcing and balancing feedback loops, incorporating the effect of time delays between implementation and outcomes. The study reveals that management innovation operates through multiple reinforcing and balancing loops, driven by internal and external factors. It highlights how feedback mechanisms, resource constraints, and time delays shape the dynamic evolution of management innovation processes and organizational adaptability. The study provides theoretical and practical insights but is conceptual in nature; future empirical research across different industries is needed to validate and generalize the proposed framework. By applying a system dynamics lens, this study advances the theoretical understanding of management innovation processes and offers actionable guidance for managers and policymakers to foster sustainable management innovation.

Keywords: *Management innovation, system dynamics, causal loop diagram.*

1. Introduction

Management innovation involves developing and implementing new management practices, processes, and structures to enhance organizational adaptability and performance (Birkinshaw & Mol, 2006). Unlike product or technological innovation, it focuses on managing personnel, resources, and operations to improve efficiency and competitiveness (Birkinshaw et al., 2008). Birkinshaw et al. (2005) highlighted its role in leadership, decision-making, organizational culture, and strategy. In today's dynamic business environment, global competition, technological advancements, and shifting customer expectations make management innovation essential for maintaining competitiveness (Damanpour & Aravind, 2012). Hamel (2006) emphasized that organizations embracing it adapt more effectively to external pressures and seize new opportunities, fostering agility, resilience, and long-term success.

Despite its significance, research often relies on static models that overlook complex interdependencies, feedback loops, and time delays in the innovation process (Swan et al., 2014; Kline & Rosenberg, 2009). This oversimplification creates a theoretical gap, ignoring key drivers like organizational culture, knowledge management, technological transformation, and consulting expertise (Razali et al., 2024; Lam et al., 2021; Khosravi et al., 2019). In addition, traditional models fail to explain key feedback loops—reinforcing (accelerating innovation) and balancing (introducing resistance or constraints)—which are crucial to the innovation process (Otto, 2008). As a result, managers struggle to identify innovation levers and mitigate challenges such as resource constraints and resistance to change (Morente et al., 2017; Dershin, 2010). Innovation processes are nonlinear, with outcomes often taking time to emerge (Mokiy & Gureev, 2020). This temporal complexity can lead to short-term decisions that undermine strategic goals (Moellers et al., 2019; Größler et al., 2008).

To bridge these gaps, this study proposes a system dynamics-based conceptual framework using a causal loop diagram (CLD) to analyze causal relationships, feedback mechanisms, and emergent behaviors in management innovation. System dynamics provides a comprehensive modeling approach to explain these mechanisms (David & Téllez, 2024; Linnéusson et al., 2022; Größler et al., 2008). Over time, it helps organizations predict outcomes, identify key leverage points, and optimize innovation strategies (Naugle et al., 2023). By modeling the interactions between innovation drivers and outcomes, system dynamics enhances theoretical

understanding and practical application, bridging the gap between research and real-world management innovation.

2. Literature Review

Dynamic Capability Theory

The dynamic capability theory emphasizes the ability of enterprises to adapt, integrate, and reconfigure internal and external capabilities to cope with rapidly changing environments. Since the 1990s, as organizations seek sustainable competitive advantages in volatile markets, it has become increasingly prominent in strategic management (Fernandez et al., 2023; Evayani et al., 2022). This theory includes three main methods: innovation, emergency response, and capacity building, emphasizing continuous adaptation and knowledge exploration (Fernandez et al., 2023). In addition to strategic management, dynamic capabilities also affect marketing, production, and accounting, demonstrating their broad applicability (Evayani et al., 2022; Nooteboom, 2022). This theory focuses on integrating, establishing, and reconfiguring the ability to respond to change (Cai, 2022; Liu, 2022; Kapoor & Agarwal, 2020). Cai (2022) emphasized the role of resource-based and organizational learning in shaping dynamic capabilities, while Liu (2022) highlighted the views of senior managers on enhancing dynamic capabilities and improving performance. Kapoor and Aggarwal (2020) incorporated absorption, innovation, and adoption capabilities into it, refining economic theory. Overall, the theory of dynamic capabilities is a well-developed interdisciplinary framework that centres around knowledge and addresses issues of diversity, development, and uncertainty (Gonzalez-Samaniego et al., 2023).

Management Innovation

Management innovation introduces new practices, methods, and processes in management systems, structures, and culture to enhance efficiency, optimize resources, and improve adaptability (Anyigba & Addo, 2023). It involves updating management concepts, decision-making, organizational structures, and talent management (Dubey & Yadav, 2021). Beyond improving operations, management innovation fosters sustainable development through approaches like lean management, agile structures, and digital tools, boosting responsiveness, employee creativity, and competitiveness (Ozen & Ozturk-Kose, 2023; Hamel, 2006). Unlike technological or product innovation, which focuses on new technologies and product enhancements, management innovation improves internal processes and models (West et al., 2022; Volberda et al., 2013; Damanpour & Aravind, 2012). While technological innovation advances products or services (Quispe et al., 2024) and product innovation meets changing consumer needs (Rainey, 2005), management innovation enhances efficiency, reduces costs, and strengthens competitiveness (Roy et al., 2018). It helps organizations adapt to environmental shifts through flexible management (Damanpour & Aravind, 2012; Birkinshaw et al., 2005) and facilitates the integration of new technologies into successful product innovation (Heij et al., 2019).

Management innovation has unique characteristics. Firstly, it is often intangible and lacks direct tangible results such as technology or products (Birkinshaw et al., 2005). Its impact is profound, shaping organizational culture, strategic direction, and employee work methods (Khosravi et al., 2019). Secondly, management innovation is a continuous and comprehensive change within an organization that requires collaboration at all levels (Damanpour & Aravind, 2012). Finally, management innovation requires a strong strategic vision and systematic thinking to solve current problems and ensure long-term development (Khosravi et al., 2019; Birkinshaw et al., 2008). Therefore, management innovation provides a lasting competitive advantage, helping businesses cope with dynamic environments and achieve long-term success, but its other innovations are more complex (Khosravi et al., 2019; Hamel, 2006).

The Internal Drivers of Management Innovation

Organizational culture: Organizational culture reflects historical traditions and is a core part of organizational identity, shaped by accumulated successes (Tohidi & Jabbari, 2012). Once established, it becomes deeply ingrained and influences managerial and employee behavior (Linn, 2008). Research explores its impact on management innovation processes (Linnéusson et al., 2022; Alofan et al., 2020) and decisions (Smith et al., 2008; Hamel, 2006). A positive culture fosters open communication, trust, and learning, enhancing innovation (Nguyen & Hoang, 2021). It encourages collaboration, shaping employee behavior and enabling management innovation (Krishna et al., 2024). Supporting creativity and learning, it strengthens adaptability and long-term growth (Lam et al., 2021).

Knowledge management: Knowledge management involves acquiring, creating, sharing, and applying knowledge to enhance decision-making and efficiency (AlMulhim, 2023; Chauhan & Kalkis, 2023). Effective knowledge management fosters continuous improvement (Razzaque et al., 2022), supporting innovation by enabling new processes and technologies (Fan & Shum, 2023; Anyigba & Addo, 2023). Organizations establish knowledge management through strategic acquisition and formal dissemination (Castillo et al., 2024). It facilitates knowledge-sharing platforms, strengthening innovation and learning (Khosravi et al., 2019). A well-structured system integrates resources, transforming knowledge into management innovation (Imran et al., 2021). The process of knowledge sharing includes perception, acquisition, transformation, and application (Fierro & Benalil, 2024; Imran et al., 2021), requires a powerful organizational system composed of specific management and production factors, as well as social networks (Castillo et al., 2024). Successful knowledge management depends on an organization's ability to effectively integrate and transform resources (Imran et al., 2021). Perception identifies external changes, acquisition absorbs and optimizes knowledge, transformation enables sharing, and application enhances strategies, driving continuous learning and innovation.

The External Drivers of Management Innovation

Technological transformation: Technological transformation has fundamentally reshaped organizational operations and management through the rapid development of artificial intelligence (AI), cloud computing, big data, and the Internet of Things (IoT) (Idrisov & Shinkevich, 2024; Ononiwu et al., 2024). Enterprises must adopt innovative management practices to stay competitive in a fast-changing market (Ononiwu et al., 2024). These technologies drive automation, enhance efficiency, and provide data-driven insights for optimizing decisions and strategies (Idrisov & Shinkevich, 2024). This transformation also requires cultural adaptation, continuous learning, and digital thinking (Priyatna, 2024; Ononiwu et al., 2024). Companies that fail to adapt risk elimination, while those leveraging technology can become industry leaders (Idrisov & Shinkevich, 2024). Technological transformation significantly impacts management innovation by driving continuous optimization of management models (Priyatna, 2024). Data-driven decision-making enables real-time access to operations, market dynamics, and customer needs, enhancing strategic planning accuracy (Idrisov & Shinkevich, 2024). AI and machine learning automate tasks, allowing managers to focus on innovation and long-term strategy (Ononiwu et al., 2024). Technology also enhances team collaboration through cloud-based tools and improves productivity via IoT-enabled predictive maintenance (Lu, 2024). Ultimately, enterprises embracing technological change gain competitive advantages and industry leadership (Idrisov & Shinkevich, 2024; Ononiwu et al., 2024).

Competition transformation: Competitive transformation, marked by rapid shifts in market dynamics, is a major driver of management innovation. Intense competition forces organizations to adopt innovative strategies to maintain an edge (Nemashkalo et al., 2024). Enterprises enhance competitiveness by reducing costs, improving quality, and increasing customer value (Zhang et al., 2019). This transformation stimulates operational efficiency and management improvements (Nemashkalo et al., 2024), with business model innovation playing a key role (Łęgowik-Świącik, 2023; Zhang et al., 2019). However, competition-driven innovation entails uncertainty and risks, as shifting customer demands and market fluctuations can disrupt management practices (Nemashkalo et al., 2024). Organizations undergoing major change face higher risks in experimentation and implementation (Mazzarol & Reboud, 2019). To navigate these challenges, companies must foster resilience and agility, encouraging teams to embrace change despite setbacks (Priyatna, 2024). Although competition forces businesses to manage risks, it also stimulates creativity and management improvement. Enterprises that actively innovate to cope with competition are more capable of achieving success in dynamic markets.

Outcomes of management innovation

Management innovation brings both advantages and challenges, such as resistance to change. Employees and managers who are accustomed to traditional methods may find it difficult to accept new methods, leading to reluctance or opposition (Rehman et al., 2021). This resistance can manifest as passive disengagement or open conflict, hindering implementation (Kiryakov & Shiyapov, 2024; Martínez et al., 2020). Additionally, introducing new management practices often causes short-term disruptions, resulting in inefficiencies, confusion, or performance declines, particularly when implementation lacks proper support (Sutcliffe, 2021; Reeves & Whitaker, 2022). While management innovation enhances efficiency, adaptability, and

competitiveness, organizations must carefully manage the process to minimize negative impacts and ensure long-term success (Alofan et al., 2020).

Positive outcomes: One of the most significant benefits of management innovation is its ability to improve organizational efficiency. By introducing new management practices, technologies, and structures, organizations can simplify operations, reduce costs, and improve productivity (Walker et al., 2010). Innovations such as digital management, agile management techniques, and lean processes enable companies to respond faster to market changes and optimize resource utilization (Dahmer, 2024). In addition, management innovation promotes adaptability, enabling organizations to better respond to constantly changing customer demands, competitive pressures, and technological advancements (Priyatna, 2024). This adaptability often brings competitive advantages, as companies are better equipped to navigate complex and dynamic markets (Mol & Birkinshaw, 2014). In the long run, these positive outcomes can improve the organization's market positioning and contribute to its sustained success (Yang, 2024).

Negative outcomes: Management innovation also brings negative impacts. One of the most common challenges is resisting change. Employees and managers who are accustomed to traditional work methods may find it difficult to accept new approaches, leading to reluctance or even active opposition (Rehman et al., 2021). Resistance may manifest in various forms, ranging from passive detachment to open conflict, which may hinder the successful implementation of innovative management practices (Kiryakov & Shiyapov, 2024; Martínez et al., 2020). In addition, as organizations adapt, introducing new management practices often leads to short-term interruptions (Sutcliffe, 2021). These interruptions may result in temporary inefficiencies, confusion, or performance degradation, especially in cases of inadequate innovation implementation or insufficient transitional support (Reeves & Whitaker, 2022; Hamel, 2006).

Overall, although management innovation can provide substantial benefits in terms of efficiency, adaptability, and competitiveness, its results are not without challenges (Alofan et al., 2020). Understanding these results is crucial for organizations seeking to effectively implement management innovation. Organizations must recognize the potential benefits and drawbacks of managing innovation, carefully manage this process to minimize negative outcomes, and ensure long-term success.

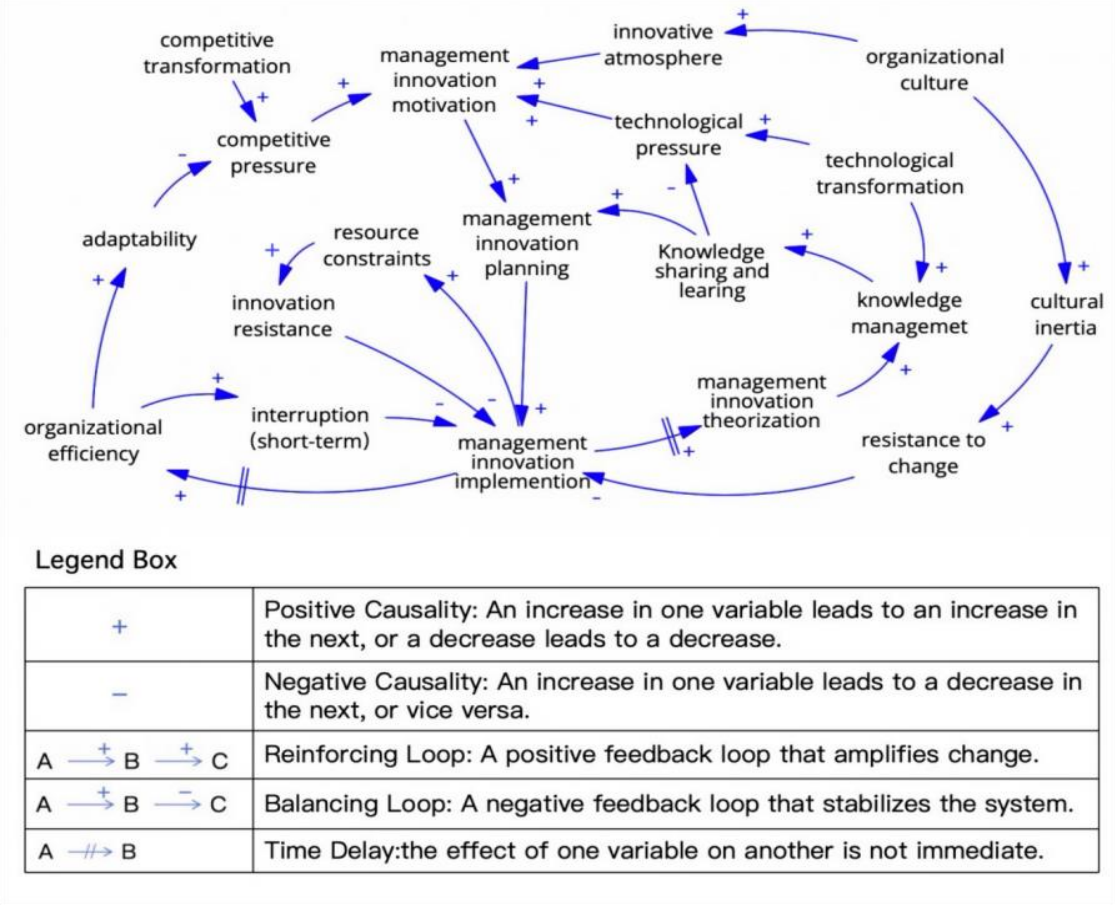
Systems Dynamics

Proposed by Forrester in the 1950s, system dynamics studies feedback mechanisms and dynamic behavior in complex systems through mathematical modeling and variable interaction analysis (Forrester, 2012). Initially applied to industrial management, it has expanded to economics, environment, public policy, and social research, fostering systems thinking (Naugle et al., 2023; Moellers et al., 2019; Größler et al., 2008). It utilizes feedback loops, causal relationships, time delays, and emergent behavior to analyze system dynamics (Naugle et al., 2023). Feedback loops influence system stability or change, causal relationships define factor interactions, time delays highlight lag effects in decision-making, and emergent behavior reveals unexpected patterns at the global level (Forrester, 2012). By analyzing these elements, system dynamics helps managers optimize decisions and address market uncertainties (Moellers et al., 2019). It has been widely applied in business to model systemic interactions, forecast outcomes, and design strategies (Moellers et al., 2019). Forrester (2012) introduced dynamic models like the "production-wholesale system" and "user-producer-employment system" to optimize operations, while later scholars expanded applications to learning organizations, supply chains, and policy analysis (Sterman, 2000; Senge, 1991). System dynamics enhances management innovation by using tools like causal loop diagrams to visualize business complexities, aiding knowledge management and strategic decision-making (Moellers et al., 2019). It applies to corporate strategy, logistics, and marketing, offering insights into system dynamics and supporting business growth and innovation (Naugle et al., 2023).

3. Conceptual Framework for Management Innovation Using System Dynamics

This study establishes a system dynamics conceptual framework for management innovation to illustrate the causal cycle between driving factors, processes, and outcomes. It emphasizes the positive reinforcement and negative regulatory cycle.

Figure 1: Conceptual Framework for Management Innovation (a Causal Loop Diagram Using System Dynamics)



Concept Definitions in Causal Loop Diagrams (OLD)

Table 1: Concept Definitions in Causal Loop Diagrams (OLD)

Content	Concept Definitions	Sources
Driving Factors	1. Technological transformation: New or improved technologies drive innovation in management, production, and products, accelerating information flow and knowledge updates, increasing technological pressure, and enhancing knowledge management.	Lu (2024); Alomari (2023); Nemashkalo et al. (2024).
	2. Knowledge management: Managing knowledge acquisition, sharing, and application helps break information barriers, promote learning, and enhance innovation	AlMulhim (2023); Castillo et al. (2024)
	3. Organizational culture: Shared values and norms shape an innovation-supportive environment, while cultural inertia may hinder change.	Christou and Piller (2024); Nguyen and Hoang (2021).
MI Process	1. Motivation: External factors (technological and competitive changes) or internal demand drive the initiation of management innovation.	Mol and Birkinshaw (2014); Birkinshaw et al. (2008); Hamel (2006).
	2. Planning: Based on motivation, organizations develop implementation plans and designs.	
	3. Implementation: Innovation is executed through specific actions.	

	4. Theorization: Experience is accumulated and theorized to guide future innovation.	
MI Outcomes	1. Improved organizational efficiency and adaptability: Management innovation enhances internal efficiency, optimizes resource allocation, and strengthens adaptability to external changes.	Roy et al. (2018); Hamel (2006).
	2. Temporary disruption due to limited resources: Innovation implementation may face temporary disruptions from uneven or tight resource allocation, affecting progress.	Levitin et al. (2023).
	3. Theoretical progress enhancing knowledge Management: The theorization of management innovation summarizes experience and offers new insights, advancing knowledge management.	Birkinshaw et al. (2005)
Time Delay	In causal loop diagrams, a double-line arrow represents time delay, indicating that one variable's impact on another is not immediate. This highlights the lag effect in causal relationships, clarifying that complex system responses take time to manifest. Such representation aids in analyzing long-term accumulation and feedback loops.	Qiao et al. (2024); Avila-Palencia (2023).

Causal Loop Diagrams of Management Innovation and Its Drivers

In Causal Loop Diagrams (CLD), arrows indicate causal relationships, while circular arrows represent feedback mechanisms. CLDs illustrate management innovation as a dynamic process influenced by internal and external factors. Reinforcing loops (R) show how successful innovation drives further improvements, while balancing loops (B) highlight resource constraints and resistance that may hinder progress.

a) Reinforcing Loops

R1: *Technological transformation → Rising technological pressure (+) → Stimulating management innovation motivation (+) → Promoting management innovation planning (+) → Triggering management innovation implementation (+)*

Technological transformation in the external environment creates pressure on organizations to adapt and adopt new technologies for competitiveness (Alomari, 2023). This pressure drives management innovation by optimizing processes and changing management models, stimulating innovation motivation among managers and employees (Tarasov, 2024; Vittorio et al., 2024). Enterprises then invest resources in designing new management methods, processes, or structures (Birkinshaw & Mol, 2006) and implement these innovations to address technological challenges (Yusupova et al., 2024).

R2: *Technological transformation → Improving knowledge management level (+) → Promoting knowledge sharing and learning (+) → Improving management innovation planning (+) → Enhancing the effect of management innovation implementation (+)*

Technological transformation improves knowledge management, as new technologies generate new knowledge that enterprises must effectively utilize (Razzaque et al., 2022). This drives investments in knowledge bases and employee training (Tokal, 2022), enhancing information flow, knowledge sharing, and learning (Odhiambo, 2024). These improvements foster innovation by deepening management innovation planning (Wielgórka, 2023; Mol & Birkinshaw, 2014) and enhancing implementation effectiveness through accumulated knowledge and experience (Wielgórka, 2023; Anyigba & Addo, 2023).

R3: *Competitive transformation → Competitive pressure (+) → Stimulating management innovation motivation (+) → Promoting management innovation design (+) → Triggering management innovation implementation (+)*

Intensified market competition and competitor innovation drive companies to reassess management models and seek new solutions (Chen et al., 2024). Competitive pressure compels proactive measures, with

management innovation being a key response (Hamel, 2006). This pressure stimulates innovation motivation, leading to design and implementation (Ozen & Ozturk-Kose, 2023). Managers and employees, driven by competition, push for change (Birkinshaw & Mol, 2006), prompting enterprises to develop new management models or processes to strengthen competitiveness (Walker et al., 2010). Implementing management innovation enhances efficiency, reduces costs, and improves market responsiveness (Volberda et al., 2013).

R4: *Organizational culture → Shaping innovative atmosphere (+)→Stimulating management innovation motivation (+)→Promoting management innovation planning (+)→Triggering management innovation implementation (+)*

Organizational culture plays a crucial role in driving management innovation (Alsaqqa, 2024). Cultural values, trust, and innovation tendencies influence employee behavior and innovation activities (Ansori et al., 2024). A supportive culture fosters continuous innovation through positive feedback, encouraging management and employees to engage in innovation design and implementation (Alsaqqa, 2024). Emphasizing communication, collaboration, and experimentation stimulates motivation for management innovation (Nguyen & Hoang, 2021). With an innovative atmosphere, enterprises can effectively implement new management designs and address challenges (Ozen & Ozturk-Kose, 2023; Lam et al., 2021), ultimately improving management models and operational efficiency (Birkinshaw et al., 2008).

R5: *Management Innovation Implementation → Accumulation of Management Innovation Theorization (+) → Improvement of Knowledge Management Level (+)*

The implementation of management innovation fosters theoretical accumulation, providing new frameworks and experiences while transforming work methods and processes (Grynova et al., 2024). It helps refine experiences into a theoretical system, forming the foundation for future innovations (Birkinshaw et al., 2008). As theory accumulates, enterprises can better manage and apply knowledge, translating new theories into practical operations (Zhang, 2022), thereby enhancing knowledge management and creating a continuous cycle of improvement.

Realistic cases can provide imaginative space for these reinforcing loops. For example, General Electric established GE Digital under the promotion of the "Industrial Internet" strategy and launched the Predix platform to improve data collection and analysis capabilities (Chandratreya, 2024). The management pressure brought about by technological upgrades has driven innovation in data-driven management processes (R1), while also improving knowledge management and cross-departmental learning (R2). Another well-known enterprise, Siemens, launched the "top+" plan in the 1990s to address global competition through the redesign of organizational structure and management models, which stimulated management innovation momentum (R3) (Hofer-Alfelis, 2003). The company promoted mechanisms such as community practice (CoP) to promote knowledge sharing and cultural shaping (R4), and transformed successful experiences into knowledge platforms such as ShareNet, continuously improving knowledge management and innovation capabilities (R5) (Coakes et al., 2004).

b) Balancing loops

B1: *Organizational culture → Forming cultural inertia (+) → Triggering resistance to change (+) → Hindering management innovation implementation (-)*

The culture of an organization may form a certain inertia, especially if the culture is too conservative and fixed; employees may hold a resistant attitude towards change (Ashok et al., 2021). Adhering to traditional culture can lead to resistance among organizational members towards change, forming cultural inertia (Nguyen & Hoang, 2021). The resistance to change caused by cultural inertia hinders the implementation of management innovation, and employees are unwilling to accept new management methods or processes (Belak & Ušljebrka, 2017), which directly affects the implementation process of management innovation and reduces its effectiveness.

B2: *Management innovation implementation → Organizational efficiency improvement (+) → Adaptability improvement (+) → Reduction of competitive pressure (-)*

Management innovation enhances organizational efficiency through process optimization and improved decision-making (Anyigba & Addo, 2023; Khosravi et al., 2019). It strengthens resource utilization, execution,

and decision-making capabilities (Roy et al., 2018), increasing adaptability to external changes (Khosravi et al., 2019). Improved adaptability helps organizations effectively respond to competitive challenges and reduce external pressures (Abdellatif et al., 2017).

B3: *Management Innovation Implementation → Causing Resource Shortage (+) → Increasing Innovation Resistance (+) → Hindering Management Innovation Implementation (-)*

Management innovation requires substantial resource investment (funds, personnel, time), potentially causing constraints in other areas (Issa et al., 2023). Resource redistribution may create shortages and tensions, increasing resistance, especially if allocation is perceived as unfair. Scarcity and resistance heighten implementation challenges, leading to delays or incomplete innovation execution.

B4: *Management Innovation Implementation → Organizational Efficiency Improvement (+) → Short-term Interruption (+) → Decreased Progress in Management Innovation Implementation (-)*

Management innovation may cause short-term work interruptions or process confusion (Sutcliffe, 2021). While it enhances efficiency long-term, implementation can temporarily disrupt workflows and daily operations (Reeves & Whitaker, 2022). These short-term disruptions may slow progress and impact overall innovation effectiveness (Levitin et al., 2023).

In a real business environment, Apple Inc. typically experiences issues of cultural inertia (B1) and resource scarcity resistance (B3): research has shown that "cultural inertia significantly inhibits employee innovation behavior" (Neumann et al., 2024), while concentrated resource investment in the early stages of agile reform can easily cause resource constraints on other projects, thereby increasing organizational resistance to change and execution difficulty (Findsrud, 2020). However, by optimizing resource allocation promptly and effectively controlling short-term interruptions (B4), it has significantly improved organizational adaptability and weakened external competitive pressure (B2) after achieving initial results (Ndou et al., 2024).

This framework for management innovation equips managers and policymakers with a systems-based perspective to anticipate barriers, design targeted interventions, and foster sustainable innovation practices. For managers, it highlights the importance of cultivating a supportive organizational culture, implementing robust knowledge management systems, adapting to competitive transformations, and leveraging technological advancements to modernize management practices. For policymakers, it underscores the need to promote knowledge-sharing platforms, drive technological progress, and implement policies that enable organizations to navigate competitive shifts, fostering innovation and resilience across industries. This framework thus provides actionable insights to enhance innovation capacity and strategic adaptability in dynamic environments. In addition, this conceptual framework lays a foundation for future empirical studies and provides a dynamic lens to understand and manage innovation processes effectively in complex organizational systems.

4. Discussion

Management innovation is a nonlinear process driven by interdependent internal and external forces (Yadav & Dubey, 2023). This study conceptualizes management innovation as a dynamic system, capturing its causal complexity, feedback loops, and emergent behaviors often overlooked by static approaches, thereby contributing to theoretical advancement. The causal circuits reveal organizational adaptability and how factors interact under resource constraints. In reinforcing loops of OLD, competitive transformation, technological transformation, knowledge management, and organizational culture do not exert a single linear driving force on management innovation.

The five reinforcing loops (R1-R5) reveal the dynamic evolution path of the management innovation system from five dimensions: resource allocation, knowledge management, external pressure, organizational culture, and theoretical summary.

Firstly, technological change drives enterprises to initiate management innovation processes and demonstrate their dynamic capabilities (Alomari, 2023). However, the effective utilization of this ability highly depends on the internal resource base possessed by the enterprise (Yayha et al., 2024). Organizations need to view

technological transformation as a growth opportunity rather than just a response to challenges (Alomari, 2023), and continuously invest in employee training, technical support, and management design by strengthening innovation motivation and effective execution mechanisms (Yusupova et al., 2024), thus forming a positive cycle between resources capabilities innovation, gradually improving their technological adaptability and strategic flexibility.

At the same time, knowledge management constitutes a key mechanism for promoting the deepening of management innovation. Enterprises can enhance the quality of innovative design and implementation by strengthening knowledge sharing and organizational learning (Georgakellos et al., 2024; Suleman et al., 2023). The continuous accumulation and reuse of knowledge strengthen the evolutionary ability of the innovation system itself (Satar et al., 2024; Zhang, 2022). Organizations should prioritize optimizing knowledge flow mechanisms, strengthening collaboration and the ability to learn new technologies (Felani et al., 2024), to establish endogenous innovation capabilities (Mol & Birkinshaw, 2014), and enhance the responsiveness and effectiveness of management change (Karwowska & Kucharska, 2024; Georgakellos et al., 2024; Birkinshaw & Mol, 2006).

Thirdly, driven by external competitive pressure, enterprises maintain their competitive advantage by dynamically adjusting their management models (Li & Keita, 2021). Every management innovation can not only alleviate current pressure, but also enhance the future resilience and strategic initiative of the enterprise (Giustiziero et al., 2022). Therefore, organizations should not passively wait for external environmental improvements but should actively initiate change, using dynamic capabilities as a pivot to build an adaptable and responsive management system and achieve sustained competitiveness enhancement (Su et al., 2023).

Fourthly, organizational culture, as an important driving force for promoting management innovation, plays an amplifying role in feedback mechanisms. The organizational atmosphere that supports innovation not only enhances employees' ability and willingness to take action (Alofan et al., 2020), but also strengthens cultural identity through successful experiences, forming a culture innovation two-way reinforcement mechanism (Birkinshaw et al., 2008). Enterprises should encourage employees to challenge existing management paradigms, provide them with the freedom to explore new ideas (Alsaqqa, 2024), and organically integrate innovative culture with organizational strategic goals, thereby enhancing innovation success rates and long-term organizational resilience (Nguyen & Hoang, 2021; Tohidi & Jabbari, 2012).

Finally, the theoretical summary and knowledge systematization process not only reflect the phased achievements of management innovation but also provide feedback practice through structured experience (Grynova et al., 2024; Zhang, 2022). The management theories formed by enterprises during the implementation of innovation can serve as part of organizational capabilities to support future innovation activities (Birkinshaw et al., 2008). The integration of theory and practice has promoted the continuous evolution of enterprise innovation capabilities and established a replicable and scalable management framework (Damanpour & Aravind, 2012). This culture of continuous improvement based on theoretical knowledge (Lam et al., 2021) enhances the effectiveness of management methods and ensures that organizations have the drive for sustained innovation in long-term development (Suleman et al., 2023).

Compared to the positive feedback mechanism, the balancing loops (B1-B4) reveal the inherent constraints and practical challenges that organizations may face in implementing management innovation, which may slow down or interrupt the continuous advancement of the innovation system.

Firstly, the B1 loop reflects the issue of inertia in organizational culture. Although a positive culture of innovation can drive management change, deeply ingrained cultural patterns can also become obstacles to resisting change (Belak & Ušljebrka, 2017). Employees' dependence on existing processes and rejection of uncertainty will affect the acceptance and implementation of new management models. Therefore, organizations must gradually transform employee attitudes, promote cultural renewal, dissolve inherent resistance, and create a more supportive cultural environment for innovation through cultural change, incremental innovation strategies, and systematic training (Alofan et al., 2020).

Secondly, the B2 loop emphasizes a sustained perception of external competitive dynamics. Although management innovation can alleviate external pressures to some extent, this relief is often temporary (Chen et al., 2024). If a company misjudges that competition pressure has permanently weakened as a result, it may reduce its emphasis and investment in innovation, leading to lax innovation and ultimately weakening long-term competitiveness (Janjić & Raženović, 2019). Therefore, enterprises should always maintain sensitivity to environmental changes and view management innovation as a continuous strategic task rather than a phased response, to avoid falling into passivity due to complacency.

Furthermore, the B3 and B4 loops jointly reveal the constraint effect of resource allocation, where uneven allocation or temporary scarcity of resources may directly affect the efficiency and effectiveness of project progress (Karwowska & Kucharska, 2024). If a project occupies too many resources, other projects may be forced to postpone or terminate, resulting in resource conflicts and internal games (Levitin et al., 2023; Issa et al., 2023). To achieve this, organizations need to improve resource utilization efficiency and maintain flexible adjustment capabilities through rational allocation and phased implementation strategies, to achieve overall optimization under limited resource conditions (Grynova et al., 2024; Issa et al., 2023).

On the other hand, time delay indicates that time plays a crucial role in the process of management innovation, as it is often a complex and gradual process involving multiple levels and stages of change (Dubey & Yadav, 2021). The implementation of each stage requires time, especially in areas such as personnel training, process adjustments, and technological adaptation (Birkinshaw et al., 2008). Due to the complexity of these changes, the effectiveness of management innovation will not be immediate, but will need to be achieved through the accumulation of time and gradual adjustments (Janjić & Rađenović, 2019). Feedback and adjustment are essential in this process, and companies will continuously optimize innovative solutions to ensure their effectiveness. In the short term, some initial effects may be seen, but long-term strategic goals such as enhancing competitiveness, changing organizational culture, and establishing new management models usually take longer to show results (Damanpour & Aravind, 2012). As time goes on, the profound impact of management innovation gradually accumulates. Managing innovation requires continuous resource investment and may face resource constraints and pressure accumulation (Khosravi et al., 2019; Birkinshaw et al., 2008). It is necessary to address these challenges through time extension to ensure the advancement of innovation.

In summary, these loops reflect the linkage and complexity of the positive feedback mechanism in system dynamics. Only by coordinating these elements can enterprises truly achieve self-strengthening, continuous promotion, and strategic upgrading of management innovation.

5. Conclusion and Recommendations

This study develops a system dynamics framework to examine the driving factors and outcomes of management innovation, offering a comprehensive perspective on its temporal and causal complexity. By introducing a dynamic system thinking approach, it advances the literature with new theoretical insights into how organizational culture, knowledge management, technological transformation, and competitive pressure interact as key drivers. The CLD illustrates how organizations adjust their behavior through different dimensions of management innovation in response to these influences. This framework provides managers with a valuable tool for addressing innovation challenges while paving the way for empirical validation.

Future research should further refine the specific mechanisms of key variables within the causal loop diagram and integrate empirical data to develop a comprehensive quantitative system dynamics model. This model can simulate the dynamic evolution of management innovation across different organizational contexts and scenarios. In particular, sensitivity analysis can be employed to identify the most critical leverage points and feedback loops within the system, thereby assisting managers in designing targeted intervention strategies. Future research can also adopt cross-industry case study methods to compare and analyze the applicability and adjustment needs of system dynamics models in different organizational types, enhancing the universality of the theory and practical guidance value. By combining these in-depth simulations and empirical evidence, we can more comprehensively reveal the dynamic complexity of management innovation and provide more

forward-looking and effective decision support tools for enterprise managers. These approaches establish a strong foundation for advancing management innovation theory and practice.

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Exploring the Suitability of Blockchain Technology in Improving Inter-Organizational Collaboration Workflows in E-Payment Processes at the Transport License Department of Malaysia

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Abstract: This paper examines the persistent inter-organizational collaboration (IOC) challenges undermining the efficiency of electronic payment workflows in Malaysia's public sector, with a focus on the Transport License Department (TLD). It aims to explore the suitability of Blockchain Technology (BCT) in addressing issues such as fragmented systems, manual reconciliation, and communication bottlenecks. Adopting a Design Science Research (DSR) methodology embedded within a qualitative paradigm, the study collected empirical data through focus group discussions with seven frontline officers directly involved in daily e-payment collection processes. Thematic analysis was used to derive key insights and inform artefact development. The analysis revealed four central challenges: absence of a shared platform, operational inefficiencies and mistrust, inconsistent service-level agreement (SLA) compliance, and fragmented communication. Participants perceived BCT's decentralized and tamper-resistant features as enabling real-time data exchange, automated reconciliation, and smart contract-enforced compliance. However, socio-cultural resistance, including skepticism towards BCT and reliance on conventional communication norms, emerged as barriers. The study culminated in the development of the Blockchain-Integrated Collaborative E-Payment Framework (BICEF), which was validated by domain experts for its technical and operational feasibility. While the framework demonstrates potential for enhancing transparency and accountability in public sector financial workflows, further longitudinal studies are required to assess its real-world implementation and address cultural and organizational resistance to BCT adoption. This study contributes a novel application of BCT within the context of Malaysian public sector e-payments by integrating blockchain functionalities such as smart contracts and decentralized communication into a validated framework tailored to IOC needs. It advances both theoretical understanding and practical design for improving digital governance in high-volume public agencies.

Keywords: *Blockchain technology, inter-organizational collaboration, e-payment, Malaysian public sector*

1. Introduction

The advancement of digital technologies has transformed the Malaysian public sector, particularly in financial operations. In Malaysia, the adoption of electronic payment (e-payment) systems has surged, with transaction value exceeding RM500 billion in 2024 (Central Bank of Malaysia, 2024) and in the federal government, more than RM60.0 billion in revenue was collected via e-payment (Accountant General Department, 2024). This growth reflects the government's commitment to a cashless society, supported by policies such as the National Fourth Industrial Revolution (4IR) and the Malaysian Digital Economy Blueprint (Economic Planning Unit, 2021; MyDigital Corporation, 2023). However, despite these trends, the inter-organizational collaboration (IOC) workflows underlying e-payment processes remain fragmented, undermining efficiency and accountability. A significant example is the Transport License Department (TLD), a high-volume federal government agency that is responsible for vehicle licensing and revenue collection, handling over RM5 billion annually. In 2022, the Auditor General reported operational issues on e-payment collection, including delays in revenue remittance amounting to RM38.94 million in 2021–2022 and discrepancies in service-level agreements (SLAs) with acquiring banks and the accounting office (Jabatan Audit Negara Malaysia, 2022). The persistence of manual reconciliation, fragmented systems, and traditional communication channels has contributed to these IOC workflow challenges.

Blockchain technology (BCT) has emerged as a promising solution for addressing these IOC workflow challenges due to its unique features, such as decentralized, transparent, and tamper-resistant architecture (Faisal et al., 2024). Recent national discourse further underscores the urgency of addressing these limitations through technological innovation. Prime Minister Datuk Seri Anwar Ibrahim has reaffirmed Malaysia's commitment to penetrating the BCT potential. National initiatives such as the National Blockchain Roadmap

2021–2025 highlight BCT's potential in public sector transformation (Ministry of Science, Innovation and Technology, 2021). However, its implementation in public financial management remains underexplored (Alafnan & Mohdzuki, 2024). This topic continues to attract scholarly interest, particularly as new regional perspectives, particularly in the Malaysian public sector context, are needed to further explore BCT suitability in resolving IOC workflow challenges. Therefore, this study aims to explore the suitability of BCT in improving IOC workflows in TLD's e-payment processes. It specifically addresses two research questions:

- How can blockchain technology improve inter-organizational collaboration (IOC) workflows in the e-payment processes at the Transport License Department (TLD)?
- How can a blockchain-based framework be conceptualized and designed to address the challenges of inter-organizational collaboration workflows in the e-payment processes at the Transport License Department (TLD)?

This study contributes to the body of knowledge by providing an empirical understanding of IOC workflows in the public sector, particularly in the context of leveraging BCT application in e-payment processes at the TLD. Furthermore, the development of the BCT framework represents a novel conceptual and practical contribution, offering a systematic approach to visualize and conceptualize BCT-enabled improvements in IOC workflows.

2. Literature Review

In the Malaysian public sector, e-payment systems have significantly modernized financial operations, reducing cash dependency and enhancing efficiency (Yaakub et al., 2023). The TLD exemplifies this shift, handling over 40 million transactions annually through digital channels (Accountant General Department, 2024). However, operational challenges persist due to fragmented workflows involving TLD, acquiring banks, and accounting offices. These challenges include manual reconciliation, delayed fund transfers, and SLA discrepancies, which impede the IOC workflows for the post-operation in the e-payment process.

Inter-Organizational Collaboration (IOC) workflows

IOC workflows involve coordinated efforts among autonomous organizations to manage interconnected processes. In public e-payment systems, such collaboration ensures timely fund transfers, compliance with SLA requirements, and accurate data reconciliation. However, traditional and manual governance models often fail to support dynamic, multiple-party environments (Banerjee & Chandani, 2022; Ganeshu et al., 2024). In their study, Kostić and Sedej (2022) outline four core dimensions of inter-organizational collaboration, including collaboration, trust, control, and information exchange, which are particularly relevant in this context. Collaboration requires the integration of systems and shared platforms to enable seamless coordination across agencies (Hubenova et al., 2024). Trust is undermined when records are inconsistent, reconciliation is manual, and data validation is delayed, compromising confidence among stakeholders (Kowalski et al., 2021). Control is weakened by reactive enforcement of SLAs, limited real-time monitoring, and ineffective compliance frameworks (Upadhyay et al., 2021). Information exchange is hindered by traditional and manual communication tools such as email and telephone, and non-standardized reporting formats that impede timely, structured data sharing (Centobelli et al., 2022). Therefore, addressing these IOC workflows in the e-payment process, particularly in the TLD context, is an interrelated dimension as an essential lens for enhancing the operational efficiency and accountability of public sector e-payment systems.

Blockchain technology (BCT) as a solution

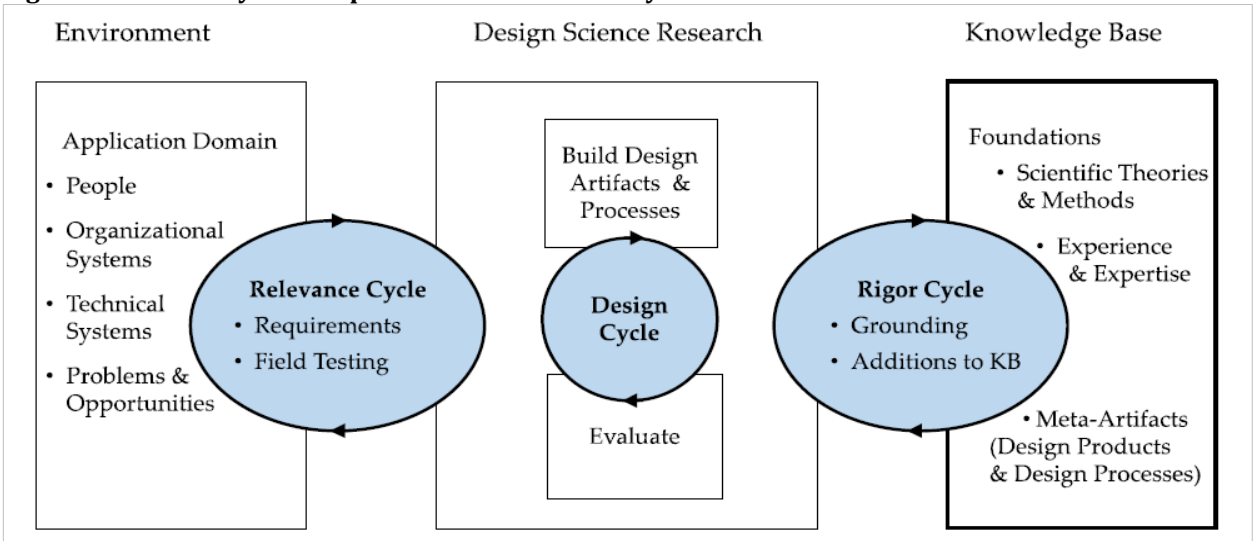
BCT offers a decentralized, tamper-resistant system that supports transparent data sharing, automated reconciliation, and smart contract-based SLA enforcement (Gomaa et al., 2023). By addressing fragmentation, manual reconciliation, and trust issues, BCT enables secure, real-time data exchange and process automation (Kang et al., 2022; Nguyen et al., 2023). In finance and supply chains, BCT has demonstrated its capacity to enhance transparency, trust, and efficiency (Rijanto, 2021; Spahiu et al., 2024). In Malaysia's public sector, however, BCT implementation remains at an exploratory stage (Alafnan & Mohdzuki, 2024). While the National Blockchain Roadmap promotes its adoption, concerns over user acceptance, system integration, and regulatory compliance persist. These gaps highlight the need for empirical studies to assess BCT's suitability within specific public sector contexts.

This review underscores the persistent challenges in TLD's e-payment IOC workflows, including fragmented operations, manual processes, and communication inefficiencies. BCT's features, decentralization, transparency, automation, and real-time monitoring offer a compelling solution. This study bridges the gap between theory and practice by evaluating BCT's suitability in TLD's context and developing a tailored framework for public sector financial systems.

3. Methodology

This study employed a Design Science Research (DSR) approach embedded within a qualitative case study, focusing on the suitability of BCT in enhancing IOC workflows in the e-payment process at the TLD. DSR was chosen for its focus on generating practical, innovative solutions to real-world problems through iterative cycles of design and evaluation (Hevner et al., 2004; Van Aken, 2005). The qualitative case study provided an in-depth understanding of operational realities within TLD's complex workflows (Yin, 2018). Figure 1 illustrates the DSR cycle proposed by Hevner.

Figure 1: The DSR cycles adapted from Hevner's study



Sources: Hevner & Chatterjee (2010)

Data Collection and Analysis

Empirical data were collected through Focus Group Discussions (FGDs) with seven operational officers at TLD directly involved in managing e-payment transactions. The study used the extended ask, record, confirm (ARC) technique to enhance the rigor of qualitative data collection and improve trustworthiness (Zairul et al., 2023). This method integrated three stages: targeted, open-ended questioning; real-time recording and categorization of responses; and immediate member checking of themes and interpretations during the (Zairul, 2021). Due to the limitation of BCT exposure, a Proof-of-Concept (PoC) dashboard was developed using TLD's mock operational data to familiarize participants with BCT concepts and to ground their reflections in practical scenarios. The PoC was given two months earlier to the participant before the FGD session.

Data were analyzed thematically using ATLAS. Ti 2025. A deductive coding framework was applied, guided by existing literature on IOC workflows and BCT suitability (see Appendix 1). The study themes were validated through peer debriefing and expert review to ensure analytical rigor and interpretive credibility (Lincoln & Guba, 1985). This study bridged the gap between theoretical innovation and real-world application by employing DSR to construct a BCT-enabled process workflow and engaging participants through a practical PoC dashboard. The qualitative case study inquiry enabled a nuanced exploration of BCT's suitability for addressing IOC workflow challenges within a Malaysian public sector setting. Ultimately, the study contributes to both design-oriented research and public sector digital transformation discourse by offering a contextually grounded, empirically informed assessment of BCT's value in improving IOC workflow in the e-payment process.

4. Findings and Results

This section presents the key empirical findings derived from FGDs conducted with operational officers at the TLD, who are directly involved in the daily operation of the e-payment process. The analysis was guided by a deductive thematic framework informed by existing literature on IOC workflow challenges and the BCT's suitability to improve IOC workflow in the e-payment process at TLD (see Appendix 1 and Appendix 2). The findings are organized thematically according to four major themes: enhancing IOC workflow through a BCT as a shared platform, BCT improving operational efficiency and trust in IOC workflow transactions, mitigating risks in SLAs and compliance, and BCT strengthening communication on IOC workflow. Each theme encapsulates participants' perceptions, suggestions for improvement, and reflections on the suitability of BCT as a technological solution. These insights provide a contextual understanding of the operational complexities within TLD and serve as the empirical foundation for the subsequent discussion on BCT suitability in addressing these issues.

Enhancing IOC Workflow through a BCT as a Shared Platform

Participants consistently identified fragmented systems and inconsistent data access as major impediments to effective IOC workflows in TLD's e-payment process. A dominant theme in the data was the strong preference for a centralized, real-time data-sharing platform that would enable seamless access across key stakeholders, including TLD, the acquiring bank, and the accounting office. Several participants advocated for integrating existing systems into a unified platform capable of synchronizing data inputs and minimizing redundancy. Crucially, participants F6 and F7 explicitly highlighted BCT's unique suitability for this role. F6 proposed a BCT-enabled platform as a practical and secure solution, capable of consolidating data sources and providing real-time access, thus reducing errors and enhancing operational synchronization. F7 added that the interoperability inherent in BCT would ensure smooth system adoption and reduce resistance from users. These views indicate a consensus that BCT's decentralized, tamper-resistant architecture offers a highly effective solution to the challenges of fragmented IOC workflows and data silos in TLD's e-payment operations.

BCT improves Operational Efficiency and Trust in IOC Workflow Transactions

Participants voiced concerns over manual processes that hinder efficiency and contribute to errors. F1, F3, and F4 emphasized that automation could reduce the burden of manual reconciliation and expedite processes, while F2 highlighted the need for clear and standardized SOPs. F5 and F6 noted that enhanced data accessibility through integrated systems could empower officers to work more efficiently. Notably, F7 pointed out that BCT's ability to provide immutable, real-time records of transactions directly supports operational efficiency by reducing the need for manual verification and promoting trust in the system. Participants recognized that BCT's transparency and traceability features could establish greater confidence among stakeholders and provide a reliable foundation for daily operations.

Mitigating Risks in SLAs and Compliance using BCT

Delays in the T+1 fund transfer period were a major concern, with participants proposing improved monitoring mechanisms. F2 and F3 suggested real-time dashboards and early-warning notifications, while F4 specifically advocated for a BCT-based dashboard, emphasizing its immutable, time-stamped records to enhance accountability and traceability. F1 and F6 stressed the importance of regulatory clarity and stricter enforcement of SLA compliance, pointing out that BCT's smart contract capabilities could automate monitoring, trigger penalty enforcement, and ensure transparency in fund transfer processes. Participants generally agreed that BCT's inherent automation and traceability features offer a significant advantage over current manual and reactive monitoring systems.

BCT Strengthening Communication in IOC Workflow for E-payment Ecosystem

Participants identified a lack of structured communication as a major obstacle to effective collaboration. F1 and F4 suggested developing shared SOPs and templates for reporting, while F2, F5, and F6 emphasized the importance of regular meetings to foster proactive communication. F3 and F7 advocated for a BCT-enabled shared digital platform that would provide real-time notifications and updates, reducing reliance on ad-hoc methods like emails and phone calls. F6 specifically noted that automated alerts and immutable audit trails supported by BCT could significantly enhance operational transparency and accountability. Participants widely

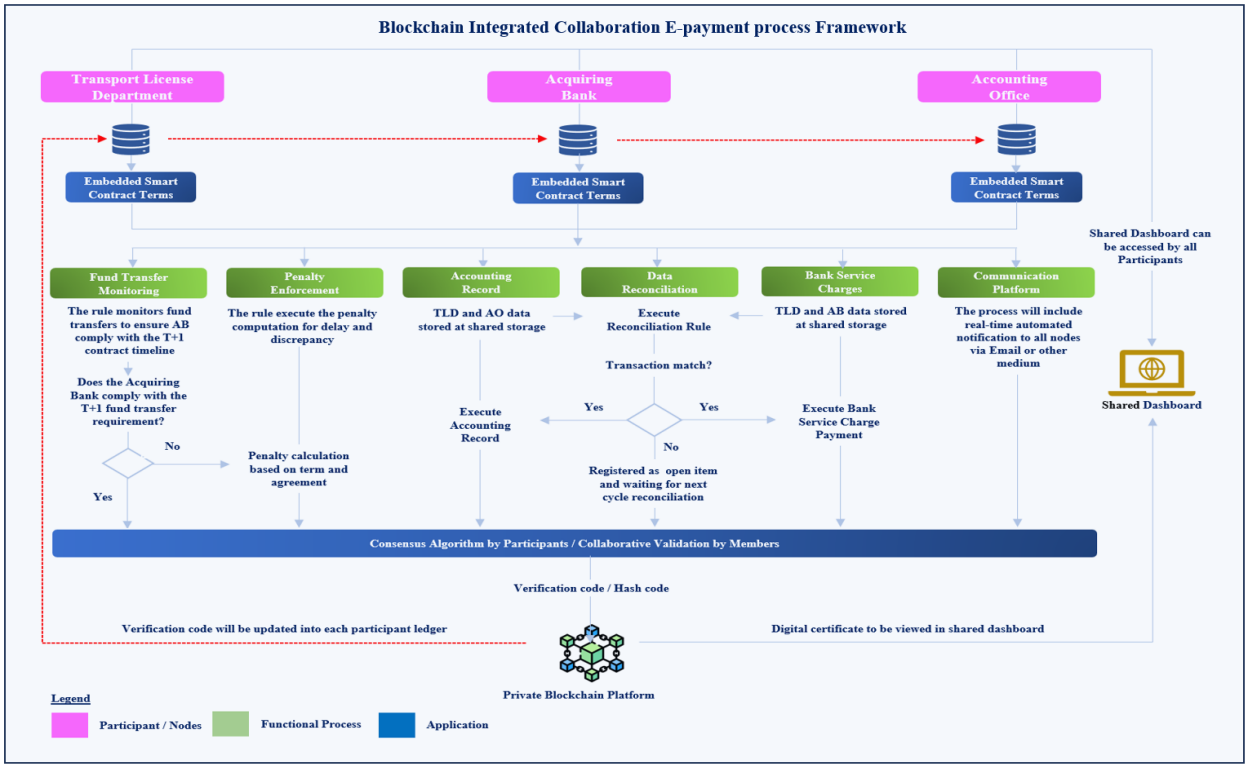
recognized that BCT's decentralized architecture and auditability could play a transformative role in streamlining communication and ensuring data integrity across agencies.

Proposed framework

This study presents the Blockchain-Enabled Collaborative E-Payment Framework (BICEF) to address the IOC workflows challenges in TLD's e-payment process (see Figure 2). The framework was developed from the empirical insights gathered through focus group discussions and triangulated with relevant literature to ensure practical and conceptual alignment. At its core, the framework comprises three main nodes: the Transport License Department (TLD), the acquiring bank, and the accounting office. Each node operates through smart contracts, automating key functions as below: -

- Fund Transfer Monitoring – ensuring compliance with the T+1 Treasury requirement.
- Penalty Enforcement – automatically applying penalties for delays or discrepancies.
- Accounting Records – synchronizing entries based on real-time verified data.
- Data Reconciliation – flagging mismatches for resolution in the next cycle.
- Bank Service Charge Management – automating service charge payments.
- Communication Platform – enabling secure, real-time communication and notifications.

Figure 2: Blockchain-Enabled Collaborative E-Payment Framework (BICEF)



The system employs a consensus mechanism, where each node validates transaction records, generating a tamper-proof verification hash. This ensures data integrity and transparency across all parties. A shared dashboard provides a user-friendly visual interface, displaying real-time updates and supporting operational decision-making with digital certification and audit trails. The framework is deployed on a permissioned blockchain infrastructure selected for its controlled access and compliance with public sector regulatory requirements. This ensures only authorized users can view, write, or validate records, safeguarding sensitive financial data.

The framework's design was validated by a Senior Accountant from the Accountant General's Department (AGD), a certified BCT developer, and an academic in digital governance. Their feedback confirmed its

alignment with Treasury Circular and *Surat Pekeliling Akauntan Negara Malaysia Bilangan 3 Tahun 2025* and best practices in BCT deployment. The framework addresses real-world operational challenges at TLD and offers a practical, scalable model for digital transformation and inter-agency collaboration in public financial management.

Discussion

The findings of this study acknowledge that fragmented operating systems remain a challenge to IOC workflows within the TLD's e-payment process. These challenges are not unique to the public sector; instead, the common challenges are also detected in private sector domains. Fragmented operational systems could obstruct data consolidation and delay transactional flows. For example, studies from Baiod and Hussain (2024) and Dowelani et al. (2023) reaffirm that fragmented operations contribute to delays in the settlement process, and they found that BCT is a suitable solution to strengthen stakeholder accountability. In the TLD scenario, the absence of a connected, real-time data-sharing platform has resulted in repetitive reconciliation processes, communication breakdowns, and delayed fund remittances, which are also observed in the traditional clearing system in the Guangdong clearinghouse (GCH) (Tsai et al., 2020). Therefore, the BICEF proposed in this study points to addressing these shortcomings by embedding BCT and smart contracts into core operational domains such as fund transfer monitoring, SLA enforcement, and data reconciliation. The proposed BCT framework is consistent with insights from extant literature (Centobelli et al., 2022; Rijanto, 2021), which suggest that automation can mitigate inefficiencies by minimizing human error, expediting processing times, and creating immutable records of transactions. Moreover, the integration of a real-time, shared dashboard fosters a culture of operational trust by enabling stakeholders to access timely and verified financial information (Sandner et al., 2020).

Furthermore, this study identifies SLA monitoring and enforcement as a critical area of concern within the TLD context. Currently, TLD's operational response remains reactive, resulting in inconsistent and often exposed to negligence. Similar issues have also been observed in broader institutional and commercial settings, such as those reported in Vietnam (Nguyen et al., 2023). This shortcoming is particularly notable in light of the Auditor General's audit findings, which have repeatedly highlighted delays in fund remittance as a recurring issue affecting public financial accountability. Therefore, in addressing these challenges, BICEF operationalizes its approach with smart contracts to enable the automated monitoring of SLAs and the enforcement of penalty provisions in instances of non-compliance. This approach may strengthen and improve procedural accountability mechanisms (Rachad et al., 2022). Moreover, the expert has affirmed that the framework is aligned with Treasury Circulars and operational guidelines, thereby reinforcing its feasibility and compliance with Malaysia's public sector context.

Meanwhile, the participants highlighted the current challenges of reliance on informal, ad-hoc channels such as email and messaging applications, which are inherently ill-suited for managing real-time and high-volume transaction environments. The manual and traditional communication tools are inadequate for complex, multi-agency collaborations (Karajovic et al., 2019). Thus, BICEF proposes a decentralized communication layer embedded with immutable records and automated notifications, offering a structural transition from reactive to proactive communication. This systemic shift is instrumental in reinforcing IOC workflow transparency, ensuring that critical information flows are timely, verifiable, and accessible to all authorized stakeholders (Sabri et al., 2023). Notably, the development of BICEF diverges from prevailing BCT models employed in the private sector, where adoption is primarily driven by efficiency gains, customer-centricity, and competitive advantage (Spahiu et al., 2024). In contrast, BICEF is grounded in the institutional imperatives of the public sector, namely, such as regulatory compliance, hierarchical accountability, and adherence to statutory obligations. Public agencies, such as TLD, operate within highly regulated environments that are constrained by Treasury directives and public audit requirements. Thus, BICEF is deployed within a permissioned blockchain infrastructure to ensure data sovereignty, controlled access, and alignment with the Surat Pekeliling Akauntan Negara Malaysia Bilangan 3 Tahun 2019. These attributes are comparatively less emphasized in private sector domains, where decentralization and rapid deployment tend to take precedence over regulatory formalities (Ølnes et al., 2017; Wang & Kogan, 2018).

Furthermore, BICEF addresses the IOC workflow in the post-collection phase of the e-payment process, an area that has received limited attention in the extant literature. The framework's design is also attuned to the well-

documented institutional resistance to technological innovation within the public sector, where legacy infrastructure and risk-averse organizational cultures often act as barriers to reform (Jayasuriya & Sims, 2023). This challenge is highlighted by studies indicating that public agencies tend to accommodate existing systems to avoid disruptions in service continuity (Benchis et al., 2025). To mitigate such resistance, this study introduced a Proof-of-Concept (PoC) dashboard that functions as a near-operational representation of a blockchain-enabled solution. This approach is consistent with established practices in government digital transformation initiatives, which often employ demonstrative tools to demystify emerging technologies and foster stakeholder confidence (U.S. Government Accountability Office, 2023). The PoC also serves to counter prevailing misconceptions, particularly the frequent conflation of BCT with cryptocurrency by illustrating its distinct utility in enhancing transparency, automation, and accountability within regulated public financial processes (Dias Santos, 2025).

Therefore, this institutional reflexivity embedded within BICEF not only exemplifies contextual responsiveness but also aligns the framework within the National Blockchain Roadmap 2021–2025 (Ministry of Science, Innovation and Technology, 2021). The deliberate inclusion of regulatory compliance, institutional culture, and user familiarization mechanisms affirms BICEF's potential as a replicable governance innovation across other public sector entities with similar IOC complexities. In sum, the distinctiveness of BICEF lies in its public-sector-oriented design, policy-embedded structure, and adaptive interface with institutional realities. These features elevate it beyond a technical artefact into a normative framework that contributes to the broader discourse on digital governance and inter-organizational reform. The framework not only addresses current operational limitations but also paves the way for sustained transformation in public financial management.

Emerging Themes: Socio-Cultural Barriers to BCT Adoption

In addition to the main findings, two emerging themes were identified that highlight socio-cultural barriers to the adoption of blockchain technology (BCT) in the public sector. First, the negative perceptions of Blockchain Technology. The participants expressed concerns that BCT is often associated with cryptocurrencies, which are viewed with suspicion due to issues like volatility and fraud. This misconception can reduce trust and hinder adoption in government settings. Clear communication and awareness efforts are needed to distinguish BCT's broader applications in governance from its financial origins.

Secondly, the continued use of informal tools such as email and WhatsApp for inter-agency communication was seen as inefficient and lacking traceability. These methods contribute to delays and oversight. Participants emphasized the need for structured, system-integrated communication tools, which BCT platforms can offer through real-time and auditable communication features. Despite participant suggestions for regular meetings and reporting templates, the limitations of these informal mechanisms suggest an urgent need for formalized, system-integrated communication channels.

5. Conclusion and Recommendations

This study reveals that TLD's e-payment ecosystem is plagued by fragmented systems, redundant manual processes, delayed fund settlements, and informal communication protocols, undermining operational efficiency and accountability. The proposed BICEF directly addresses challenges by integrating real-time data sharing, automated reconciliation, SLA monitoring, and decentralized communication through smart contracts. Validation by experts affirmed its alignment with operational, technical, and regulatory standards, highlighting its viability within public sector financial operations. By employing DSR embedded in a qualitative case study, this research answers its two core questions:

- How can blockchain technology improve inter-organizational collaboration (IOC) workflows in the e-payment processes at the Transport License Department (TLD)?
- How can a blockchain-based framework be conceptualized and designed to address the challenges of inter-organizational collaboration workflows in the e-payment processes at the Transport License Department (TLD)?

RQ1, on the how BCT can improve IOC workflows in TLD's e-payment processes, is addressed through evidence that BCT offers substantial improvements in collaboration, trust, control, and information exchange by

resolving data fragmentation, ensuring transparency, and automating compliance monitoring; and RQ2, on how the conceptualize the BCT framework to address the challenges of IOC workflows, is answered by presenting a context-specific solution operationalizing BCT features such as smart contracts and real-time dashboards to reduce human error, streamline operations, and strengthen inter-agency collaboration.

The study further extends Kostić and Sedej's (2022) inter-organization collaboration dimensions by identifying two emergent themes: negative perceptions of BCT, arising from its association with cryptocurrencies, highlight the need for awareness-building and policy clarification to promote BCT adoption in public administration, while entrenched traditional communication practices, such as reliance on WhatsApp and email, underscore the necessity for system-integrated, immutable communication channels, which are addressed by the BICEF's decentralized platform. These insights contribute to theory by demonstrating how BCT functions as a workflow artefact that operationalizes inter-organizational collaboration, transparency, and trust in public financial management. The inclusion of a Proof-of-Concept (PoC) dashboard further strengthens the framework's practical relevance and user-centered design.

Despite its contributions, the study is limited by its single case focus and use of mock data in the PoC, suggesting a need for future research to test the framework across multiple agencies and in live environments, while exploring strategies to overcome misconceptions and foster public sector trust in BCT. In conclusion, the study offers a theoretically robust and practically applicable approach to the BICEF framework, advancing both digital transformation in public sector financial systems and theoretical understanding of inter-organizational collaboration in digital governance.

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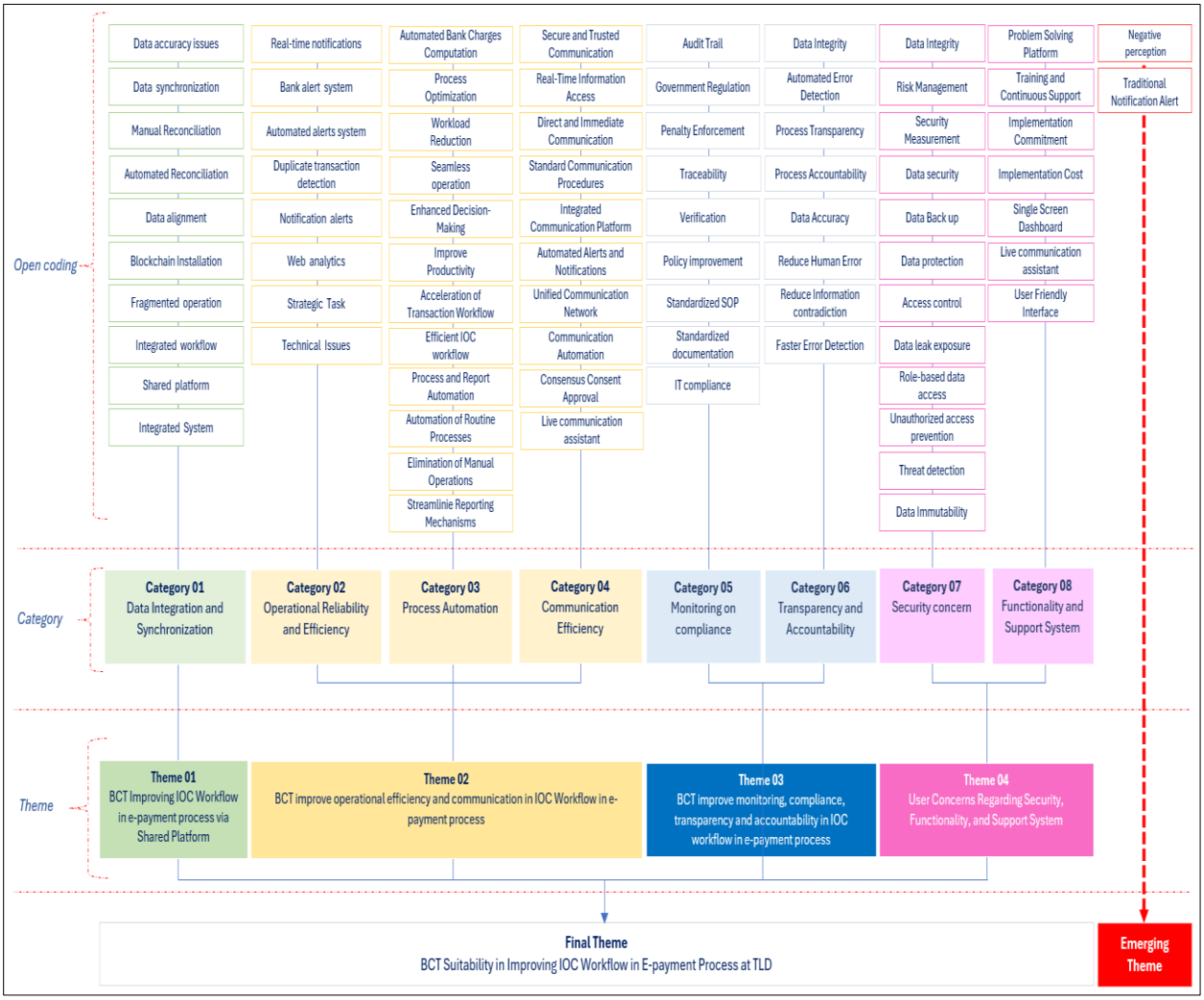
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Appendix 1
Thematic Coding Diagram



Appendix 2
Thematic Analysis Matrix

1. Main RQ

How is BCT suitable for addressing the IOC workflow challenges in the e-payment process at the TLD?

2. Aim of research

To explore the suitability of BCT in addressing the IOC workflow challenges in the e-payment process at the TLD.

3. Research approach and research inquiry

DSR with qualitative case study

4. Participant

TLD officers who are involved in the daily routine work in the e-payment process

Research Questions	Deductive codes / Theories	Strategy of inquiry	Inductive codes			Emerging themes
			Coding	Category	Theme	
How is BCT suitable for addressing the IOC workflow challenges in the e-payment process at the TLD?	Data Sharing Through a Shared System Improving Operational Efficiency Improving SLA Monitoring Improved communication system	Focus Group Discussion (FGD) with seven participants from TLD who engage in the daily routine operation in the e-payment process	-Automated Notification Alert System -Traditional Notification Alert -Technical Issues -Efficiency on the IOC workflow -Process and Report Automation -Automated Bank Charges Computation -Government policy and Regulation -Penalty Enforcement-SLA Discrepancy -Audit Trail and Traceability -Implementation Cost -Implementation Commitment -Data Safety and Access Control -Security Measurement -Risk Management -Consensus Consent Approval -Problem Solving Platform -Training and Continuous Support	**CAT 01: Data Integration and Synchronization** (Automated Reconciliation, Integrated System and Shared Platform) **CAT 02: Operational Reliability and Efficiency** (Automated Notification Alert System, Strategic Task, Technical Issues) **CAT 03: Process Automation** (Automated Bank Charges Computation, Efficiency on IOC workflow, Process and Report Automation) **CAT 04: Regulatory and Compliance Monitoring** (Audit Trail and Traceability, Government policy and Regulation, Penalty Enforcement-SLA Discrepancy) **CAT 05: Security and Error Minimization** (Data Safety and Access Control, Risk Management,	**Theme 01** Enhancing Inter-Organizational Workflow through a Shared Platform **Theme 02** Improving Operational Efficiency & Trust in IOC Workflow Transactions **Theme 03** Mitigating Risks in SLAs & Compliance **Theme 04** Strengthening Communication and IOC Workflow in E-Payment Ecosystem	**ET1** Negative perception of Blockchain Technology **ET2** Traditional Communication Practices

Research Questions	Deductive codes / Theories	Strategy of inquiry	Inductive codes			Emerging themes
			Coding	Category	Theme	
			-User-Friendly -Negative perception -Error Minimization and Error Detection -Real-Time Data Access and Monitoring -Data Integrity and Accuracy -Process and Data Transparency	Security Measurement) **CAT 06: Smart Contract Execution** (Consensus Consent Approval) **CAT 07: Stakeholder Communication and Coordination** (Problem Solving Platform, Training and Continuous Support, User-Friendly, **CAT 08: Transparency and Accountability** (Data Integrity and Accuracy, Error Minimization and Error Detection, Process and Data Transparency, Real-Time Data Access and Monitoring)		

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The Importance of Financial Literacy to Non-Finance Managers of Healthcare Institutes in Malaysia

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Abstract: Financial literacy among non-finance managers is crucial for the operational success and sustainability of healthcare institutes. This research explores the significance of financial literacy for non-finance managers at various hospitals in Klang Valley, emphasizing its impact on informed decision-making and efficient resource management. The study investigates the current financial literacy levels among non-finance managers, identifies gaps and proposes strategies to enhance their financial competencies. Using a comprehensive approach, including situational analysis and empirical data collection, the research aims to demonstrate how improved financial literacy can lead to better financial management, ultimately contributing to the hospital's competitive edge and long-term viability. This study's data were based on the questionnaires adapted from several previous studies, including Bongomin et al. (2018) and Al-Rahhaleh et al. (2023). The findings suggest that enhancing financial literacy among non-finance managers is essential for achieving financial stability and effective healthcare service delivery, thereby underscoring the need for targeted financial training programs in the healthcare sector.

Keywords: *Financial literacy, Non-Finance Managers, Healthcare Institutes*

1. Introduction

The significance of financial literacy among non-finance managers is crucial for the overall success and sustainability of the Healthcare Industry. Financial literacy empowers non-finance managers to comprehend and interpret financial data, facilitating more informed decision-making. In private hospitals, staying competitive and delivering high-quality healthcare services relies on the financial expertise of all managerial staff, not solely those in finance. Grasping financial principles assists non-finance managers in contributing effectively to budgeting, resource management and strategic planning, ensuring the smooth operation of hospital services. The contributions of various individuals within an organization, including non-finance managers, are vital in attaining and upholding good operational standards. By providing non-finance managers with financial literacy, hospitals can navigate the intricate healthcare landscape more effectively, invest in advanced technology and equipment, attract and retain skilled healthcare professionals, and expand their facilities, ultimately enhancing their ability to provide quality care. Financial literacy is crucial for managers in many industries, including healthcare, manufacturing, banking, and others. Organizations can greatly benefit from having a basic understanding of financial concepts and making informed decisions regarding their financial aspects.

The ability of non-finance managers to make informed decisions based on financial analysis is crucial for achieving long-term sustainability and success in a healthcare setting. This involves not only understanding the financial data but also applying this knowledge to strategic planning and daily operations. By doing so, non-finance managers can contribute to the hospital's financial stability, helping to ensure that it can continue to provide high-quality care to patients. As such, enhancing financial literacy for non-finance managers is a critical investment that hospitals must make to ensure their sustainability and effectiveness in delivering healthcare services.

The importance of financial literacy among non-finance managers in hospitals cannot be overstated. Their decisions encompass managing budgets, controlling costs, evaluating financial risks, and optimizing revenue generation. For non-finance managers to make effective decisions, their understanding of financial concepts and their ability to interpret financial information are essential. These elements of financial literacy empower non-finance managers to contribute significantly to the hospital's financial health. By understanding and applying financial concepts, they can make strategic decisions that align with the hospital's financial goals, thus driving the organization towards long-term sustainability and success.

In recent years, the number of private hospitals has significantly increased in the healthcare industry. To stay competitive and profitable, these hospitals must ensure effective financial management. Financial literacy is vital for improving financial management behavior (Sriyono & Rif'ah, 2022), enabling individuals to make informed decisions about financial matters and manage their finances more effectively. Despite its importance, non-finance managers in hospitals often lack the necessary financial knowledge and skills to contribute effectively to financial management (Naranjee et. al, 2019).

Due to the background of all non-finance managers at Healthcare Institutes, who lack formal financial education, there is a deficiency in financial literacy that hampers decision-making and operational efficiency. Jusoh and Abd Talib (2018) noted moderate financial management skills, emphasizing the importance of enhancing financial literacy in managerial roles. Additionally, the financial attitudes and behaviors of non-finance managers play a crucial role. Siswanti and Halida (2020) highlighted the impact of financial knowledge and attitudes on financial management behavior, indicating the significance of cognitive and affective aspects in improving financial literacy among managers.

Additionally, the financial attitudes and behaviors of non-finance managers play a crucial role. Siswanti and Halida (2020) highlighted the impact of financial knowledge and attitudes on financial management behavior, indicating the significance of cognitive and affective aspects in improving financial literacy among managers. Moreover, the educational healthcare background of non-finance managers raises issues regarding the role of attitude in financial management. Siswanti and Halida (2020) pointed out that attitude influences how individuals handle financial responsibilities, suggesting that enhancing self-regulation could improve financial literacy and decision-making in a healthcare context.

Healthcare privatization in Malaysia is primarily driven by powerful interest groups that are seeking profits rather than real concerns for allocative efficiency. As private healthcare expenditures have risen faster than government expenditures, public funds have also been used to purchase private services from public hospitals since 1982 (Rasiah et al., 2009). A part of that is that financial literacy is a critical component of entrepreneurship and small business ownership, highlighting its multifaceted significance. As a result of financial literacy, individuals can make informed financial decisions, enabling them to effectively manage their finances, including budgeting, savings, expense control, debt management, and participation in the financial markets (Lyn & Sahid, 2021). It provides individuals with a better understanding of financial concepts, asset management, inflation, investments, cash flow, and risk analysis, which makes it easier for financial businesses to make informed decisions regarding saving, planning, risk management, and navigating the financial landscape.

Reuter et al. (2022) demonstrated the importance of promoting financial literacy for economic well-being and success, as it may lead to poor investment and savings decisions, restricted access to finance, and increased market failures. Furthermore, financial literacy is essential to achieving better financial outcomes, greater well-being, and increased economic stability and growth (Zait & Bertea, 2015). Collectively, these findings underscore the critical role that financial literacy plays in enhancing economic prosperity and individual and societal well-being (Plakalović, 2015).

In many organizations, non-finance managers make budget decisions, allocate resources, and influence financial outcomes in various ways. Therefore, equipping them with financial knowledge can lead to more informed decision-making and potentially better financial results for the organization. Therefore, this research will also be of great significance to the Malaysian government indirectly because, as the organization employs the best strategies to increase financial literacy among non-financial managers, it will lead to better financial planning, management, and reporting, which can be critical for public transparency and accountability in healthcare services.

The significance of the study on financial literacy among non-finance managers in private hospitals is vital for the healthcare sector. It can assist in hiring capable managers with a strong understanding of financial concepts. These managers are better equipped to make well-informed decisions, potentially increasing profitability. Efficient financial management can also elevate the hospital's standing, build investor trust, and enhance credit terms, all beneficial in the competitive healthcare field, especially in private healthcare. Moreover, improved

financial literacy among non-finance managers can lead to better budgeting, cost control, and resource allocation within the Healthcare Institutes. This can result in more efficient operations, higher quality patient care, and ultimately, improved patient outcomes. By investing in financial education for non-finance managers, Healthcare Institute can foster a culture of financial responsibility and accountability, ultimately driving long-term success and sustainability in the healthcare industry.

Next, the paper discusses the literature review on financial literacy in healthcare, followed by the methodology used for data collection and analysis, and concludes with results and discussion on findings and implications.

2. Literature Review

Financial Literacy

Throughout research on financial literacy, it has been recognized that it is a multifaceted concept that encompasses understanding, knowledge, confidence, and practical application of financial concepts. According to a study conducted by Andarsari and Ningtyas (2019), early financial education improves children's decision-making skills. Moreover, Eniola and Entebang (2017) emphasized the important role early financial education plays in a company's performance and survival. In order to improve financial literacy among managers, Abousaidi et al. (2021) identified a number of factors, including education and managerial record, which are crucial.

According to James et al. (2012) and Sugiyanto et al. (2019), financial literacy contributes to better decision-making and improved financial well-being, while studies conducted in Malaysia and Bosnia and Herzegovina have revealed alarming gaps in financial literacy among medical practitioners and managers of small and medium enterprises (SMEs). Nawaz (2015) emphasized that finance has a crucial role to play in business success and emphasized the importance of learning financial terms for managers who are not financial experts. Furthermore, in addition to highlighting the positive effects of financial ignorance on the profitability of businesses and the value of shareholders, Nawaz (2015) encouraged non-financial professionals to gain a better understanding of finance. Numerous studies have explored the financial literacy of private hospitals, emphasizing its impact on importance to the healthcare sector. Factors such as reimbursement policies, patient volumes, and cost control strategies significantly affect financial outcomes (Cerullo et al., 2022). As argued by Brannagan (2012), a hospital's capacity to generate revenue, manage expenses, and achieve profitability is crucial. Distinct challenges encountered by private hospitals, such as escalating healthcare costs, competition, and technological advancements, underscore the significance of effective financial management (Al Rahhaleh et al., 2023). Hospital administrators must grasp financial statements, budgeting, and cost control, even without a finance background, to positively influence hospitals to know the importance and significance (Al Rahhaleh et al., 2023). Managers with enhanced financial literacy were observed to be more proficient in budget management, cost control, and strategic financial decision-making, ultimately enhancing hospital performance.

Financial Knowledge

According to Andarsari and Ningtyas (2019), financial knowledge is correlated with better financial behaviour in the areas of budgeting, saving, expense management, debt management, and stock market participation. The study by Eniola and Entebang (2017) extended this perspective by demonstrating that financial knowledge, along with financial awareness and attitude, positively affects the performance of business owners and managers. A higher level of financial knowledge is associated with a deeper understanding of complex financial concepts and sound decision-making, according to Potrich et al. (2016).

Higher financial knowledge and skills leading to better financial decisions are linked in Bongomin et al. (2018). In contrast, Anthony and Sabri (2015) found that Malaysian medical practitioners lack financial knowledge, which leads to inadequate financial literacy. In a related note, the importance of understanding financial issues for non-financial managers is underscored, suggesting that basic financial literacy plays a key role in success.

Financial attitude

Financial attitude plays an important role in financial literacy. According to Eniola and Entebang (2017), possessing financial skills alone is not sufficient to prevent financial problems, as a positive financial attitude, long-term thinking, and resistance to temptation are most important. In these circumstances, attitudes play a

critical role in determining the success of small and medium-sized businesses. In a related vein, Abousaidi et al. (2021) claimed that managers in specialized fields may lack adequate financial attitudes due to their lack of financial literacy.

Consequently, improving financial skills is essential for enhancing attitudes, as Veira et al. (2020) indicate a close correlation between financial attitudes and individual financial behaviour. The findings of the Jusoh and Abd Talib (2018) study indicated a positive relationship between financial attitude and financial literacy among micro-entrepreneurs, with higher levels of financial literacy associated with more positive attitudes towards money. A positive attitude towards finance is essential to achieving greater financial literacy, according to Rahman et al.'s (2021) research.

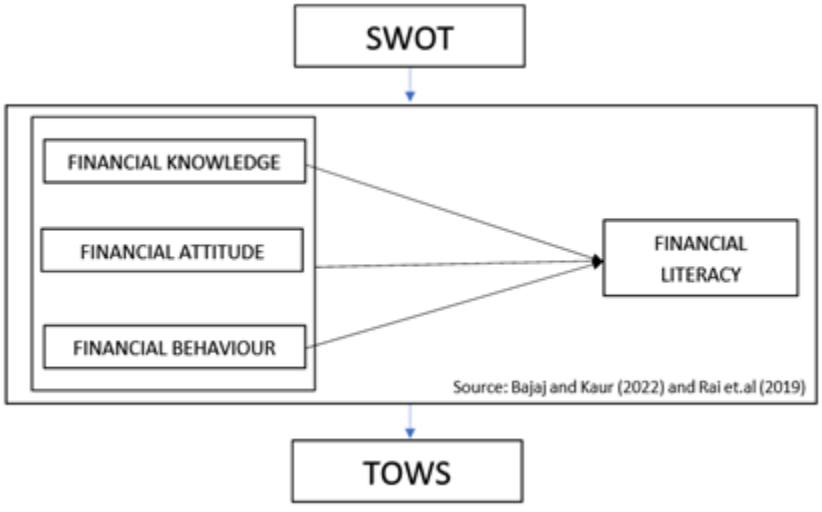
The study by Lyn and Sahid (2021) emphasized the importance of financial attitudes in influencing financial literacy among rural communities, whereas the study by Reuter et al. (2022) emphasized that financial attitudes should be considered core competencies to measure financial literacy. Across diverse contexts and populations, these studies illustrate the importance of financial attitude in shaping financial literacy and behaviour.

Financial Behavior

According to Bongomin et.al (2018), financial behaviors are influenced by peers, school, family, and media, with family being the main socializing agent. It has been consistently demonstrated that increased financial literacy positively impacts financial behaviour, including budgeting, saving, debt management, and stock market participation (Andarsari and Ningtyas, 2019; Boon et al., 2011). Financial behaviour is considered one of the most pivotal aspects of financial literacy.

Studies have shown that managers' financial literacy is influenced by various factors, including their education, managerial experience, and financial literacy courses. Thus, specialized training is required. Research conducted by Siswanti and Halida (2020) indicated that financial knowledge, financial attitude, self-control, and financial management behaviour are interconnected and have a significant impact on financial behaviour. It has consistently been demonstrated in the literature that individuals who possess higher levels of financial literacy exhibit better financial practices, such as budgeting and saving (Lyn & Sahid, 2021; Oppong et al., 2023). The academic construct of this research and review of the literature suggests the relationship between the influenced strategies and financial literacy.

Figure 1: Research Framework



3. Methodology

This research adopted primary data sources, which are data sources that provide first-hand information and were obtained through a survey of respondents from non-finance managers of various Healthcare Institutes.

Moreover, information was also obtained through an interview session with the in-charge personnel from the Finance Department and Human Resource Department of the organization to get a clear picture of the matters investigated.

Based on the obtained data, correlational analysis and multiple regression analysis were performed to understand relationships between variables. This research also applied strategic tools to formulate a strategy and recommendations. These strategic tools helped in answering the research questions. A SWOT analysis is a simple but widely used tool that aids in understanding the strengths, weaknesses, opportunities, and threats involved in this research. To apply the SWOT analysis, we obtained information from the management of the Healthcare Institute and verified the pre-SWOT analysis. Furthermore, the TOWS matrix was used to identify relationship threats, opportunities, weaknesses, and strengths. TOWS matrix will generate strategies based on the combination of strengths and opportunities (SO), strengths and threats (ST), weaknesses and opportunities (WO), and weaknesses and threats (WT) of the Healthcare Institute.

The sample size for this survey was 105 non-finance managers from various Healthcare institutes. To maintain the privacy of the Healthcare Institute, this research did not reveal the names of Hospitals. By using Krejcie and Morgan's (1970) formula, a total number of 83 respondents was determined. This means at least 83 or more measurements or surveys were needed to have a confidence level of 95% and a real value within ±5% of the measured or surveyed value. The questionnaire was distributed to the non-finance managers who were under active employment status by the time of the study.

There is are total of 27 questions in the questionnaire analyzed for descriptive analysis using Statistical Package for the Social Sciences (SPSS) software. Those questions using a 5-point Likert scale were set based on research variables. All questions were set as compulsory for the respondents to answer before moving to the next section to ensure 100% of usable answers could be obtained from the respondents.

4. Findings and Results

Performing reliability analysis in this research is crucial to assess the relationship between items in the questionnaire, including the independent and dependent variables. Cronbach's alpha is utilized to evaluate repeatability and internal consistency of each item. The reliability coefficient of Cronbach's alpha ranges from 0 to 1; the closer the value is to 1, the higher the internal consistency of the item in the scale.

Table 1 shows that all variables have a Cronbach's alpha value ranging from 0.7 to 1.0, indicating excellent data proximity to 1. The independent variable, Financial Attitude, exhibits the lowest Cronbach's alpha at 0.791. Nonetheless, as per Schmitt's (1996) research, a Cronbach's alpha exceeding 0.7 suggests a high level of internal reliability for an instrument. Azib et al. (2022) reported a reliability test result of 0.942 for financial literacy, while the current data reveals a Cronbach's alpha of 0.932, which is fairly similar. Furthermore, the highest score recorded in this test is for Financial Knowledge at 0.958, indicating strong internal reliability. This result aligns closely with the study conducted by Siswanti and Halida (2020), where the value was 0.943. Therefore, the items utilized to assess the variable demonstrate consistency and reliability, underscoring the quality of the measurement.

Table 1: Cronbach's Alpha Test on All Variables

Variables	Set of Items	Cronbach's Alpha
Financial Knowledge (IV)	9	0.958
Financial Attitude (IV)	5	0.791
Financial Behavior (IV)	8	0.817
Financial Literacy (DV)	5	0.932
Overall	27	0.875

Table 2 consists of the mean and standard deviation of the dependent and independent variables and the ranking score based on the mean values. Financial Attitude, the highest ranking, has a mean score of 3.813 (SD = 0.952), indicating a less favorable attitude towards financial matters in general. There is less variability in financial attitude compared to knowledge, implying scope for interventions to yield uniformly positive impacts.

Financial Knowledge ranked third, with a mean score of 3.079 (SD = 1.257), indicating significant variability among participants. This suggests a need for targeted educational interventions to address knowledge gaps. Financial Knowledge emerges as a key factor influencing financial literacy. Financial Behaviour, the second-ranking variable, has a mean score of 3.514 (SD = 1.188). Participants exhibited behaviors suggesting higher engagement than attitudes but lower than their knowledge levels, reflecting diverse financial management approaches. The mean score for Financial Literacy, the dependent variable influenced by financial knowledge, attitude, and behaviour, is 3.509 (SD = 1.040). Variability in participants' literacy levels underscores differences in these contributing factors.

Table 2: Mean and Standard Deviation Variables

Variables	Rank	Mean	Std. Deviation
Financial Knowledge	3	3.079	1.257
Financial Attitude	1	3.813	0.952
Financial Behavior	2	3.514	1.188
Financial Literacy (DV)		3.509	1.040

Table 3 shows respondents' self-reported financial knowledge and abilities in detail. Firstly, they were most confident in understanding simple financial terms and planning financial activities such as budgeting, investing, and forecasting, scoring 3.667 and 3.533, respectively. However, confidence levels varied, with a standard deviation of 1.039 and 1.173, respectively. Respondents also felt moderately capable in managing financial risk, scoring 3.089 on average. While they generally think they can handle financial risk, confidence levels varied, with a standard deviation of 1.196. The lowest confidence levels were in financial performance analysis based on reports and the receiving of adequate financial training from the organization, with a mean score of 2.944 and 2.656, respectively. This implies low confidence in analyzing financial performance and insufficient financial training from the company, although with variability (standard deviation of 1.327 and 1.351, respectively).

Table 3: Mean and Standard Deviation for Financial Knowledge

No	Statement	Mean	Std. Deviation	Rank
FK1	I can plan financial activities such as budgeting, investing, and financial forecasting.	3.533	1.173	2
FK2	I can manage financial risk.	3.089	1.196	3
FK3	I understand simple financial terms easily	3.667	1.039	1
FK4	I am capable of preparing monthly financial reports accurately and efficiently.	3.089	1.312	4
FK5	I can perform financial performance analysis based on the financial report.	2.944	1.327	8
FK6	I have received adequate financial training from the organization.	2.656	1.351	9
FK7	I am familiar with the necessary documents, system and data required to prepare the financial report	3.022	1.315	7
FK8	I can calculate the profit and loss of the project.	3.078	1.292	6
FK9	I have the knowledge and skills to perform basic financial tasks	3.089	1.312	5

Table 4 provides insights into respondents' financial attitudes. Respondents had demonstrated a relatively positive attitude towards saving money, achieving a mean score of 4.056. This suggests a generally positive attitude towards saving money, though there was variability in this mindset, as seen in the standard deviation of 0.693. Respondents showed the lowest interest in financial news and matters, scoring a mean of 3.433. This implies a generally unfavorable attitude towards staying informed about financial news. However, there was some variability in this attitude, as indicated by the standard deviation of 1.209. In summary, the data indicated that respondents generally hold positive attitudes towards saving money, responsible spending, and staying informed about financial news. However, variations in these attitudes may mirror differences in respondents' financial behaviors and practices.

Table 4: Mean and Standard Deviation for Financial Attitude

No	Statement	Mean	Std. Deviation	Rank (Based on mean)
FA1	I have a positive attitude towards saving money	4.056	0.693	1
FA2	I have a responsible attitude towards spending money.	3.967	0.827	2
FA3	Saving money comes easily to me.	3.644	1.202	4
FA4	I am always organized when it comes to managing money.	3.967	0.827	3
FA5	I am always interested in financial news and matters.	3.433	1.209	5

Table 5 outlines respondents' financial behaviors. Individuals mostly look to save money, scoring 4.122, showing a preference. There is some variance in this trend, evident from the standard deviation of 0.934. Regarding expense tracking, respondents had an average score of 3.422, implying a general tendency to monitor spending. Nonetheless, there is diversity in this practice, as shown by the standard deviation of 1.289. Likewise, for creating a monthly personal budget, respondents achieved an average score of 3.456. This demonstrates a general inclination towards budgeting, with variability illustrated through the standard deviation of 1.359. In addition, respondents uncommonly seek financial guidance from banks and friends and family, scoring an average of 2.589 and 3.022, respectively. This underscores the insignificance they place on this advice, despite some variation as indicated by the standard deviation of 1.389 and 1.332, respectively.

Table 5: Mean and Standard Deviation for Financial Behavior

No	Statement	Mean	Std. Deviation	Rank (Based on mean)
FB1	I am always looking to save money	4.122	0.934	1
FB2	I always compare prices before purchasing any product	4.056	0.916	2
FB3	I am always tracking my spending	3.422	1.289	6
FB4	I am always preparing my monthly personal budget	3.456	1.359	5
FB5	I have always received financial information and advice from the bank	2.589	1.389	8
FB6	I have always received financial information and advice from friends and family	3.022	1.332	7
FB7	I have allocated money to short-term savings.	3.800	1.083	3
FB8	I have allocated money into long-term savings.	3.644	1.202	4

Table 6 reveals respondents' views on financial literacy in the hospital setting. Respondents indicated the hospital has an investment plan, scoring a mean of 3.656, suggesting respondents see the hospital as somewhat planned in investments. However, there was variability in perception, evident from the standard deviation of 1.029. Respondents also noted the hospital uses financial data in its statements to manage operations, scoring a mean of 3.489. This suggests they believe the hospital leverages financial statements for business management. Similarly, respondents perceived the hospital to have a business plan, scoring a mean of 3.444, hinting at strategic planning. Yet, variations existed in these perceptions, as reflected in standard deviations of 1.052 and 1.029, respectively. Overall, the findings imply respondents generally perceive the hospital as involved in financial practices like investment plans, using financial statements, and having business and ROI monitoring. However, these perceptions varied, potentially due to differences in understanding the hospital's financial approaches and strategies.

Table 6: Mean and Standard Deviation for Financial Literacy

No	Statement	Mean	Std. Deviation	Rank (Based on mean)
FL1	This hospital manages its business using the financial information in its financial statements.	3.489	1.052	3
FL2	The hospital has a business plan.	3.444	1.029	4
FL3	The hospital must save money for business expenses	3.511	1.019	2
FL4	Return on investment (ROI) is regularly monitored by the	3.444	1.072	5

	hospital.			
FL5	The hospital has an investment plan.	3.656	1.029	1

Table 7 indicates that the correlation between financial knowledge and financial literacy is 0.741, showing a significant positive correlation. This indicates that an increase in respondents' financial knowledge is associated with an increase in their literacy of financial matters. Likewise, the correlation between financial attitude and financial literacy is 0.820, demonstrating a strong positive correlation. This suggests that a more positive financial attitude in respondents corresponds to a more positive understanding of financial matters. The correlation between financial behaviour and financial literacy is 0.839, also showing a strong positive correlation. This implies that an enhancement in respondents' financial behaviors is linked to an improvement in their literacy of financial matters. In summary, these robust positive correlations highlight a connection between financial knowledge, attitude, behavior, and literacy. Improvement in one aspect is likely to lead to improvements in the others.

Table 7: Pearson Correlation

		FK	FA	FB	FL
FL	Pearson Correlation	.741**	.820**	.839**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	90	90	90	90

Table 8 above shows the result for the multiple regression summary. The R-squared value in the table shows the variance of the dependent variable being influenced by the independent variable. For this case R R-squared is 0.656 with F F-statistic value of 55.777 and a significance level of 0.000; therefore, the model is significant. Thus, the linear regression result indicates 65.6% of the dependent variable (financial literacy) can be explained by the independent variables (financial knowledge, financial attitude, financial behaviour) included in the study. It can be concluded that the remaining 34.4% of the dependent variable is explained by other factors that are not included in the research.

Table 8: Multiple Regression Summary

Model	R	R Square	F	Sig.
1	.901[a]	.656	55.777	.000[b]

Table 9 represents the correlation coefficient for multiple regression analysis. Results show financial knowledge, financial attitude, and financial behaviour have a significant value below 0.05, which indicates the independent variables are significant. In conclusion, the findings indicate that financial knowledge, attitude, and behaviour are significant predictors of financial literacy. As individuals' financial knowledge, attitude, and behaviour improve, their literacy of financial matters also tends to improve.

Table 9: Correlation Coefficient for Multiple Regression

Model	Beta	t	Sig
(Constant)	.688	1.572	.120
FK	.225	2.735	.008
FA	.328	2.108	.038
FB	.300	2.013	.047

Table 10 indicates that this study utilized the SWOT analysis tool to conduct a situational analysis of an organization in the healthcare industry. This analysis delves into internal and external aspects to pinpoint strengths, weaknesses, opportunities, and threats, aiding in devising measuring factors contributing to financial literacy among non-finance managers. The SWOT analysis aids researchers in crafting strategies and recommendations for organizational improvement. This aligns with existing research underlining the significance of SWOT analysis in strategic decision-making and organizational growth (Sandra et al., 2016).

Table 10: SWOT Analysis

Strengths	Weaknesses
Offer a diverse array of specialized services, primary care, and wellness solutions Employ skilled managers who specialize in their respective fields. Focus on patient services, prioritizing patient care and satisfaction.	1. Limited financial background among managers 2. Inadequate financial training for managers 3. Delays in financial reporting and inefficiencies in resource management within departments. 4. Unhealthy corporate policy management practices
Opportunities	**Threats**
1. Financial courses offered by local and international universities are available 2. Training can be done online or in person, making it easy for managers to enroll. 3. Mentorship program for financial training. 4. User-friendly financial systems are available in the marketplace.	Increasing competition among private hospitals. Strong financial performance among competitors Shift in healthcare patterns, consumer choices, and lifestyles.

The TOWS Matrix, as indicated in Table 11, is a vital tool for assessing internal strengths and weaknesses of an organization, while considering external opportunities and threats. It helps identify ways to leverage opportunities, address threats, and address weaknesses by maximizing strengths. This strategic assessment, tailored for non-financial managers at Healthcare Institutes, aids in developing strategies aligned with research objectives. Consequently, implementing the TOWS Matrix at Healthcare Institutes will empower non-finance managers to make informed decisions, enhancing strategic planning and operational efficiency. Through thorough examination of internal factors and external market dynamics, Healthcare Institutes can position themselves for sustainable growth and competitive advantage in the healthcare sector. This strategic approach will assist the Healthcare Institute in overcoming challenges, capitalizing on opportunities, and achieving research goals with precision and foresight.

Table 11: TOWS Matrix

	Opportunities	**Threats**
	Financial courses offered by local and international universities are available. Training can be done online or in person, making it easy for managers to enroll. Mentorship program for financial training. User-friendly financial systems are available in the marketplace.	Increasing competition among private hospitals. Strong financial performance among competitors. Shift in healthcare patterns, consumer choices, and lifestyles
Strength	**S-O Strategies**	**S-T Strategies**
Offer a diverse array of specialized services, primary care, and wellness solutions. Employ skilled managers who specialize in their respective fields. Focus on patient services, prioritizing patient care and satisfaction.	Utilize skilled managers to enroll in financial courses offered by the universities to enhance financial literacy and better manage the hospital's finances (S2, O1) Implement advanced training programs for skilled managers by using user-friendly financial systems (S2, O4)	Utilize the hospital's skilled managers (S2) to formulate strategies that address the increasing competition (T1) and strong financial performance among competitors (T2). Promote specialized services (S1) to adapt to changing healthcare patterns (T3)
Weaknesses	**W-O Strategies**	**W-T Strategies**
Limited financial background	Overcome the limited background	Implement healthy corporate

among managers Inadequate financial training for managers Delays in financial reporting and inefficiencies in resource management within departments Unhealthy corporate policy management practices.	of finance (W1) and lack of financial training (W2) among non-finance managers by providing a financial course (O1) and a mentorship program (O3) Overcome the delays of financial reporting and inefficiencies (W3) by implementing a user-friendly financial system (O3) that can be used by the non-finance manager.	policies (W4) to remain competitive among private hospitals (T1) Hire and improve talent management (W1) by recruiting qualified managers to enhance competitiveness among private hospitals (T1).

5. Conclusion and Recommendations

Based on the research results on enhancing financial literacy among non-finance managers in Healthcare Institutes, this study yields several targeted recommendations. These suggestions aim to boost the financial knowledge, attitude, behaviour, and overall literacy of the managers, ensuring improved financial performance and sustainability for the hospital. Firstly, it is crucial to conduct regular and comprehensive training programs focused on financial management. These sessions should cover key financial principles, budgeting, financial reporting, and interpretation of financial statements. The goal is to equip non-finance managers with the necessary skills to understand and manage financial data effectively. Regular workshops and seminars led by finance experts can bridge the knowledge gap and promote a culture of continuous learning within the organization.

Secondly, establishing a mentorship program by pairing non-finance managers with experienced finance professionals is recommended. This mentorship will offer ongoing support and guidance, assisting managers in applying financial concepts in real-world scenarios. Mentors can provide insights into complex financial issues and help develop strategic thinking and decision-making skills among the managers.

Thirdly, embedding financial literacy into the organizational culture is crucial. Every Healthcare institute should foster an environment where financial discussions are part of daily operations. This entails integrating financial literacy into performance evaluations, setting improvement goals, and recognizing and rewarding managers who exhibit strong financial management skills. Promoting financial literacy as a core competency will ensure managerial decisions are made with a thorough understanding of their financial implications.

Furthermore, adopting user-friendly financial systems and tools can significantly enhance financial reporting and resource management. Implementing modern financial software that offers real-time tracking and reporting will help non-finance managers stay updated on the hospital's financial status. Training managers to use these tools effectively will reduce delays and inaccuracies in financial reporting, supporting better decision-making processes.

Finally, refining talent management practices by recruiting managers with strong financial backgrounds and offering professional development opportunities is essential. Healthcare institutions should prioritize hiring individuals with expertise in financial management and healthcare administration. Creating a comprehensive talent management strategy that includes ongoing professional development, mentorship initiatives, and clear career paths will aid in retaining competent managers. Cross-training opportunities can also be provided to non-financial managers to enhance their understanding of financial management practices and improve their overall effectiveness.

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Integrating Environmental, Social and Governance (ESG) into Higher Education: Voices of Accounting Undergraduates

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Abstract: Environmental, Social and Governance (ESG) is a framework for businesses to assess their business practices and performance on various ethical and sustainability issues. Over two decades of global prominence, the ESG concept is now rooted across sectors, including education. In the context of higher education, embedding ESG into the curriculum is essential to equip students with a deeper understanding of ESG principles and related issues. This study explores undergraduate students' perceptions of ESG principles within the context of higher education. This study employed a quantitative research design, and 174 responses among undergraduates accounting students were collected using a survey questionnaire. The findings reveal that while ESG elements are addressed within the academic syllabus, they are not delivered systematically, highlighting the need for deeper integration and clearer curriculum alignment. Overall, student responses across all three dimensions, Environmental Awareness, Social Awareness, and Governance and Ethics, were generally positive. Among these, Governance and Ethics recorded the highest mean score, suggesting that students strongly perceive ethical behavior and see it as a crucial component in implementing ESG principles within higher education. Furthermore, awareness of climate change and its effects needs to be highlighted among students. Embedding ESG into the curriculum will help to produce environmentally conscious and socially responsible students. In addition, regulators and practitioners can play their role in jointly educating students on ESG. Future studies could consider expanding the sample size by including research universities and further examining the ESG relationship comprehensively within the context of higher education. These findings enhance the current literature on ESG in education by highlighting students' perspectives on ESG implementation, offering valuable insights for policymakers and universities to strengthen the integration of ESG into the curriculum and to cultivate socially and environmentally conscious graduates prepared for global change.

Keywords: *Environmental, Social, and Governance (ESG), Sustainability, Ethical, Higher Education, Accounting*

1. Introduction

The formalization of the Environmental, Social and Governance (ESG) concept was started in 2004 after the United Nations (UN) introduced the Global Compact "Who Cares Wins' report. ESG gained prominence and became a global phenomenon among the stakeholders, which requires all organizations to embed it in their operations. Over two decades of global prominence, each sector plays its role and takes responsibility in achieving the Sustainable Development Goals (SDGs), including the education sector specifically in SDG 4 Quality Education (United Nations, 2025). The education sector plays a significant role in advancing ESG and achieving SDGs as a hub for research, education, and community engagement. In 2022, Higher Education Institutions (HEI) benefited most from increased funding from ESG-mandated funds, with a total of USD143.5 billion for education and research activities (Bursa Malaysia, 2022). This investment and these actions help HEI take the first step in preparing future leaders who can deal with sustainability challenges.

The Malaysian Ministry of Higher Education has mandated public universities to implement ESG policy as part of the 2030 Agenda for sustainable development. Aligning campus operations with sustainability metrics not only supports this agenda but also enhances the global standing of public universities in assessments such as the Times Higher Education (THE), Impact Rankings on SDGs and the Quacquarelli Symonds (QS) World University Rankings: Sustainability (Times Higher Education, 2024). Further, towards environmental sustainability, the UI GreenMetric World University Ranking conducted by Universitas Indonesia in 2010 is also another initiative to measure university green sustainability initiatives (Universitas Indonesia, 2025).

Consequently, transitioning to sustainable practices is not only a strategic imperative but also in the

universities' best interest. Consequently, many HEIs have taken the step by starting to embed ESG into their operations and curriculum development. For instance, Universiti Malaya (UM) came out with the discussion paper on "Leveraging sustainable finance for institutions of higher learning" in February 2025 to see how the HEI can help achieve these goals (Zullif, 2025). Despite challenges faced, with effective strategies, institutional support, and industry collaborations is possible to embed ESG concepts in curriculum development. This action is essential to equip students with a deeper understanding of ESG reporting requirements and related issues (Abo-Khalil, 2024; Alenezi & Alanazi, 2024).

The government initiative and the HEI actions will be achieved if all people understand and have an awareness of the ESG concepts. In addition, Wahab (2024) indicates that Service-Learning Malaysia-University for Society (SULAM) is one of the initiatives to link students to ESG elements with communities in the sense of civic duty. In his findings, SULAM brings a positive outcome for students by bridging academic learning with community engagement and providing a well-rounded education experience. This is related to social and environmental elements. Therefore, this study aims to explore students' perceptions of ESG principles within the context of higher education. The early understanding is essential for the success of ESG implementation and the SDGs goals. The selected undergraduate accounting students from the public universities in Malaysia will be chosen as the sample for the study.

The next section presents a literature review, providing context and insights from previous studies. This is followed by an explanation of the research methodology, including the target population, sampling process, and questionnaire design. The subsequent section outlines the key findings and offers a detailed discussion. Finally, the paper concludes by summarizing the results, acknowledging limitations, and suggesting directions for future research.

2. Literature Review

Environmental, Social and Governance in Higher Education

The incorporation of Environmental, Social, and Governance (ESG) principles into education is increasingly recognized as essential in shaping socially responsible and ethically grounded graduates. ESG in the context of higher education not only prepares students to understand global sustainability challenges but also encourages them to act as proactive contributors to societal transformation (Finatto et al., 2024; Teh, 2025). The concept of sustainability has evolved, transcending traditional economic goals to encompass social and environmental responsibilities. This evolution has been expanded in education, where institutions are increasingly called upon to model sustainable practices and instill these values in learners. One foundational approach to sustainability is the Triple Bottom Line (TBL) framework, first introduced by Elkington (1998, 2013). TBL advocates for balancing three core elements, namely people, planet, and profit, emphasizing that true sustainability arises from their interconnection.

In the context of education, these concepts focus on contributing to society and minimizing their environmental impact, including managing their financial well-being. The ESG principles in the 2004 UN report Who Cares Wins provided a clearer structure for evaluating sustainable practices (United Nations Global Compact, 2004). While ESG was initially prominent in corporate finance and investment, its relevance has extended to sectors like education. Universities and schools are now being assessed on their ESG performance. Recent research on ESG and sustainability education highlights many positive outcomes. Singh (2024) indicates that HEIs that incorporate ESG principles into their curriculum development and course syllabus can enhance students' awareness and responsibility on ESG. This could enrich their academic experience and better prepare them for complex real-world problems.

Sustainability Theory in ESG Education

From a theoretical standpoint, ESG research is largely grounded in stakeholder theory and institutional theory. The application of stakeholder theory to ESG in education suggests that institutions respond proactively to the expectations of their stakeholders, including students, faculty, parents, and the community. Li et al. (2021) highlight how responsiveness to stakeholder concerns enhances legitimacy and institutional trust. In practice, this could involve integrating sustainability into university syllabi, engaging students in green campus initiatives, or fostering partnerships with local communities.

Meanwhile, institutional theory explains how educational institutions may adopt ESG practices in response to regulatory pressures or to align with global best practices. For example, Chatterji and Toffel (2010) demonstrate how rating systems can motivate performance improvements, which in the educational realm could translate to sustainability certifications or rankings. Studies by Jayachandran et al. (2013) and Koh et al. (2014) reinforce that focusing on social and environmental dimensions can mitigate risks and enhance institutional resilience, an increasingly vital concern in an era of climate change and social transformation. This study categorizes ESG principles into three core dimensions, namely Environmental Awareness (EA), Social Responsibility (SR), and Governance and Ethics (GE). These dimensions collectively capture the breadth of ESG engagement among university students. Social, environmental, and governance criteria are vital in the educational process for an educational institution as a sector of educational services (Akopyants et al., 2024). Yeo et al. (2025) incorporate additional elements 'economic' in proposing the sustainability framework for higher education in Malaysia.

Environmental Awareness

Environmental awareness (EA) within educational contexts refers to both cognitive understanding and behavioral alignment with sustainability principles (Littledyke, 2008). This includes familiarity with key global issues such as climate change, environmental degradation, and the concept of CSR. Furthermore, it encompasses the practical application of this awareness, such as recycling and energy conservation. Research emphasizes that environmental literacy must go beyond theoretical knowledge; it should inspire students to adopt environmentally responsible habits in their daily lives (Kopnina & Meijers, 2014). Institutions that integrate sustainability into their curriculum contribute meaningfully to the development of environmental stewardship among learners (UNESCO, 2017). Nurillayev (2024) found that environmental education and overall ESG education help to reduce the number of emissions and lower the youth unemployment rate. This means that better education in these areas is linked to improvements in both environmental and social outcomes. Questions in this category assess not only awareness but also the adoption of environmentally sustainable practices, reflecting the extent to which environmental education influences behavior.

Social Responsibility

The social responsibility (SR) pillar of ESG education examines students' civic involvement, their respect for diversity, and their exposure to ethical and social content within the academic syllabus. Active participation in community service (Afzal & Hussain, 2020), valuing inclusivity in the classroom, and feeling safe and supported in a diverse university environment are markers of social engagement. Educational frameworks that prioritize social responsibility emphasize the role of the curriculum in fostering empathy, mutual respect, and a sense of civic duty (Turker, 2009). Carroll's (2016) model of CSR further supports this notion by identifying ethical and philanthropic responsibilities as fundamental elements of responsible behavior. Including ESG and CSR topics in university courses equips students with the tools to navigate social complexities and act with awareness and integrity. Yeo et al. (2025) found in their study that the university had diligently attended to the welfare and well-being of its students and staff, underscored the significance of maintaining an environmental agenda, and had an excellent governance policy, from a social sustainability standpoint.

Governance and ethics

The governance and ethics (GE) component relates to how students internalize and act upon ethical standards, institutional regulations, and principles of fairness. In this study, governance is operationalized through students' compliance with rules, their willingness to report misconduct, and their valuation of ethical conduct in daily life. Ethical development is a cornerstone of educational governance, as it ensures students not only understand but also uphold academic integrity and fairness (Feday, 2017). Institutions play a critical role in modelling governance by promoting transparency and ethical conduct as cultural norms. The Association to Advance Collegiate Schools of Business (AACSB) (Association to Advance Collegiate Schools of Business, 2020) also underscores the importance of embedding ethical reasoning as a core learning objective. By evaluating students' ethical behavior and their responses to injustices, this dimension reveals the effectiveness of ethical education in shaping principled individuals.

Together, these categories offer a robust framework for assessing how well ESG principles are integrated into the academic experience. They also provide a lens through which to examine the preparedness of students to contribute to sustainable and ethically sound societal development. This tripartite structure aligns with the

best international practices in education for sustainable development and offers a comprehensive approach to evaluating ESG engagement among learners. Overall, integrating ESG into the education framework not only supports sustainable development goals but also prepares students to be responsible global citizens. Embedding ESG principles into the governance and operations of educational institutions is no longer optional, but it is essential for fostering ethical leadership, environmental stewardship, and long-term institutional sustainability. Ho and Kim (2024) indicate that the environmental and governance areas were the priorities of educational demand for ESG awareness among university faculty; for instance, energy-saving education and fair and transparent policies and treatment shall be introduced and strengthened.

3. Methodology

Research Design

This study adopts a quantitative research approach using a survey method to examine university students' understanding and awareness of integrating ESG in their daily lives and university. This approach is widely used and acceptable to assess students' attitudes, awareness, and practices due to its capacity to yield generalizable findings (Creswell, 2014).

Population and Sampling

The population of this study comprises undergraduate accounting students that taking Ethics and Governance courses at two Malaysian universities: Universiti Teknologi MARA (UiTM) and Universiti Pendidikan Sultan Idris (UPSI). These institutions were purposively selected to allow for a comparative analysis between different types of higher education institutions. The study population is likely to provide generalizable findings, as UiTM represents a sample from the comprehensive university and UPSI represents a sample from a focused university. Using the purposive sampling method allows the researcher to deliberately select participants who are expected to provide relevant and insightful data, particularly those currently studying Ethics and Governance topics (Etikan, Musa, & Alkassim, 2016). A final total of 174 respondents participated in the questionnaire from both universities.

Research Instrument

The research instrument was self-developed and segmented into four sections: (1) demographic background, (2) environmental awareness (EA), (3) social responsibility (SR), and (4) governance and ethics (GE). There are five survey items in EA and SR, while three survey items in GE. The items were constructed based on prior research and frameworks in sustainability education and CSR, adapted to reflect the higher education context. The questions are rated on a seven-point interval Likert scale ranging from 1 as "strongly disagree", 2 "disagree", 3 as "somewhat disagree", 4 as "neither agree or disagree", 5 as "somewhat agree", 6 as "agree" and 7 as "strongly agree" to capture degrees of agreement and frequency (Vagias, 2006).

Data Collection Procedures

Data was gathered using an online survey platform (Google Forms), which facilitated efficient distribution and accessibility for students from both participating universities. Students were invited to participate through teaching lecturers and faculty administrators, who provided brief introductions about the purpose of the study. All respondents were informed that their participation was voluntary and that anonymity and confidentiality would be maintained throughout the research process.

Data Analysis Techniques

Upon the data collection process, the data were transferred into a Microsoft Excel spreadsheet, and descriptive analysis, including the minimum, maximum, and mean score for each of the survey items, was presented to derive the findings of the study on the students' understanding of ESG.

4. Findings and Discussion

Descriptive Findings

The respondents are 174 undergraduate students in accountancy programs. 79% (138) are female students, while 21% (36) are male students. Table 1 provides descriptive information, including the minimum, maximum, and mean score for each of the survey items under Environmental Awareness (EA), Social

Responsibility (SR), and Governance and Ethics (GE). Overall, the minimum value ranges from the majority of 1.00, 2.00 (EA2) and 5.00 (GE3), while the maximum value is 7.00 for all three dimensions. Interestingly, item GE3, denoted as '*Do you think ethical behavior is important in your daily life*?' was responded with a minimum value of 5, indicating the respondents agree that ethical behavior is essential to be integrated in their daily life in practicing the concept of environmental, social and governance (ESG). Ethical behavior is the pillar of ESG; without ethical behavior, the element of ESG and corporate social responsibility cannot be reflected and applied.

Table 1: Descriptive Information (*N*=174)

Items	Min	Max	Mean
Environmental Awareness (EA)			
EA1 - Do you know about environmental, social, and governance?	1.00	7.00	5.90
EA2 - Are you aware of climate change and its effects?	2.00	7.00	5.11
EA3 - Do you know about Corporate Social Responsibility?	1.00	7.00	5.94
EA4 - Do you recycle?	1.00	7.00	5.53
EA5 - Do you turn off lights and electronics when not in use?	1.00	7.00	5.55
Social Responsibility (SR)			
SR1 - How often do you participate in community service or volunteer work?	1.00	7.00	5.32
SR2 - Do you respect diversity and inclusion in your classroom?	1.00	7.00	5.99
SR3 - Do you feel safe and supported in your university environment?	1.00	7.00	6.02
SR4 - Does your university's syllabus teach you about Environmental, Social, and Governance?	1.00	7.00	5.28
SR5 - Does your university's syllabus teach you about Corporate Social Responsibility?	1.00	7.00	5.94
Governance and Ethics (GE)			
GE1 - Do you follow the rules and regulations of your university?	1.00	7.00	6.13
GE2 - Do you report or stand against unfair practices (e.g., bullying, cheating)?	1.00	7.00	5.56
GE3 - Do you think ethical behavior is important in your daily life?	5.00	7.00	6.41

Source: Authors

Environmental Awareness

The mean score reported based on Table 1 for EA is in the range of 5.11 to 5.94. The highest mean score recorded of 5.94 for EA3 is represented by *Do you know about Corporate Social Responsibility?* This indicates that the respondents somewhat agree that they possess knowledge about Corporate Social Responsibility (CSR). The term CSR is widely used in Malaysia, especially in business and management, since it was first introduced in 2006. Most of the public and private business entities, including non-profit entities, integrate the CSR concept into their business activity, making the public aware of the CSR implementation. Public listed companies, for instance, are required to report their CSR initiative annually in their corporate annual report. In addition, the highest mean score was followed closely by EA1 refers to *Do you know about environmental, social, and governance?* (Mean = 5.90). It shows that respondents agree that they possess knowledge of ESG. Even though sustainability and ESG are among the newly referred terms, CSR is still dominant and highly regarded as a concept of social responsibility, thus it reflects this finding.

Meanwhile, the lowest mean score reported is EA2 (Mean = 5.11), which represents *Are you aware of climate change and its effects?*. This portrays the fact that the respondents are relatively less aware of information and knowledge about climate change and its effects compared to other environmental issues. Further, they may have unstructured information on climate change from various sources. All other EA items reported mean scores above 5, indicating that respondents generally agree they are knowledgeable about ESG (EA1) and practice energy-saving behaviors such as turning off lights and electronics when not in use (EA5). The finding aligns with the earlier studies by Kopnina and Meijers (2014) and Nurillayev (2024).

Social Responsibility

The mean scores reported are within the range of 5.28 to 6.02. Based on Table 1, the highest mean score was reported by SR3, and it is closely followed by SR2 and SR5. The highest mean score of 6.02 shows the statement *Do you feel safe and supported in your university environment?*, indicating that the respondents agree and

perceive strong support in the university environment. SR2 refers to *Do you respect diversity and inclusion in your classroom?* And SR5 refers to *Does your university's syllabus teach you about Corporate Social Responsibility?* With mean scores of 5.99 and 5.94, respectively, these findings suggest that universities are increasingly promoting gender diversity and fostering inclusion practices such as opening the intake to people with difficulties. The university is also integrating CSR into its academic programs to raise awareness among students, such as through the implementation of SULAM, to provide students with the opportunity to contribute knowledge, skills and competencies in their field towards solving problems or issues within communities. Other courses also integrate out-of-classroom activities that involve CSR elements. This reflects the findings of this category.

Interestingly, the lowest mean score recorded was for item SR4 (Mean = 5.28), which asked whether the university's syllabus teaches ESG topics. A mean score above 5 implies that the ESG is covered under the university syllabus. However, it is still the lowest among all items. This raises concerns about the coverage of ESG and how it systematically integrates into the curriculum. The lower score suggests that some element of ESG may be present at the moment. However, at some point, it may not be well highlighted and systematically delivered and mapped to the university curriculum. It is also possible that the student is uncertain whether the coverage falls under the ESG, reflecting that the university curriculum needs to be refined to better align with the ESG elements. This finding is consistent with previous research conducted by Afzal & Hussain (2020) and Yeo et al. (2025).

Governance and Ethics

The highest mean score is GE3 as indicated in Table 1, which is the question asked *Do you think ethical behavior is important in your daily life?*. The mean score reported is 6.41, which indicates that the respondents agree with the importance of ethical behavior in their everyday actions. Similarly, item GE1 refers to *Do you follow the rules and regulations of your university?* Also reported with a high mean score of 6.13, above 6. Item GE1 is also closely interrelated to GE3, which implies that the respondents are rule-abiding as they follow the rules and regulations of their university. By adherence to the rules and regulations, a person can be seen as a reflection of ethical conduct. The findings suggest that the respondents recognize the value of ethical behavior through compliance with university rules and regulations.

The lowest mean score reported is GE2, which refers to *Do you report or stand against unfair practices (e.g., bullying, cheating)?*. The mean score reported is 5.56, which the respondents somewhat agree with their ability to report unfair and wrongdoing practices. However, it is discovered to be the lowest among other items in GE indicates that the respondents seem unlikely to report against unfair practices. This implies that it may be due to their attitude, which does not concern their surroundings. In addition, the regulators and policymakers need to make the reporting platform more friendly and accessible. By having a specified platform or medium, the wrongdoing can be easily reported, and action can be immediately taken. Awareness among the students shall be emphasized through a campaign and information on the importance of reporting any wrongdoings and unfair practices.

Based on the 174 responses, the finding reveals that the ESG is present but covered in a limited manner. Overall, GE reported the highest mean score, followed by SR and EA. This finding indicates that all three variables are important from an academic perspective. The finding of GE indicates that students perceive the importance of ethical behavior by adhering to the rules and regulations. However, the university must emphasize students' role in raising awareness of environmental and social issues and in encouraging them to report unfair practices. Additionally, all items in SA and EA show a positive level. For instance, students are aware of the CSR concept as compared to ESG. This is evidenced by practicing recycling, conserving unnecessary energy. However, they are less aware of climate change and its effects. In addition, students feel supported in university through diversity and inclusion. Their university integrates CSR into its syllabus, and this is reflected by its awareness of CSR. However, they tend to be less involved in community service or volunteer work, and this needs to be integrated into the ESG syllabus to enhance students' involvement. Engagement in community service showed variability, indicating areas where educational reinforcement is needed. This result is in line with the research conducted by Ho and Kim (2024) and the aspiration stated by Feday (2017).

Comparison between Comprehensive and Focused Universities

Table 2 indicates the mean scores for comprehensive and focused universities across three dimensions (EA, SR and GE). Overall, the mean scores range from 5.60 to 6.03, indicating a generally positive response across all areas. Among these three dimensions, GE is reported as the highest mean score for both comprehensive and focused universities, suggesting that respondents (i.e., students) place a strong importance on governance and ethical values. While EA and SR reported quite similar mean scores of 5.60 and 5.71, respectively, showing a moderate but consistent level for both areas.

Table 2: Comparisons of Total Mean Scores

Types	Environmental Awareness (5 items)	Social Responsibility (5 items)	Governance and Ethics (3 items)
Comprehensive university	5.35	5.50	5.90
Focused university	6.27	6.24	6.37
Overall	5.60	5.71	6.03

Source: Authors

Based on Table 2, the focused university outperformed the comprehensive by reporting the highest mean scores of all three dimensions. The focused university's mean score is above 6, which means the respondents agree that they perceive strong integration of ESG aspects in their university, academic and daily practices. On the other hand, a comprehensive university reported a mean score below 6, indicating the respondents somewhat agree with the ESG integration, but it might not be well covered. The lower mean score may be attributed to a wider generalized curriculum offered, where the element of ESG is not explicitly embedded across all programs and the programs are not well mapped to the ESG elements. This led to difficulties for students to identify such content within their courses. Moreover, the comprehensive university's diverse academic offerings and larger student body might contribute to a more diluted delivery of ESG-related initiatives, potentially affecting students' perceptions and engagement with these topics. Focused universities often focus and concentrate on specific disciplines or themes, allowing for a more targeted and integrated approach to ESG education.

5. Conclusion and Recommendations

This study sheds light on how undergraduate accounting students perceive ESG principles within their academic experience. While ESG topics are included in the syllabus, they are often presented in a fragmented and inconsistent way, suggesting a need for better structure and integration. Among the three ESG dimensions, students placed the highest importance on GE, showing that they value ethical behavior and understand its role in both their education and future careers. SR and EA were also viewed positively, though with slightly lower mean scores, pointing to areas that need more attention, especially in raising awareness about climate change and encouraging active engagement with environmental and social issues, such as encouraging recycling, conserving energy, involvement in community service and volunteer work and being alert to the surrounding alert through reporting unfair practices. In addition, university needs to be one step ahead by embedding ESG as part of their syllabus and curriculum and mapping it clearly so that ESG is better addressed, so that their understanding can be deepened even further.

This study enlightens the current literature on ESG in education. This study offers a valuable finding to policymakers, regulators and universities in developing strategies and policies related to ESG in education, embedding ESG into the current syllabus and curriculum systematically, as well as implementation practices of ESG inside and outside universities that can be applied by students. This will fill in the gap in the current curriculum delivery. This study also sheds light on practitioners to collaborate with the university to provide practical ESG implementation to better prepare graduates to meet real-world expectations around ethical and sustainable practices. Future research could employ other methods of data collection, such as interviews, to obtain a deeper understanding of how students engage with ESG concepts. This data could be expanded into a longitudinal study to determine whether this awareness leads to a persistent impact beyond the classroom.

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Parents' Readiness to Nurture their School Children Adopting Digital Payment

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Abstract: Normalizing in adoption of digital payment will contribute to a digital economy environment. This conceptual paper describes the literature review on a proposal for a study of the parents' behavior towards the use of digital payment by their primary school children. The proposed factors derived from the TAM and UTAUT model that would explain the adoption and non-adoption factors. The main objective of the study is to investigate the relationship between parents' readiness and the factors influencing their acceptance of technology, especially the use of digital payment systems by their primary school children. The proposed research method uses convenience sampling. The questionnaire will be disseminated to parents who have primary school children aged 6 to 12 years old. The response of 200 questionnaires was assumed as suitable for drawing a conclusion for the study. The findings aim to provide insight into the various factors, including digital literacy, financial awareness, and accessibility of technology, that influence parents' readiness to adopt digital payments. The result of this study will assist the banking industry in improving its facilities and strategies in its digital payment. The result would also help government agencies (such as schools and the education ministry) in improving their policy and management.

Keywords: *Digital economy, Digital payment, Technology acceptance*

1. Introduction

In this modern era of technological advancements, the acceptance of new technology has become a critical field of interest and debate. The perception that technology is more efficient and effective in various situations increases the adoption of these technologies. One of the significant technological innovations is financial technology or is also known as fintech. The growth of the digital payment system in education and financial transactions has transformed how transactions are conducted. Adaptation of digital payment methods for tuition fees, stationery purchases, canteen or cafeteria payments and extracurricular activities is increasing. However, the success of this shift largely depends on the parents' readiness to embrace and navigate these digital tools.

Recently, in Malaysia, schools have begun integrating digital payment systems to streamline transactions within the educational environment. These systems allow students to make purchases from buying food at the school canteen to other school-related expenses using e-wallets or contactless cards. These initiatives are to reduce the reliance on cash, enhance transaction efficiency and inculcate financial literacy from a young age. The introduction of contactless student cards for digital payments will allow students to conduct transactions without relying on their mobile phones, which are frequently prohibited in Malaysian educational environments, especially for school students. The cards are associated with parental accounts, enabling parents to oversee and regulate their children's expenditures. Moreover, the features such as pre-purchasing meals and setting daily spending limits have been well-received by parents, offering convenience and peace of mind (The Edge Malaysia: Bringing children into the digital payments universe).

Adopting the digital payment systems provides a multitude of advantages, improving convenience, security and financial accountability. Digital payments streamline the transaction process, enabling parents to swiftly and effortlessly pay school fees and other expenses from any location, thereby minimizing the necessity for in-person visits to schools or banks (Colline et al, 2022; Ritthitraiphop & Hamra, 2019 and Nasution, 2022) and it is also improving the security measures to combat fraud (Sundararaj & Meera, 2024)

Ministry of Investment, Trade and Industry (MITI) has planned to expand the Digital Economy's economic contribution to 22.6% of Malaysia's Gross Domestic Product (GDP) by the year 2025. MITI is also committed to making Malaysia one of the regional leaders in the Digital Economy. One of the segments in the digital economy

is digital financial services. Therefore, to emerge as a leader of the digital economy, the adoption of digital financial services should be at par with the ambition.

The ambition to become a leader of the digital economy in the future will require the young generation to possess a strong foundation in adopting digital financial services. Consequently, the young generation will be more committed to adopting other digital economy segments in the future. However, parents are responsible for shaping the young generation's minds. Their support to allow their young children to adopt digital finance services is important. Therefore, it is essential to examine the behavior of parents towards the use of digital financial services by their children.

This article explores the factors influencing parental adaptation to digital payments, the challenges they face and strategies to support them in nurturing their children's financial transactions in a digital world. Thus, the main objective of the study is to investigate the relationship between parents' readiness and the factors influencing their acceptance of technology, especially the use of digital payment systems by their primary school children. This study will also outline plans for digital financial services providers in improving their products and will strengthen the foundation of digital economy adoption. Subsequently, the ambition of making Malaysia one of the regional leaders in the digital economy will be realized.

Digital Economy Within The Malaysian Context

As a leader of the digital economy, the majority of economic transactions will be conducted online. Thus, conducting online economic transactions should be the norm among citizens. Normalcy can be achieved when it is nurtured from a young age. Subsequently, digital payment is one of the elements in the digital economy (Shen et al.,2021) that could nurture the younger generation to adopt online economic transactions. According to Statista.com, Malaysia's digital payments gross transaction value was USD165 billion in 2023, an increase of 9% from 2022.

The mission of digitalizing economic transactions will not be successful if Malaysians are not ready to change their current norm. Readiness for change refers to two features (Weiner, 2009). Firstly, members and employees collectively determine to implement a change. Secondly, members and employees collectively believe that they are capable of implementing the change. If the readiness for change is high, the implementation of digitalisation will likely be effective. Thus, parents should determine and embrace this cashless culture.

A cashless school program has been introduced by "Bank Rakyat" and "Bank Simpanan Nasional". The program has been conducted in collaboration with "Jabatan Pendidikan" and secondary school management by introducing the method of cashless payment at the school canteen, bookstore and cooperative store. This program should be extended to primary school as facilities provided by Banking institutions are important to ensure adoption (Shehadeh et. al, 2024). However, changes usually will face resistance (Dimitrova, 2023).

2. Literature Review

Perceived Usefulness and Perceived Ease of Use

Davis (1989) introduced the Technology Acceptance Model (TAM), which states that users tend to use a system if the system is perceived as easy to use and beneficial to them. The concept is introduced as a basis for understanding user behaviour in receiving and adopting information systems. While the Unified Theory of Acceptance and Use of Technology (UTAUT) model posits that the actual utilization of technology is influenced by behavioural intention. The perceived likelihood of adopting the technology is dependent on the direct effect of four key constructs, namely performance expectancy, effort expectancy, social influence, and facilitating conditions. The effect of predictors is moderated by age, gender, experience and voluntariness of use (Venkatesh et al., 2003). Most researchers investigating the adoption of financial technology used the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Arvian et al., 2023). The perceived ease of use and perceived usefulness are the main variables in those two theories.

The adoption of digital payment systems by parents is significantly influenced by their perceptions of usefulness and ease of use. These elements are essential in determining their willingness to engage with such technologies, as they enhance convenience and efficiency in financial transactions. Perceived usefulness reflects

an individual's strong belief in technology and is considered a critical factor in enhancing performance (Davis, 1989). Kabir et al. (2017) clarified that perceived usefulness is the most frequently utilized independent variable in prior research for assessing people's readiness to adopt digital payments, both at the individual and organizational levels.

Digital payment applications facilitate transactions, allowing parents to handle payments rapidly and effortlessly. Convenience and efficiency by applying digital payments, optimizing transactions and allowing parents to manage payments quickly and easily, which is particularly beneficial in busy lifestyles (Purwanto et al., 2024). A study by Sundararaj & Meera (2024) targeted 250 millennials has found that there is a significant relationship between perceived usefulness and adoption of digital payment by the millennial. The ease of use and the perceived security of digital payment systems are also vital factors that encourage parents to integrate these methods into their children's financial education (Sundararaj & Meera, 2024).

Individuals believe that using the system will enhance its effectiveness. This can be interpreted as the perceived usefulness of the level of confidence of individuals that the positive impact on their performance and achievements. By enhancing the security of digital payments, parents will be ready to use digital payments. That's why many digital payment systems offer improved security features compared to cash transactions, which can reassure parents about the safety of their financial information (Hanafi & Toolib, 2020). Integration with the other services features like cashback, promotions and with other platforms also will increase the perceived value of using the digital payments (Purwanto et al., 2024).

The ease of use is the one factor in TAM that reflects the extent to which users are confident that technology can be understood and easily used. It also refers to the ability of young children to use digital payment. Chawla, D & Joshi (2019) stated that the concept of ease of use can be defined as a system that is easy to learn and use by the users, or it can be referred to as user-friendly. It also involves the extent to which an individual is confident that using the technology does not require more effort (Rodiah & Melati, 2020). Teo et al. (2020) identify that parents are more inclined to adopt digital payments that are user-friendly and demonstrably beneficial.

The applications designed with user-friendly interfaces will reduce the learning curve for parents, making them more likely to adopt the digital payment technologies (Ramdhani et al., 2024). Not only the interface, but also the accessibility to conduct transactions via smartphone or computers when making digital payments, especially to the parents, will help them manage multiple responsibilities (Pratama & Anas, 2024).

Srivastava et al. (2024) explained that the less effort needed to learn and use digital payment would increase the adoption. The usage of debit cards is no doubt easy to use by young children to use. However, the security of keeping the debit cards is probably a deterring factor to using them. The misplaced, missing or damaged issues may not be favourable in supporting to use of digital payment. The ease of digital payment methods, including mobile wallets and online banking, streamlines the payment process, facilitating users' ability to monitor their spending. Sundararaj & Meera (2024) expose that the individuals from the millennial generation, specifically, are attracted to the user-friendly nature and the ability to track expenses through digital payment platforms.

Digital payment is perceived as useful, as parents no longer need to have exact cash on hand to give to their young children for daily pocket money. This would be incredibly convenient for working parents who are normally busy during the workdays. If parents handed in a larger note of money, the spare change is difficult to track by parents. As Talwar et al. (2023) described that consumers viewed this innovation as having greater value by the alternative method of payment, namely, using cash.

Although perceived usefulness and ease of use are pivotal, additional elements like trust and social influence also play a role in the acceptance of digital payment systems. Understanding these dynamics can help developers create more appealing applications for parents. Another usefulness discussed in the previous study is the ability to audit spending habits. Information on transactions of spending using digital payments can be accessed through the facilities provided by digital payment providers. The ability to audit spending is a

significant factor in the adoption of digital payments, as it enhances financial awareness and promotes responsible spending.

Digital payment systems provide users with the capability to track and control their expenditures in real-time, which is an appealing aspect for numerous consumers (Bhoopathy & Kanagaraj, 2023). This transparency in financial transactions promotes the adoption of digital payment methods, as it facilitates enhanced budgeting and financial planning. The ease of digital payments, along with the capacity to oversee spending, makes them an appealing choice for consumers looking to improve and enhance their financial management. Bhoopathy & Kanagaraj (2023) reveal that the ability to audit spending habits encourages responsible spending and better financial management.

While the ability to audit spending habits is a strong motivator for adopting digital payments, other factors such as security, trust, and convenience also play critical roles. The interactions of these factors vary across different demographics and regions, influencing the overall adoption rates of digital payment systems. Understanding these dynamics can help stakeholders tailor strategies to enhance the adoption of digital payments.

Perceived Risk (Security Concerns)

Perceived risk or security is the belief of consumers that their private data cannot be accessed, manipulated or stored by other parties during online transactions. Cybercrimes emerged as a threat to digital economic transactions (Xia Loh et al, 2021). Many believe that hackers and fraudsters could steal money from their digital payment facilities (Krishna et. al., 2023). Users are worried that they might become one of the victims of these digital crimes.

This fear is defined as the perceived risk that could be a deterrent for parents to allow their children to adopt digital payment. It becomes the biggest concern of the parents while making any online transactions. Ensuring that the digital payment systems have strong security protocols is imperative for a responsible parent. Studies by Shafie et al. (2020) show that perceived trust or security concerns do affect the adoption of e-payment systems. Handoko et al. (2022) reveal the concerns about the security risk, like fraud and unauthorized transactions can deter parents from adopting digital payments, as they prioritize the safety of their financial assets.

Bhuiyan et al (2024) proved in their study, perceived risk did not negatively influence the adoption of digital payment. Nevertheless, young children should be educated and trained on the basic knowledge to keep their digital payments safe. For example, they should never allow a friend to use it to pay for their purchase. They should also be educated on procedures for losing or missing their digital payment card. Another risk is system errors that could raise disputes among users and digital payment providers (Talwar et al.,2023).

The underestimation and overestimation of risks and security factors that support parents put on payment systems vary greatly based on trust, security, and accessibility. Examining these aspects is important in meeting the expectations of parents using digital payment systems. Parents frequently express their concern about the safety of their personal and financial information when using digital payment methods, fearing data breaches or misuse (Nurabiah et al., 2024). The potential for technical issues or lack of internet access can also create hesitation, particularly among those who are unfamiliar with technology.

The safety of financial transactions is a primary concern for parents. Ensuring that digital payment platforms have robust security measures is crucial in gaining parental trust. Research indicates that perceived security positively influences the adoption of e-payment systems (Mat Shafie et al., 2020). Trust in technology will become a significant factor in the adoption of digital payments. The level of trust amongst the parents will shape the trust and acceptance of digital technologies and service providers. Research by Rezza et al. (2024) and Saragih et al. (2025) found that trust greatly influences the intention to use e-wallets. While these perceived risks and security concerns are significant, some studies suggest that as digital literacy increases, parents may become more comfortable with digital payments, potentially leading to higher adoption rates in the future (Susanto et al., 2022).

Social Influence

Social influence has been demonstrated to affect human behaviour in technology adoption. Social influence explores how individuals' beliefs, attitudes and behaviours are shaped by their interactions with others. A study by Ghouse et al. (2025) confirms that the influence of subjective norms affects the adoption of mobile wallets. Mun et al (2017) found that social influence has a significant impact on affecting the consumers' intention to use mobile payment services in Malaysia. Shafie et al. (2020) and Saragih et al. (2025) also agreed that social influence has a significant relationship with the adoption of e-payment.

Parents' decisions to use digital payments may be influenced by peers and the broader community. When digital payment becomes the norm within a community, parents may feel more compelled to adopt similar practices for their children. The adoption of digital payment systems among parents is significantly influenced by various social factors. These influences stem from the recommendations and behaviors of peers, family, and community, which shape perceptions and intentions towards using digital payment methods. Understanding these social influence factors can help in promoting digital payment adoption among parents.

Peer effects are a strong determinant in adopting digital payments. Individuals are likely to mirror the payment behaviors of their peers, which can lead to increased adoption of digital payment systems (van der Cruijsen & Knoben, 2021). A study by Sundararaj & Meera (2024) reveals that peer networks and community practices significantly impact parents' decisions to adopt digital payments, as cultural norms dictate acceptable behaviors regarding technology use. Peer recommendations also influence the parents to adopt digital payments. Parents often rely on advice from friends and family when considering new technologies, including digital payments. This reliance can enhance their willingness to adopt such systems (Viony & Widodo, 2024).

In China, social influence plays a more significant role in mobile payment adoption compared to the USA, where users are more rational and risk-averse. This suggests that cultural contexts can amplify the impact of social norms on digital payment adoption (Zhang et al., 2018). Community norms also become a social influence on the acceptance of digital payments. The presence of a National Non-Cash Movement encourages collective behaviour towards digital payments, reinforcing social acceptance and usage within communities (Kartika et al., 2023).

While social influence plays a pivotal role in promoting digital payment adoption, barriers such as technological challenges and financial literacy can hinder this process. Addressing these barriers is essential for fostering a more inclusive digital payment environment for parents (Lakhaiyar & Mani, 2022) and (Oktafian, 2022). Social influence will also enhance trust in digital payment systems, which is crucial for parents who may be hesitant due to concerns about security and usability (Syafaastuti et al., 2024).

In this study will also use the Diffusion of Innovation theory, where the study will identify which category of adopters the parents. The innovators who are venturesome and interested in new ideas will be ready to allow their young children to adopt digital payment. The parents who are Early Adopters and Early Majority categories may have doubts about allowing their young children to adopt digital payment, even though they are aware of the need to change. Most of them most likely will be influenced by friends and relatives to adopt digital payment (Linh T, et al, 2024). The Late Majority category is sceptical of change and digital payment providers need to educate them in allowing their young children to adopt digital payments. The laggard's category is bound by tradition and very conservative and the hardest to tackle.

Cultural and Educational Factor

Cultural factors that influence values, norms, beliefs and social norms that shape parental attitudes to use and adapt to the new technology significantly impact how people embrace digital technology. A study by Shafie et al. (2020) shows that culture was not significant in the adoption of e-payment. Ritthitraiphop & Hamra (2019) stated that trust and security are the main factors that parents prioritize in digital payment systems, influenced by cultural perceptions of security and reliability.

Not only the cultural factors, the educational factor, or it can refer to the level of digital literacy among the parents play vital roles in the adoption of digital payment. Digital financial literacy combines the skills needed to navigate financial services with the knowledge and skills to use digital technologies. Here it shows the

parents' ability to understand and effectively use various financial skills, including acquiring the knowledge, skills, confidence and competencies to safely use digitally delivered financial products and services, to make informed financial decisions. The educational initiatives will form and train parents on the use of digital payments will enhance readiness and adoption of the system.

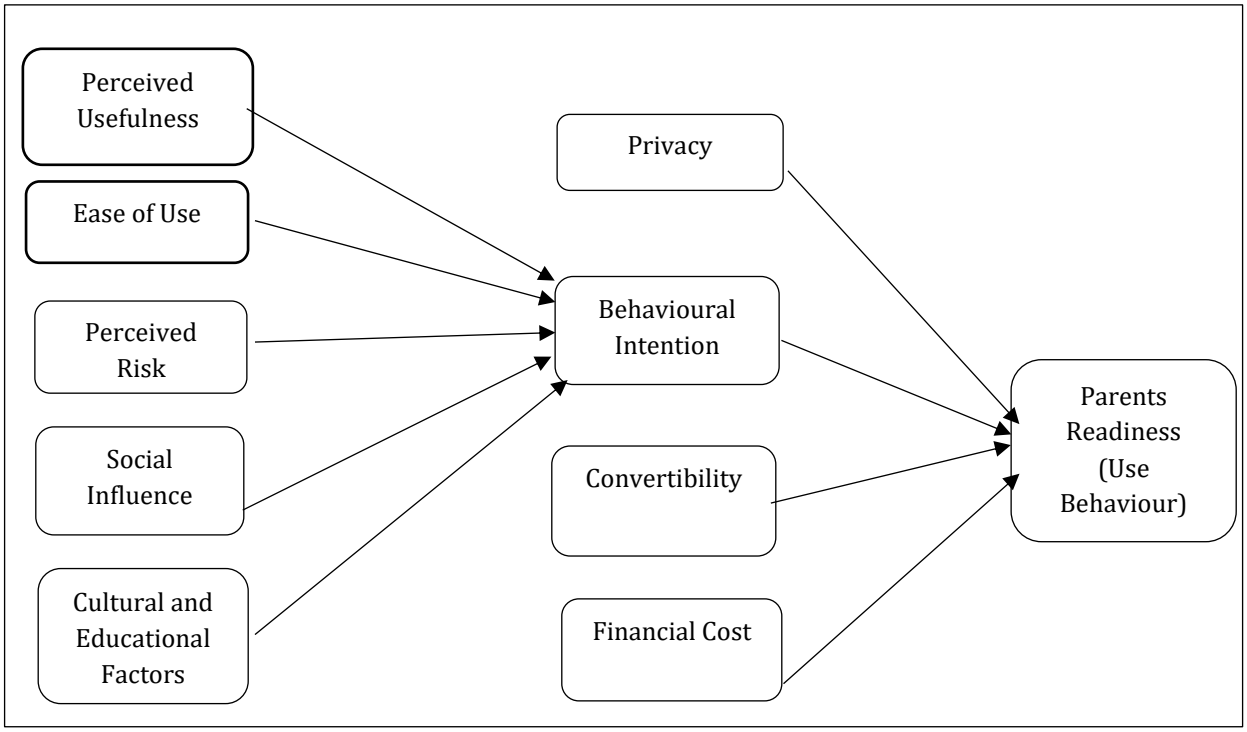
Adopting digital payments for children is significantly influenced by parents' readiness and various educational factors. It encompasses financial literacy, educational attainment and the perceived benefits of digital transactions. The level of digital literacy among parents that combines the skills to navigate financial services with the use of digital technologies is closely linked to the parents' readiness. Those with higher self-efficacy in using technology are most likely to adopt digital payments (Zhao et al., 2023). Parents with higher financial literacy are more likely to teach their children about managing money and using a digital payment system (Wang et al., 2024).

Digital competency is often linked to educational attainment. Digitally competent parents can better manage their children's financial activities through the systems, where the gap in digital financial culture is more pronounced among less educated demographics, impacting their willingness to adopt digital payment methods (Buenestado-Fernández et al. 2023). Parents' level of education directly impacts their comfort and trust in using digital payment technologies. Educated parents tend to have higher levels of social trust and are more inclined to adopt financial technology solutions (Wang et al., 2024). A study by Ritthitraiphop & Hamra (2019) reveals that parents with higher education levels are more aware of security features and benefits of digital payments, which influence their decision to adopt them.

3. Research Methodology

The purpose of this study is to develop a conceptual framework that includes the perceived usefulness, ease of use, perceived risk, social influence and cultural & educational factors in explaining the use behaviour of use behaviour of parents' readiness to nurture their school children adopting digital payment. In terms of theoretical underpinnings, the conceptual framework incorporated aspects of TAM and the UTAUT, including the Diffusion of Innovation theory, in deriving the constructs of the study. The conceptual framework is as visualised in Figure 1, is adopted from Tomić et al. (2023)

Figure 1: Proposed Theoretical Framework of Parents' Readiness to Nurture Their School Children Adopting Digital Payment.



This study will use a survey technique for data collection. It will be feasible for the researcher to obtain quantitative data, which then can be analyzed using descriptive and inferential statistics to offer information about possible relationships between the variables. Questionnaires will be designed using previous studies that were conducted on digital payment adoption. A pilot test on the questionnaire will be done to ensure its validity. In 2025, The Malaysian Reserve reported that there were 126,608 primary students in Melaka. Assuming a parent has three primary school children, the proposed population would be 42,203. Since the population is large and has limited funding, a sample size of 200 is sufficient to conclude the study.

The questionnaire will be disseminated to parents who have primary school children aged 6 to 12 years old. A Google Form questionnaire was randomly distributed to customers using a social media platform. The accepting response in the Google form will be deactivated once the response achieved targeted responses are achieved. The data collected will be analyzed using the Statistical Package for the Social Sciences (SPSS) software.

4. Discussion

In this dynamic environment, parents' readiness to nurture their school children in adopting digital payments is crucial as schools increasingly shift towards cashless transactions. Numerous factors affect their preparedness, including digital literacy, trust in digital payment systems, financial awareness and ease of accessing the technology. Parents who are familiar with mobile banking, e-wallets and online security measures can better equip their children to use these tools safely. However, those with limited technology skills or concerned about the safety or fraud may be reluctant, highlighting the need for educational programs to build confidence.

Additionally, financial literacy enables parents to instill responsible spending habits in their children, while access to a stable internet and devices facilitates seamless transactions. Despite challenges like resistance to change or security concerns, promoting digital payments offers benefits such as convenience, enhanced financial management and reduced cash-handling risks. Schools, financial institutions, and policymakers can assist or support parents through training sessions, secure platforms and affordable internet connectivity. Nurturing parental readiness will lead to smoother transactions with digital payment systems, empowering children to adeptly and responsibly navigate cashless environments.

5. Conclusion

This study will provide important information regarding whether parents are ready to allow their primary school children to adopt digital payment. Factors that will be studied, including perceived usefulness, ease of use, perceived risk, social influence, cultural and educational background, will be tested to determine whether they have a significant relation with the intention of parents allowing their children to use digital payment. The adoption factors and non-adoption factors of digital payment among the parents also provide significant determinants of parents' behaviour towards the digital economy in the future. Other than that, digital payment providers such as banks will use the results of this study to improve their facilities and strategies in their digital payment products. The result would also help government agencies such as the education ministry to improve their policy and school management.

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Analysis of Macroeconomic Factors of Energy Consumption in Malaysia, Thailand and Indonesia

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Abstract: This paper examines the relationship between GDP, FDI and inflation rate and energy consumption by analyzing time-series data from Malaysia, Indonesia, and Thailand. Data sources include the World Bank, the Malaysia Energy Information (MEI), and the World Development Indicators (WDI) from 2003 to 2023 and were examined by multiple regression analysis. The findings show that energy consumption in Malaysia is significantly impacted by GDP, FDI, and the inflation rate. Energy usage in Indonesia is significantly influenced by both GDP and FDI. In contrast, the GDP and inflation rate are the main variables that have a major impact on energy use in Thailand. These findings have important implications for policymakers that provide insights into the trends in economic development across different countries. Policy makers must develop coordinated energy usage and economic policies to achieve resilient and long-lasting economic development.

Keywords: *FDI, GDP, Inflation, Energy*

1. Introduction

Energy usage is the quantity of energy utilized by individuals, industries or countries including the use of electricity, oil and natural gas, and renewable energy sources like solar, wind and hydropower. Energy has an important key in elevating global socio-economic growth and acting as a vital force in sustainable development and national wealth. A sharp rise in energy utilization in developing economies led to promoting societal growth, rapid economic expansion and quality of living standards (Ibrahiem, 2015).

Next, Sadiq (2023) claimed that GDP, FDI, and inflation rate have a significant in energy usage in China as an emerging country is boosting the GDP, increasing inflation and encouraging FDI,, which is driving increased energy consumption. Similarly, Sapuana (2020) found that FDI, GDP and inflation are related to each other in Yemen's economy. For example, a rise in FDI would boost the GDP expansion, increase inflation because of the higher consumer demand and production cost and finally, increase the energy usage in Yemen. Policymakers should be concerned about the relationship between these three variables before making policies related to economic policy and energy use for sustainable, competitive economic development and improving the standard of living of the people.

The main factor of a sustainable and resilient country is energy consumption, which is significantly impacted by macroeconomic variables like GDP, inflation and FDI. A growth in GDP often indicates more productivity, improved living standards, and increased industrial activity, which raises the need for energy usage. Additionally, FDI is important because it finances technological development, industrial expansion, and infrastructural projects, which increase energy consumption. Meanwhile, via influencing buying power, manufacturing prices, and general economic stability, inflation can have an indirect effect on energy usage. Policymakers, scholars, and investors who want to strike a balance between sustainable energy usage and economic growth must comprehend how GDP, FDI and inflation relate to energy use.

2. Literature Review

Foreign Direct Investment has an impact on Energy Consumption

Majumder (2019) indicated that FDI positively impacts domestic investment and energy usage in Bangladesh. In the case of Bangladesh, FDI has been concentrated in sectors such as manufacturing, textiles, telecommunications, and energy, which require significant infrastructure development and energy inputs. Additionally, FDI-driven industrial growth increases the demand for electricity and fuel, particularly in energy-intensive sectors. The construction of factories, export processing zones, and other production facilities raises national energy consumption. Azam (2019) and Zheng (2020) revealed that FDI positively impacts energy consumption in China. Foreign Direct Investment (FDI) brings in capital, advanced technology, and industrial

expansion, all of which contribute to increased energy consumption. In China, much of the FDI flows into energy-intensive sectors such as manufacturing, construction, and heavy industry. As foreign companies establish or expand their operations, they increase the demand for electricity, fuel, and other energy resources to support production processes, transportation, and infrastructure.

Inflation has an impact on Energy Consumption

Adi (2022) discovered that inflation significantly enhances electricity usage, a relationship that can be explained through multiple economic mechanisms. During periods of rising inflation, production costs such as labor and raw materials increase, leading firms to substitute labor with machinery and automation, which raises electricity demand. Talha (2021) suggests that consumer demand and production cost combined result in a significant relationship between inflation and energy consumption. Inflation influences energy consumption in Malaysia through its impact on both consumer behavior and production costs. When inflation rises, the prices of goods and services including energy tend to increase. The study highlights the importance of stable inflation for managing energy demand effectively.

Growth Domestic Product and its impact on Energy Consumption

Ibrahiem (2015) showed that Egypt's GDP had a sustained positive effect on renewable electricity consumption from 1980 to 2011. Economic growth typically increases energy demand, and Egypt responded by gradually expanding its renewable energy capacity to meet this need more sustainably. The study highlights the role of economic growth as a driver of renewable energy development, supporting both environmental sustainability and long-term energy planning. Hongyun (2021) revealed that electricity consumption rises as GDP increases in Zhejiang's economy, reflecting a relationship between GDP and energy demand. As GDP grows, industrial production, commercial activities, and household income typically increase which contributes to higher electricity usage.

3. Methodology

Population and Sampling

The population of this study comprises GDP, FDI, inflation rate and energy consumption data from Malaysia, Thailand and Indonesia. These countries were purposively selected to analyze the consequences of FDI, GDP, and inflation on energy utilization from 2003 to 2023. A final total of 360 data points of GDP, FDI, inflation rate and energy consumption from three countries were retrieved from the WDI, MEI, and World Bank.

Data Analysis Techniques

Regression analysis using SPSS to examine the statistical significance and strength of impact among selected variables. In this study, regression analysis helped identify whether independent variables such as GDP, FDI and inflation, and independent, energy consumption were significantly correlated and whether changes in one variable could predict changes in another. Using SPSS ensured accurate computation of coefficients, p-values, and R-squared values, providing a robust basis for concluding the nature and direction of the relationships.

4. Findings and Results

Regression Analysis

Table 1: Malaysia

Model	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	t	Significance
1 (Constant)	-0.059	0.582	-0.101	0.920
FDI	0.114	0.026	4.402	0.000
GDP	7.510	0.0821	9.143	0.000
Inflation	-7.671	1.044	-7.349	0.000

Note: a. Dependent Variable: Energy
R-Square = 0.876, F value = 49.620, P value = 0.000

R-square is 0.876, meaning GDP, FDI, and inflation rate explain 87.6% of the changes in energy consumption in Malaysia. The F value was 49.620 and a p-value of 0.000. Independent variables have a strong impact on energy consumption, as supported by the findings of Hongyun (2021) and Adi (2022). GDP, inflation rate and FDI typically lead to increased industrial activity, urbanization, and higher living standards, which significantly boost the demand for energy in Malaysia.

Table 2: Thailand

Model	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	t	Significance
1 (Constant)	3.050	0.789	3.865	0.001
FDI	-0.350	0.057	-0.531	0.601
GDP	7.498	1.782	4.208	0.000
Inflation	-7.832	2.402	-4.093	0.001

Note: a. Dependent Variable: Energy
R-Square = 0.73
F value = 18.940
P value = 0.000

The results suggest that the independent variables collectively explain 73.0% of the variation in energy consumption in Thailand. The findings reveal that GDP and inflation have a significant positive effect on energy consumption aligning with the findings of Talha (2022). This suggests that as the Thailand economy grows, increased industrial activity, higher household income, and greater infrastructure development, increase the inflation contribute to rising energy demand. However, the impact of FDI on energy consumption is found to be statistically insignificant.

Table 3: Indonesia

Model	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	t	Significance
1 (Constant)	0.654	0.661	0.989	0.334
FDI	0.100	0.056	1.792	0.088
GDP	2.346	0.840	2.794	0.011
Inflation	-0.023	0.021	-1.083	0.291

Note: a. Dependent Variable: Energy
R-Square = 0.444
F value = 5.589
P value = 0.000

Table 3 presents an R-squared value of 0.444, indicating a moderate level of explanatory power. GDP and FDI have a significant positive effect on energy consumption consistent with the findings of Ibrahiem (2015) and Zeng (2020). In contrast, inflation does not have a significant impact on energy consumption, as indicated by a p-value of 0.291.

5. Conclusion and Recommendations

This research looks at how energy utilization in Malaysia, Thailand, and Indonesia has changed over the past 20 years in relation to FDI, GDP, and inflation. The results showed that in all three nations, GDP has a major impact on energy usage. While inflation and energy consumption are significantly correlated in Malaysia and Thailand, FDI has a major impact on energy usage in Thailand and Indonesia. It is advised that future studies investigate how other macroeconomic factors, such as the money supply, government spending, and

international commerce, affect energy usage. Furthermore, toward the conclusion of the analysis, extending the research term can produce new or stronger findings.

Energy usage in less economically developed nations is typically more strongly influenced by macroeconomic issues. These results have significant policy implications since they provide insightful information on the patterns of economic development in various countries. Implementing integrated energy and economic strategies is crucial for nations to achieve resilient and long-lasting economic development. In order to ensure sustainable economic growth and national advancement, governments should create efficient plans to encourage energy efficiency.

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The Role of Motivation, Commitment and Awareness in Zakat Payment Intention: Evidence From Employees of Private Higher Learning Institutions in Northern Malaysia

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Abstract: This study examines the gap between awareness and actual zakat payment among Muslim employees in private universities and colleges in Kedah, Malaysia. Despite recognizing zakat as a religious obligation, many do not fulfil it due to misunderstandings about calculation methods, misconceptions regarding its benefits, and practical challenges in the payment process. The study aims to assess the influence of motivation, commitment, and awareness on zakat payment intention. Data were collected through a snowball sampling technique, yielding 147 valid responses from academic and administrative staff in private higher education institutions. The data were analyzed using Partial Least Squares Structural Equation Modelling (PLS-SEM). Motivation significantly influences both awareness and intention to pay zakat, while commitment affects only awareness. Awareness fully mediates the relationship between commitment and intention and partially mediates the relationship between motivation and intention. This study highlights the critical role of awareness in translating knowledge into zakat-paying behavior. It also underscores that while motivation is essential for fostering intention, commitment alone is insufficient without adequate awareness. The findings offer valuable insights for policymakers and institutional leaders to design targeted strategies that enhance zakat compliance among employees in the higher education sector.

Keywords: *Motivation, commitment, awareness, intention to pay zakat*

1. Introduction

Zakat is a fundamental pillar of the Islamic economic system, playing a vital role in promoting social justice, reducing poverty, and ensuring equitable wealth distribution. When effectively managed, zakat contributes to national economic development by empowering the underprivileged and encouraging broader participation in economic activities. In Malaysia, zakat administration is governed by constitutional provisions that allocate responsibilities between federal and state authorities, ensuring compliance with Islamic principles. (Hasan et al., 2021). Zakat on income is obligatory for Muslim salaried employees and is calculated based on net income, including savings and earnings. Its proper fulfillment supports wealth redistribution and strengthens community welfare. (Ahmad & Ma'in, 2014).

Recent data reflect encouraging trends in zakat collection. In 2023, the Federal Territories collected RM1.035 billion in zakat, marking an 11% increase from the previous year (PPZ, 2023), while Selangor recorded RM1.12 billion in collections and distributed RM1.15 billion to over 350,000 asnaf (Bernama, 2024). In Kedah, compliance has reportedly improved due to a royal decree mandating salary deductions, strategic collaborations with educational institutions, and enhanced payment channels (Ariffin et al., 2024). Despite these advancements, individual compliance rates remain inconsistent. Many employees still lack intrinsic motivation and a strong sense of affective commitment, which undermines consistent zakat payment (Darapar & Haron, 2022; Engku Ali et al., 2018; Khalil et al., 2020). Addressing this issue requires a holistic approach that deepens understanding of zakat's spiritual and socio-economic significance while fostering a stronger sense of responsibility among Muslim employees.

Despite the encouraging trends in zakat collection highlighted earlier, actual compliance among Muslim employees in higher education institutions (HEIs) remains inconsistent. This discrepancy between awareness and practice suggests that the issue extends beyond informational campaigns and institutional efforts. It points to a deeper behavioral gap influenced by psychological and contextual factors. While previous studies have acknowledged the role of awareness in shaping organizational behavior (van der Schyff & Flowerday, 2021; Zadawa et al., 2018; Zhao et al., 2020). The mechanisms through which awareness translates into zakat-paying intention are still not well understood.

In addition, the influence of other psychological and behavioral factors, such as motivation and commitment, on bridging the awareness-action gap has not been thoroughly examined. Although these constructs have been shown to significantly affect intentions and behaviors in other domains (Chan & Lay, 2021; Goh & Sandhu, 2013; Mohamad et al., 2022; Noor et al., 2020; Raman et al., 2022; Zainordin et al., 2022; Zhu et al., 2022). Their direct impact on zakat-related awareness and compliance within the HEI context remains underexplored.

Moreover, recent literature presents mixed findings regarding the roles of religious beliefs, trust in zakat institutions, and social norms in shaping zakat payment intentions and behaviors. (Afandi et al., 2022; N. Ahmad et al., 2021; Kasri & Sosianti, 2023; Mohamed et al., 2017; Noor Azman et al., 2022; Sareye & Haji-Othman, 2017; Sheikh Mokhtar et al., 2018). These inconsistencies highlight the need for a more nuanced and context-specific understanding of how these factors interact to influence zakat compliance, particularly within the higher education sector.

This paper seeks to investigate how motivation, commitment, and awareness affect the intention to pay income zakat among the employees of the private higher learning institutions in Kedah. The goal is to determine the main psychological drivers that can be used to improve zakat compliance and base specific institutional interventions.

2. Literature Review

This study draws on the Theory of Planned Behavior (TPB) (Fishbein & Ajzen, 1975), which posits that behavioral intention is shaped by three core components: attitude toward the behavior, subjective norms, and perceived behavioral control. In the context of zakat payment, TPB provides a robust framework for understanding how personal beliefs, social expectations, and perceived ease or difficulty influence an individual's willingness to comply. To deepen this understanding, the study integrates Cognitive Evaluation Theory (Deci & Ryan, 1985), distinguishes between intrinsic and extrinsic motivation. CET helps explain how internal values and external cues—such as religious teachings or institutional encouragement—can either strengthen or weaken an individual's motivation to fulfill zakat obligations.

Complementing these perspectives is Organizational Commitment Theory (Allen & Meyer, 1990), which explores how affective, normative, and continuance commitment influence behavior. In this study, OCT is used to assess how emotional attachment to religious values and institutional loyalty may affect both awareness and intention to pay zakat. By integrating TPB, CET, and OCT, the study constructs a comprehensive theoretical model in which motivation (from CET) and commitment (from OCT) serve as psychological antecedents that influence awareness and behavioral intention (as framed by TPB). This layered approach allows for a nuanced exploration of how internal drives and contextual factors converge to shape zakat compliance among employees in private higher education institutions in Kedah.

Motivation, Awareness and Behavioral Intention

Motivation is widely recognized as a key internal force that initiates, sustains, or halts behavior at any given moment (Bedeian, 1993). It is shaped by the goals individuals aim to achieve, the intensity of their efforts, and their persistence in pursuing those goals (Chowdhury, 2007). Employees are generally more motivated when they find personal meaning in their work and see how it aligns with their values and aspirations. This motivation often leads to greater engagement and improved performance (Falk, 2023).

The influence of motivation as a key driver of human behavior is a well-established principle in prior research. The current findings reinforce this notion, specifically highlighting its significance in shaping an individual's intent to fulfill their zakat obligation. For example, it has been shown to significantly affect the intention to teach science (Chan & Lay, 2021), tourists' return intentions (Mohamad et al., 2022), participation in Family Takaful products (Zainordin et al., 2022), and the use of Moodle in education (Raman et al., 2022). The current research corroborates that motivation serves as a powerful predictor for shaping behavioral intentions. This contrasts with other evidence, such as Suo et al. (2021), who reported its negligible effect on QR-code mobile payment adoption, implying that its influence is not uniform across all contexts. Recognizing its potential, this study emphasizes the importance of motivation in fostering both awareness and the intention to fulfill zakat obligations. Accordingly, the following hypotheses are proposed to explore this relationship further.

H_1: Motivation positively affects awareness.
H_2: Motivation positively affects the intention to pay zakat.

Commitment, Awareness and Behavioral Intention

Commitment reflects an individual's sense of dedication and responsibility toward a person, cause, or objective. It involves a deliberate pledge to act in support of a specific goal. In organizational settings, committed employees are typically well-integrated into their work environment and actively engage with colleagues and leadership to drive performance improvements (Achim et al., 2020). This form of commitment often signifies loyalty and a strong alignment with organizational values and goals (Ardiansyah & Afandi, 2019).

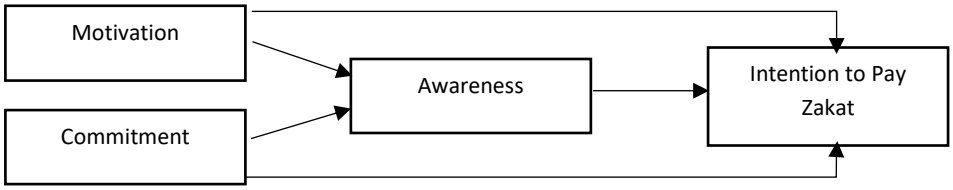
This paper investigates commitment as a determinant of behavioral intention, particularly in the context of payment of zakat. Previous research has demonstrated the influence of organizational commitment on various behavioral outcomes, such as knowledge-sharing intentions. (Goh & Sandhu, 2013), retention in the ICT sector (Noor et al., 2020), and turnover intentions (Naiemah et al., 2021; Zhu et al., 2022). These findings suggest that commitment can significantly shape intention-related behaviors. Non-significant effects have been reported in other studies, however, such as in the case of whistleblowing (Urumsah et al., 2018) and academic knowledge-sharing (Fauzi et al., 2018), suggesting that the effect of commitment is context-dependent. In recognition of its potential, the study takes into account affective commitment, which is the emotional connection with the values and beliefs, as a factor that affects awareness and the intention to perform zakat. According to this view, the following hypothesis is put forward.
H_3: Commitment positively affects awareness.
H_4: Commitment positively affects the intention to pay zakat.

Mediating Effect of Awareness

Awareness refers to an individual's capacity to recognize, comprehend, and remain informed about specific issues, events, or environments. It reflects a conscious understanding of what is happening within a given context. In the context of zakat, raising awareness is essential to deepen public understanding of its religious and social importance. Educating the broader community, especially the younger generation, about zakat's values and obligations is a vital step toward fostering long-term compliance and social responsibility (Senawi et al., 2021).

In addition to its direct impact, awareness has been demonstrated to act as a mediating variable in a number of organizational and behavioral situations. It has been revealed through several empirical studies that awareness can completely mediate the relationship between independent and dependent variables. For instance, Sihombing et al. (2023) Found that fraud awareness was essential for linking risk management to integrity systems. Likewise, van der Schyff & Flowerday (2021) Found that the connection between personality traits and privacy-related behaviors was mediated by information security awareness. As Zhao et al. (2020) Pointed out, ambient awareness improved knowledge sharing in students, and Chee Choy et al. (2017) Demonstrated that learner awareness had an important impact on affective and cognitive learning behavior. However, not all findings are consistent, Zadawa et al. (2018) Found that awareness did not mediate the relationship between compliance barriers and cost performance in Nigerian public universities. Considering these mixed findings, this study proposes that awareness serves as a mediator between motivation, commitment, and the intention to pay zakat. It is assumed that motivation and commitment have high chances of affecting the behavior of paying zakat when it is facilitated by an increased sense of awareness. In this line of reasoning, the following hypotheses are postulated.
H_5: Awareness is positively related to intention to pay zakat.
H_6: Awareness mediates the relationship between motivation and intention to pay zakat.
H_7: Awareness mediates the relationship between commitment and intention to pay zakat.

Figure 1: Research Framework of the Study



3. Methodology

Research Design

This study employed a survey method as the primary data collection approach, utilizing structured questionnaires to facilitate a cross-sectional analysis. As noted by Sekaran & Bougie (2016) and Kumar et al. (2013) tThis approach is considered robust for its ability to capture data from authentic settings, thereby improving the credibility of the study's findings. The research was conducted in Kedah Darul Aman, located in the northern region of Malaysia, and specifically targeted employees working in private universities and colleges within the state.

To accommodate varying levels of accessibility among participants, the distribution of questionnaires was carried out through a mixed distribution mode approach. Approximately half of the respondents received printed copies delivered directly by the researchers, while the remaining participants were provided with a Google Form link via email, as requested by the participating institutions. This ensured that staff members who were unavailable during the initial in-person distribution still had the opportunity to participate in the study.

Sampling

A total of 500 questionnaires were distributed to employees at private universities and colleges in Kedah, with prior approval from their respective Human Resource (HR) departments. Within a week, follow-up efforts with institutional managers yielded 173 completed responses, resulting in a response rate of 34.6%. After data screening, 26 responses were excluded due to incompleteness or inconsistencies, leaving 147 valid responses for analysis.

Due to the lack of comprehensive employee lists, a combination of convenience and snowball sampling was employed. Convenience sampling enabled access to readily available participants, while snowball sampling was initiated through faculty and departmental managers who encouraged staff participation. Although non-probability sampling may limit generalizability, it was suitable for this exploratory study and allowed for diverse representation across academic and administrative roles.

Measures

The questionnaire for this study was developed by adapting established measurement scales to assess four key constructs: motivation, commitment, awareness, and intention to pay zakat. It was divided into five sections. Section A collected demographic data, including gender, age, education level, job position, income, work experience, and institution name. Section B measured motivation using seven items from McAuley et al. (1989), while Section C assessed commitment with eight items from Allen & Meyer (1990). Section D evaluated awareness using five items; two adapted from Ahmed (2015) and three items from Ambali & Bakar (2014). Section E was dedicated to the intention to pay zakat, and it was based on four items of Indrawati & Putri (2018). Following established methodological recommendations, the questionnaire underwent a back-translation process to ensure linguistic accuracy between its English and Bahasa Malaysia versions; all items were then measured using a seven-point scale (1 = strongly disagree; 7 = strongly agree) to capture responses. (Hulland et al., 2010; Sekaran & Bougie, 2016).

Data Analysis Procedures

The data analysis in this study was conducted in two main stages. Before hypothesis testing, a preliminary

analysis was carried out using IBM SPSS to ensure data quality and readiness. Following this, inferential analysis was performed using PLS-SEM via SmartPLS 4 (Ringle et al., 2022). The quality of the measures was determined before testing the proposed hypotheses by assessing the measurement model in terms of reliability and validity. After ensuring the psychometric integrity of the constructs, the analysis was continued with the structural model to determine whether the proposed relationships were significant and whether the model had predictive power (Hair et al., 2019; Henseler et al., 2016).

4. Findings and Results

Profile of Respondents

The survey involved 147 respondents. Of these, 61.9% were female and 38.1% male. The majority of participants (49.7%) were aged between 36 and 45 years, while the smallest group was those under 25. Regarding education, 33.3% of the respondents had a bachelor's degree, 25.2% had a master's degree, and 17% had a diploma. Regarding work experience, 39.5% had served 11 to 15 years, while only 8.8% had 16 to 19 years of experience. Most respondents were administrative staff (53.7%), with academicians making up 44.2%. A detailed summary is presented in Table 1.

Table 1: Profile of Respondents (n = 147)

Profile	Sub-Profile	Frequency (n)	Percentage (%)
Gender	Male	56	38.1
	Female	91	61.9
Age	Less than 25 years	6	4.1
	26 – 35 years old	40	27.2
	36 – 45 years old	73	49.7
	46 – 55 years old	23	15.6
	55 years old and above	5	3.4
Education	SPM/STPM	16	10.9
	Diploma	25	17
	Bachelor's Degree	49	33.3
	Masters	37	25.2
	PhD/Doctorate	20	13.6
Job Position	Admin	79	53.7
	Academician	65	44.2
	Others	3	2
Salary	RM 0 – RM 1,799	10	6.8
	RM 1,800 – RM 3,000	51	34.7
	Above RM 3,000	86	58.5
Work Experience	Less than 5 years	26	17.7
	6 – 10 years	26	17.7
	11 – 15 years	58	39.5
	16 – 19 years	13	8.8
	20 years and above	24	16.3

All the variables were assessed for normality using skewness and kurtosis values to determine their suitability in further analysis. Results indicated that motivation, commitment, awareness, and intention to pay zakat were normally distributed, with values falling within the acceptable range of ±1.96 (Hair et al., 2010). Also, to overcome the possible common method bias, the Single Factor Test by Harman was used in the study. The analysis revealed that the proportion of the total variance explained by a single factor was 33.28%, which is significantly less than 50% and this fact showed that there was no common method bias, and the data could be used in further analysis.

Measurement Model

To ensure the reliability and validity of the measurement model, several assessments were conducted, including indicator reliability, internal consistency, convergent validity, and discriminant validity. The indicator loadings were all above the 0.50 minimum threshold, with values between 0.577 and 0.904, which

means that all indicators have acceptable reliability. (Hair et al., 2014). Internal consistency was measured using Composite Reliability (CR), with the CR value of all constructs ranging between 0.858 and 0.951, which exceeded the recommended value of 0.70 (Henseler et al., 2009), and therefore, internal consistency was high. Convergent validity was determined by the Average Variance Extracted (AVE). The results indicated that the AVE scores of all constructs were between 0.585 and 0.768, which were above the minimum threshold of 0.50 and thus passed the convergent validity criteria. (Ramayah et al., 2016; Wong, 2013). These findings substantiate that the constructs are reliable and valid. Table 2 shows a summary of CR and AVE values.

Table 2: Results of Reliability and Convergent Validity

Construct	Item	Loading	CR	AVE
Motivation (MOT)	MOT1	0.917	0.951	0.768
	MOT2	0.898		
	MOT3	0.875		
	MOT4	0.870		
	MOT5	0.904		
	MOT6	0.861		
	MOT7	0.804		
Commitment (COMT)	COMT1	0.725	0.873	0.627
	COMT2	0.822		
	COMT3	0.792		
	COMT4	0.781		
	COMT7	0.834		
Awareness (AWA)	AWA1	0.834	0.858	0.585
	AWA2	0.823		
	AWA3	0.806		
	AWA4	0.754		
	AWA5	0.577		
Intention to Pay Zakat (INT)	INT1	0.729	0.865	0.651
	INT2	0.862		
	INT3	0.822		
	INT4	0.809		

Discriminant validity was assessed using the Heterotrait-Monotrait (HTMT) ratio, which evaluates whether constructs are conceptually distinct. All HTMT values were below the recommended threshold of 0.85 (Kline, 2011), indicating satisfactory discriminant validity, as shown in Table 3. Additionally, the HTMT inference method was applied by examining the confidence intervals (CI) for each construct pair. None of the intervals exceeded the critical value of 1, further confirming the absence of discriminant validity concerns (Hair et al., 2017).

Table 3: Results of the HTMT Ratio

	MOT	COMT	AWA	INT
MOT				
COMT	0.157 (CI: 0.077, 0.266)			
AWA	0.618 CI: 0.452, 0.753)	0.301 (CI: 0.154, 0.453)		
INT	0.462 (CI: 0.275, 0.615)	0.185 (CI: 0.090, 0.290)	0.652 (CI: 0.494, 0.778)	

Structural Model

To ensure the stability of the path estimates, a multicollinearity assessment was performed by calculating the Variance Inflation Factor (VIF) for each construct. As none of the VIFs exceeded 3.3, the model met the requirement of being below the 5.0 threshold, and therefore, multicollinearity was not a concern in this analysis (Hair et al., 2017; Ringle et al., 2018).

The structural model was then tested to ascertain the explanatory and predictive power, as summarized in Table 4. The model's explanatory strength was assessed using R^2 and effect size (f^2), while bootstrapping with 10,000 resamples (Becker et al., 2022) It was used to estimate path coefficients. Predictive relevance (Q^2) was evaluated using the blindfolding procedure. Results showed that motivation (MOT) and commitment (COMT) together explained 37% of the variance in awareness (AWA) and 36.6% in intention (INT), indicating moderate explanatory power. (Chin, 1998; Hair et al., 2012). Effect size analysis revealed that MOT ($f^2 = 0.041$) had a small effect, COMT ($f^2 = 0.000$) had no effect, while AWA ($f^2 = 0.226$) had a medium effect on INT (Hair et al., 2014).

Path coefficient analysis showed that both MOT ($\beta = 0.563$, $t = 7.747$, $p < .001$) and COMT ($\beta = 0.180$, $t = 2.786$, $p < .01$) significantly influenced AWA, supporting H_1 and H_3. AWA also significantly predicted INT ($\beta = 0.475$, $t = 6.735$, $p < .001$), supporting H_5. H_2 was confirmed by a significant direct relationship between MOT and INT ($\beta = 0.197$, $t = 1.984$, $p < .05$), whereas H_4 was not supported, as the path between COMT and INT was insignificant ($\beta = 0.015$, $t = 0.199$, $p > .05$). The model demonstrated adequate predictive relevance, as indicated by a Q^2 value of 0.207 for INT, which is well above the threshold of zero (Hair et al., 2011; Henseler et al., 2009).

Table 4: Path Coefficients

	Path	*β*	*t*	*p*	Hypothesis	VIF	f^2
H_1	MOT –> AWA	0.563	7.747	0.000	Supported	1.021	0.498
H_2	MOT –> INT	0.197	1.984	0.047	Supported	1.530	0.041
H_3	COMT –> AWA	0.180	2.786	0.005	Supported	1.021	0.051
H_4	COMT –> INT	0.015	0.199	0.842	Not Supported	1.074	0.000
H_5	AWA –> INT	0.475	6.735	0.000	Supported	1.608	0.226

Adj. $R^2 = 0.366$
Q^2 for INT= 0.207

To evaluate the mediating role of awareness, the bootstrap resampling technique was employed. The results, presented in Table 5, reveal two statistically significant mediation pathways. First, the indirect effect of MOT on the outcome variable through awareness was significant, with a standardized coefficient of ($\beta = 0.086$, $t = 2.554$, $p < .01$). Second, COMT also demonstrated a significant indirect effect via awareness ($\beta = 0.267$, $t = 4.752$, $p < .001$). These findings provide robust support for Hypotheses H_6 and H_7, confirming that awareness serves as a significant mediator in both relationships.

Table 5: Results of the Mediating Analysis

	Path	Beta (β)	*t*-value	*p* value	Decision
H_6	MOT–> AWA –> INT	0.086*	2.554	0.011	Supported
H_7	COMT –> AWA –> INT	0.267***	4.752	0.000	Supported

The out-of-sample predictive accuracy of the model was assessed with the PLSpredict procedure, a holdout sample technique that generates predictions for both constructs and their individual items. (Shmueli et al., 2016). A 10-fold cross-validation was conducted, focusing on the model's final endogenous variables, AWA and INT, as recommended by Shmueli et al. (2019). For this test, AWA and INT were identified as the final endogenous variables. The Q^2_predict values of both variables were positive (AWA = 0.343; INT = 0.207), which means that they have predictive relevance (Hair et al., 2019). The main measure of evaluation was Root Mean Squared Error (RMSE). The model's out-of-sample predictive power was evaluated by comparing its performance against a basic linear model (LM), with detailed results available in Table 6. In most of the indicators, the PLS-SEM model generated a lower prediction error, which, based on the standards set by Shmueli et al. (2019), proves that the model has a medium predictive power.

Table 6: PLSpredict Results

	Q^2predict	PLS-SEM_RMSE	PLS-SEM_MAE	LM_RMSE	LM_MAE
AWA1	0.379	0.405	0.269	0.455	0.278
AWA2	0.313	0.414	0.265	0.458	0.28
AWA3	0.117	0.843	0.667	0.918	0.721
AWA4	0.108	1.123	0.907	1.181	0.96
AWA5	0.01	1.25	0.995	1.337	1.068
INT1	0.286	0.379	0.263	0.42	0.242
INT2	0.049	0.811	0.607	0.849	0.628
INT3	0.000	0.900	0.657	0.942	0.683
INT4	0.022	0.787	0.57	0.792	0.577

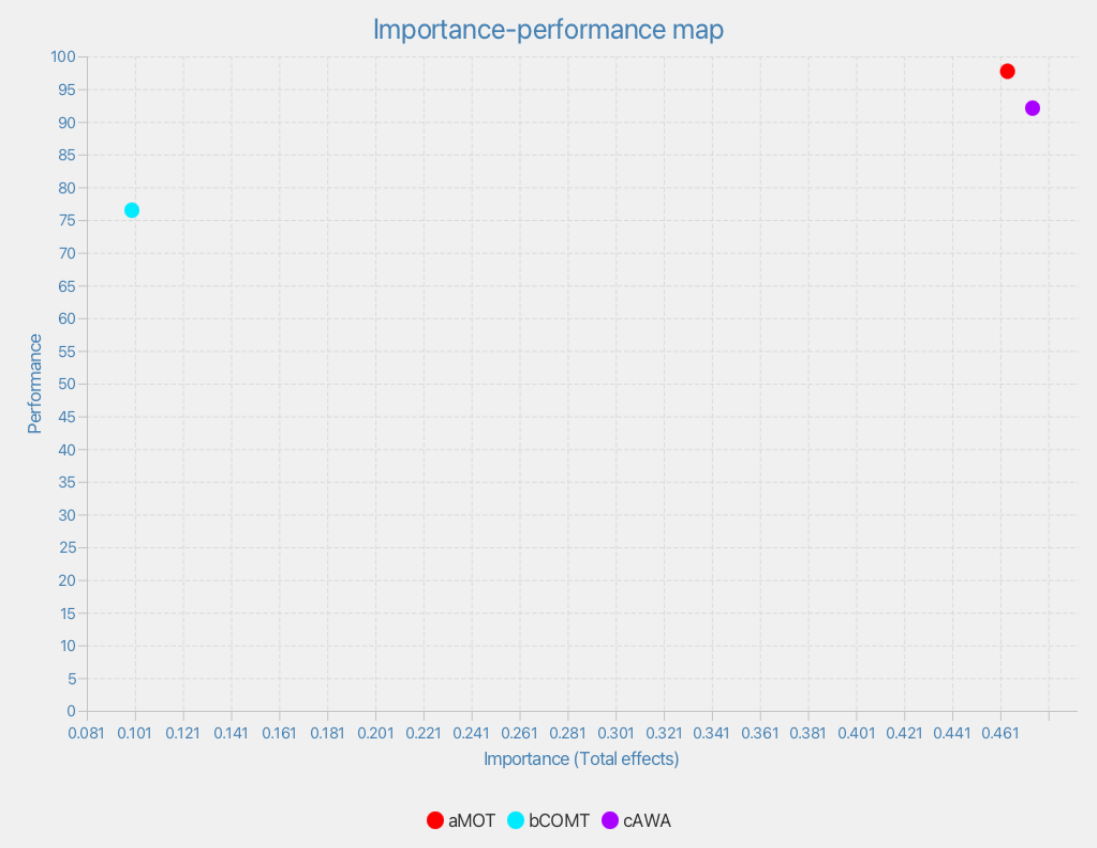
Importance-Performance Matrix Analysis (IPMA)

To pinpoint areas for improvement, IPMA was used, targeting Intention to Pay Zakat. The analysis contrasts the importance of each predictor (its total effect) with its current performance (average score), quickly identifying critical yet underperforming factors to guide strategic efforts. (Ringle & Sarstedt, 2016). AWA was the most influential predictor (importance = 0.475) as indicated in Figure 2 and Table 7, but its performance score (92.091) was not the best. In contrast, MOT demonstrated the highest performance (97.721) but was less influential. COMT showed the lowest importance (0.100) and a relatively low performance score (76.490), suggesting it is a weaker predictor and a potential area for strategic improvement.

Table 7: Results of IPMA

Variables	Intention to Pay Zakat	
	Total Effect (Importance)	Index Value (Performance)
Motivation	0.464	97.721
Commitment	0.100	76.490
Awareness	0.475	92.091

Figure 2: IPMA Assessment Illustration



Discussion

This study shows that motivation, commitment, and awareness all play roles in influencing employees' intention to pay zakat at private universities and colleges. Motivation stands out as the most important factor; it helps increase awareness about zakat and encourages people to act on it. While commitment helps raise awareness, it does not directly lead to a stronger intention to pay zakat. This means that even committed employees may not necessarily feel driven to fulfill this obligation unless they are also motivated. These results support earlier research by Sheikh Mokhtar et al. (2018), which also emphasized the importance of motivation. The model explains about 36.6% of the variation in zakat payment intention, suggesting that other factors may also be involved and should be explored in future studies.

This study identifies awareness as the most influential factor driving employees' intention to pay zakat. When individuals understand zakat's purpose, calculation, and distribution, they are more likely to act on it. Awareness not only enhances intention but also aligns personal values with religious and social responsibilities, making the act of paying zakat more meaningful. These findings are consistent with prior research emphasizing the role of awareness in shaping behavioral intentions (Chee Choy et al., 2017; Sihombing et al., 2023; van der Schyff & Flowerday, 2021; Zadawa et al., 2018). Motivation also plays a role, particularly for the employees who view zakat as a means of returning to society. It validates the findings of the earlier studies that focus on motivation as one of the factors that determine behavioral intention (Chan & Lay, 2021; Mohamad et al., 2022; Raman et al., 2022; Suo et al., 2021; Zainordin et al., 2022).

However, the study found that commitment does not directly influence intention, contrasting with findings from Zhu et al. (2022), Noor et al. (2020), Sufian and Lee (2019), and Goh and Sandhu (2013), where commitment was a significant predictor in other behavioral contexts. This suggests that in zakat compliance, commitment may operate indirectly through awareness. The mediating role of awareness is further supported by Chee Choy et al. (2017) and Sihombing et al. (2023), reinforcing its function as a bridge between commitment and intention. Notably, motivation influences intention both directly and indirectly via awareness,

indicating that informed individuals with strong motivation are more likely to fulfill their zakat obligations. By clarifying this mechanism, the study helps reconcile inconsistent findings in the literature and pinpoints awareness as a central lever for encouraging compliance.

This research advances a more cohesive understanding of zakat compliance by empirically validating a key behavioral pathway. The findings demonstrate that both motivation and commitment are crucial in building awareness, which in turn acts as the pivotal catalyst driving an employee's intention to pay zakat. Specifically, awareness emerged as a key mediator, linking motivational and commitment-related factors to zakat payment intentions among staff at private universities and colleges in Kedah. These results demonstrate the relevance of promoting awareness in order to promote the practice of zakat via deduction of income. In addition, the combination of Cognitive Evaluation Theory, Organizational Commitment Theory, and the Theory of Planned Behavior (TPB) provides a sound and comprehensive framework to explain the psychological and organizational factors that influence the behavior of paying zakat. This comprehensive approach enhances our understanding of how internal values and workplace dynamics converge to influence religious financial obligations.

Private universities and colleges in Malaysia can boost zakat compliance among employees by creating a culture that supports social responsibility and religious giving. To do this, they should focus on raising awareness through workshops, seminars, and clear, accessible resources that explain zakat, how it's calculated, and how to pay it. At the same time, institutions should nurture motivation by highlighting the spiritual and social value of zakat and promoting a workplace culture that respects religious duties. While commitment alone may not directly lead to zakat payment, it lays the groundwork for awareness and motivation to take effect. Tailoring strategies to match employees' varying levels of understanding and motivation can make these efforts more effective. In the long run, these initiatives not only help employees fulfill their religious obligations but also strengthen the institution's culture and potentially increase zakat contributions that can benefit the wider community.

5. Conclusion and Recommendations

This study provides valuable insights into the psychological drivers of zakat payment among employees in private universities and colleges in Kedah. Awareness emerged as the most influential factor, serving as a critical link between motivation, commitment, and the intention to pay zakat. Motivation also showed a strong direct and indirect effect, while commitment influenced intention only when mediated by awareness.

A notable limitation is the study's cross-sectional nature, which provides only a static view at one point in time and prevents us from observing how behavioral intentions might develop going forward. Self-reported data may be subject to social desirability bias, and the use of nonrandom sampling restricts the generalizability of findings beyond the study context.

Future research should adopt longitudinal approaches to examine changes in zakat behavior over time and expand sampling to include public institutions and other regions for broader applicability. Further exploration of variables such as religiosity, institutional trust, and perceived fairness of zakat distribution is recommended. Additionally, testing targeted interventions, such as structured awareness campaigns, digital zakat platforms, or automated salary deductions, could yield practical strategies for enhancing compliance.

To sum up, this research confirms that awareness is a key factor in encouraging people to pay zakat and that motivation and commitment should be a part of comprehensive compliance efforts. Addressing current gaps and building on these findings can support more effective, sustainable zakat practices that benefit both individuals and society.

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Accountability and Trustworthiness in Consumer Dispute Resolutions: A Comparative Study of Initial and Repeated Consumers

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Abstract: Many studies have indicated the significance of trustworthiness in alternative dispute resolutions (ADR) and how it protects consumer rights. Studies on trustworthiness in online alternative dispute resolutions (ODR) have received extensive attention, while traditional consumer ADR (CDR) has received less attention. Additionally, a few studies have claimed that consumer familiarity with CDR may affect the measurement of trustworthiness. Thus, this study aims to examine the relationship between accountability and three dimensions of trustworthiness (ability, benevolence, and integrity) in consumer ADR. This study also seeks to compare the relationship between initial and repeated consumers. A total of 323 sets of data were collected and analysed from consumers who filed their claims with the Tribunal Consumer Claim Malaysia. Using path analysis, this study supports the relationships between accountability and both ability and benevolence; however, it rejects the relationship between responsibility and integrity. Additionally, this study found a significant difference between initial consumers and repeated consumers in the three relationships. This study contributes to the body of knowledge by adopting and testing a relationship suggested in the Causal Attribution Model of Trust Repair (CAMTR). The ADR platform should have a strong ability to organise and coordinate with consumers who have prior experience because they attribute their experiences differently from initial consumers.

Keywords: *Trustworthiness, Accountability, Alternative Dispute Resolution, Initial Consumers, Repeated Consumers*

1. Introduction and Background

Alternative dispute resolutions (ADR) refer to a set of mechanisms designed to allow individual conflicts to be settled outside of the courts at low cost (Lieberman & Henry, 1986; Mucha, 2016). In current practices, there are two types of ADR: consumer alternative dispute resolutions (CDR) and online alternative dispute resolutions (ODR). In the Malaysian marketplace, consumers can file a case with the Tribunal Consumer Claim Malaysia (TCCM) for protection if they do not receive what they expected from sellers following an unsuccessful request for redress. Cases filed with TCCM in 2023 increased by 15% compared to 2022 (KPDN.GOV, 2024). TCCM also reported that it has solved 86% of the cases; many cases were overdue and could not be scheduled for a first hearing (Harian Metro, 2022). The delay in hearing the cases will result in justice being denied (Azman, 2022). An effective ADR mechanism that reflects an accountable platform enhances the trustworthiness of redress procedures (Ong & Teh, 2016). In the design of an ADR mechanism to protect consumers, trustworthiness is essential.

A few studies focusing on the mechanism of CDR highlighted concerns about the effectiveness of TCCM (Abdullah, 2015; Ilias et al., 2023; Ismail and Osman, 2019; Safei and Abdullah, 2023). The research provides valuable suggestions on how the procedure of the CDR mechanism can be enhanced. Since the purpose of CDR is to protect consumer rights, consumer perception of the platform needed to be investigated. One of the major concerns that arises for consumers is the trust in the ability of CDR platforms to resolve disputes (ASEAN Committee on Customer Protection, 2023; Amin et al., 2022). Trust has been recognised as a significant driver in procedural fairness judgements (De Cremer & Tyler, 2007). According to Wallace & Goodman-Delahunty (2021), public trust in legal institutions has been ignored and is in decline. At the same time, the study argues that measuring trust is complicated and should target users who use the service.

According to Mayer et al. (1995), perceived trustworthiness consists of three major dimensions: ability, benevolence, and integrity. These dimensions can be adopted to measure the effectiveness of the CDR platform. The measurement of trustworthiness has been adopted in a few studies. For example, Ferreira et al. (2022)

have adopted the measurement of trustworthiness as a means of establishing trust in ADR proceedings, based on the assumption that consumers initially develop trust in ODR. Despite the significance of trust in determining the effectiveness of CDR (Biard, 2018; Lieberman & Henry, 1986), studies on CDR are less enthusiastic in examining the trustworthiness of consumers. Few researchers have suggested that attribution theory has consistently shown that individuals are generally perceived as accountable for their actions in everyday life (Tetlock, 1985). Similarly, individuals assign accountability to institutions for their actions. When it comes to the functioning of legal systems, accountability underlies the principle of justice and has consistently been ignored in previous studies (Folger & Corponzano, 2001). In the context of trust, Tomlinson & Mayer (2009) developed a Causal Attribution Model of Trust Repair (CAMTR) that explains the reasons behind trustworthiness. Drawing from the model, this study aims to adopt CAMTR to examine the relationship between accountability and trustworthiness of the CDR platform and compare trustworthiness levels between first consumers and repeat consumers.

Two reasons drive the examination of the relationship between accountability and trustworthiness in CDR. First, without understanding trustworthiness, CDR is likely to fail to protect consumers. CDR platforms serve as mediators in resolving disputes between consumers and sellers, where consumers are considered the weaker party; a lack of trust may lead consumers to avoid CDR and instead pursue litigation. Secondly, the role of accountability in CDR remains unexplored. Surprisingly, there has been a lack of attention to understanding how consumers perceive a CDR platform. The adoption of CAMTR suggests examining causal attributes (accountability) and trustworthiness, which lead to future trust.

2. Literature Review

This study reviewed a few previous studies on ADR after 2020, both conventional and online (Table 1). Few studies have emphasised the significance of trust in the implementation of ODR (e.g., Chung & Yu, 2021; Jimenez et al., 2022) and the challenges of ODR in the e-commerce market that operates cross-border (e.g., Ye & Zhao, 2024; Aziz & Hamid, 2020). A growing body of research has explored the mechanisms of dispute resolution for consumers. However, the main focus of a few CDR studies was on how effective the mechanism worked, looking at its operations, procedure, and process (e.g., Ilias et al., 2023; Safei & Abdullah, 2023). Although the research did not include the phrases “trust” or “trustworthiness”, several comparable concepts elicited concern: fairness and bias. Trust concerns have been an issue since the early beginnings of CDR (Lieberman & Henry, 1986). However, studies in CDR that measure trustworthiness are lacking (Ferreira et al., 2022). For the study of ODR, trust has been examined (Ferreira et al., 2022) and explored (Aziz & Hamid, 2020) more widely due to the nature of the virtual environment. Compared with CDR, the procedure of ADR also gains much attention from past studies (Jimenez et al., 2022; Aziz & Hamid, 2020).

Causal Attribution Model of Trust Repair (CAMTR)

The attributional theory explains whether the causal attribution is internal or external, as this distinction alters perceptions of an event. A few studies, such as Ellen et al. (2006) and Min et al. (2023), employed the theory in the marketing field to explain the impact of organisational actions on consumers’ reactions. In the context of legal studies, Sperry & Siegel (2011) adopted the theory to explain how different aspects of attribution affect decisions made in court. However, the applicability of attribution theory is less apparent when applied to trust. Building on this theory, Tomlinson and Mayer (2009) incorporated causal attribution into the CAMTR to explain trustworthiness. Based on the CAMTR, the causal attributions (locus, controllability, and stability) regarding a negative event affect trustworthiness, which comprises the dimensions of ability, benevolence, and integrity. While legal literature has highlighted the importance of accountability of a legal decision (Folger & Cropanzano, 2001), it positions accountability as an alternative form of causal attribution (Zhao & Ki, 2018).

Accountability

Ferry et al. (2024) explained that accountability can be defined in multiple ways that relate to an individual’s characteristics or an institution’s positive qualities. In the study of social psychology, accountability refers to behaviour’s causes (Frink & Klimoski, 2004). In the accounting field, auditors exhibit superior judgment on financial quality when they are accountable (Bovens, 2007). Accountability is the ability to organise and coordinate the interrelationships among individuals who can control their actions (Tetlock, 1985). In the context of an organisation, accountability refers to the obligation of an organisation to clarify and justify its

actions to the public, thus supporting equitable and fair governance (Bovens, 2007). Based on a review of literature, studies of organisational responses to crisis have explored and examined accountability as the causal attribute of an institution. For example, borrowing the theory of attribution, accountability is one of the new dimensions introduced by Zhao & Ki (2018) related to an organisation's crisis responsibility. Past literature explained that accountability is crucial for a mechanism of enforcement to connect with the social system (Bovens, 2007). As a platform for consumer protection, CDR must be held accountable for its actions and their outcomes.

Table 1: Past studies on ADR

Citation	Platform	Country	Problem	Findings
Ye & Zhao (2024)	ODR	China	There is insufficient ADR to protect consumers who use mobile payment services.	Adding mobile payment users to the current landscape and standardising the ADR methods to make them easier to use and more effective.
Ilias et al. 2023)	CDR	Malaysia, Indonesia	The ambiguity and ineffectiveness of ADR mechanisms for financial institutions in Malaysia and Indonesia.	Both countries need to develop more accessible ADR mechanisms, increase the monetary jurisdiction, enhance staffing levels, and enhance ODR methods.
Safei & Abdullah (2023)	CDR	Malaysia	The Consumer Protection Act 1999 contains an ambiguous statement regarding ADR.	The authors suggest including mediation and an ombudsman during the negotiation process.
Ferreira et al. (2022)	ODR	Brazil	The use of information technology in the arbitration process resulted in trust issues.	Only one of the three dimensions of trust related to users' attitudes is benevolence.
Jimenez et al. (2022)	ODR	Spanish, EU	Regulations that guide online stores and offerings have not been enforced strongly enough, which has made consumers doubt their reliability and trust.	In e-commerce, ADR works better than other methods. Self-regulation should be a tool, enforcement should be improved, and rules should be the same everywhere.
Chung & Yu (2021)	ODR	Global	There are challenges in building trust in the global e-commerce market.	Effective ODR practices can enhance trust, consumer loyalty, and the intention to repurchase.
Aziz & Hamid (2020)	ODR	Malaysia	The unclear concept of the ODR and fairness issues is being discussed.	ODR facilitates prompt resolution at a low cost and enhances effectiveness. ODR cannot entirely supplant judicial litigation, but it can complement it.

Trustworthiness

The examination of trust has drawn the attention of many researchers across various service industries (Isaeva et al., 2020). Most past literature in the service industry agreed that the operational definition of trust is complex. In the study of legalisation services, various types of trust related to the justice process have been explored and examined, such as trust from individual perception, trust in the source of information, and trust toward institutions (Wallace & Goodman-Delahunty, 2021). For trust toward institutions, previous studies focused on the general perception and specific processes. Many studies debate the operational definition of trust. Mayer et al. (1995) used the terms trust and trustworthiness to clarify the doubt. Trust refers to the psychological state, and trustworthiness focuses on the characteristics or attributes of individuals. Isaeva et al. (2020) further clarified that trust reflects the intention or behaviour of the trustor, and the qualities that a

person or institution shows reflect its trustworthiness. When consumers use the service of TCCM, consumer perception of TCCM is viewed as trust, and the qualities or attributes of TCCM are indicative of its trustworthiness. Mayer et al. (1995) proposed ability, benevolence, and integrity as the dimensions for assessing trustworthiness. Although some studies try to differentiate between trust and trustworthiness, several studies have also utilised these dimensions to assess trust (e.g., Ferreira et al., 2022). Various fields of study have widely adopted Mayer et al.'s (1995) measurement of trustworthiness. The definitions of the dimensions are also widely accepted by various studies. Ability is the competency, skills, and traits that allow a party to influence a domain; Benevolence involves assisting others without reason; and Integrity is a set of values one accepts.

Hypotheses Development

The study by Wood et al. (2023) investigates views of accountability and trust within regulatory governance. Both concepts are considered important for understanding the extent to which regulatory governance regulates their activities. However, the relationship between accountability and trust in legal studies is complicated (Irvita & Asriani, 2025). Ehren et al. (2019) and Ferry et al. (2024) agreed on the mutual relationship between accountability and trust. However, past studies have yet to examine the relationship between accountability and trust. According to Bovens (2007) and Calnan & Rowe (2008), an organisation that exercises public authority should use accountability to promote a sense of trustworthiness. Based on the CAMTR, the dimensions of trustworthiness have an effect on causal attribution, which in turn has a direct effect on trustworthiness (Tomlinson & Mayer, 2009). However, Sekhon et al. (2014) and Isaeva et al. (2020) have suggested that causal attribution (accountability) comes first and influences trustworthiness.

Ability is the competency of an institution to exert influence within a certain domain (Ferry et al., 2024). The particular domain of the ability is unique, as a trustee's competency in a specific technical field enables them to be trusted with related obligations (Mayer et al., 1995). For example, consumers who filed claims with TCCM credit the platform with significant accountability for delivering fair outcomes, resulting in an enhanced perception of TCCM's ability. Consumers are more likely to submit their redress to TCCM due to its perceived ability. Ferry et al. (2024) emphasise that public administrative institutions with accountability can significantly impact trust by signalling the organisation's competence. For instance, consumers who submitted their claims to TCCM attribute TCCM as having high accountability for rendering equitable outcomes, leading to an elevated impression of TCCM's competence or ability. Consumers are more likely to file their redress with TCCM because of TCCM's perceived ability. Thus, this study hypothesises that:
H1(a): Accountability has a significant relationship with the ability of TCCM.

The integrity of an institution is determined by the consistency of its actions, the reliability of information about the institution, the perception of its sense of justice, and the alignment between its actions and promises (Mayer et al., 1995). From law enforcement, integrity refers to ethical principles, moral standards, and commitment to execute obligations with honesty and responsibility (Irvita & Asriani, 2025). Abd Aziz et al. (2015) concluded that integrity pertains to the quality of organisational behaviour that reflects compliance with moral values, standards, and rules that are defined by society. The relationship between accountability and integrity is complicated. Studies suggested that integrity has a positive impact on accountability (Abd Aziz et al., 2015). However, according to CAMTR, the outcome of accountability is trust, and integrity is one of the facets of trust. Ramli et al. (2024) tested and found a significant influence of accountability on integrity. Thus, based on CAMTRA and Ramli et al. (2024),
H1(b): Accountability has a significant relationship with the integrity of TCCM.

Mayer et al. (1995) defined benevolence as the degree to which a trustee is perceived as having the intention to benefit the trustor. Zainal Abidin & Salamat (2023) explained that the benevolence of an institution reflects its care and concern for the people that it serves. Given that the objectives of TCCM are to safeguard consumers or trustors, TCCM, in its capacity as trustee, should act in the best interests of the consumers. Ferry et al. (2024) explained that institutional delays and inaction in response to enquiries indicate a lack of institutional benevolence. The postponement by TCCM in adjudicating a claim indicated a lack of benevolence. Therefore, for the TCCM to be considered accountable, it is imperative that the hearing be executed as pledged. Zainal Abidin & Salamat (2023) revealed a positive and statistically significant correlation between accountability and benevolence in the context of local government service delivery. Thus, for a similar role at TCCM,
H1(c): Accountability has a significant relationship with the benevolence of TCCM.

Gefen (2000) asserted that familiarity is a prerequisite for trust, significantly strengthening it. The more familiar someone is with the system, the more trust they have in it. According to Ferreira et al. (2022), predicting trust and related behaviours may be less relevant, as some individuals may only engage in ODR once. This conclusion suggests that differing levels of experience may lead to different perceptions of trustworthiness. Thus,

H2: There is a significant difference between initial and repeated consumers on the relationship between accountability and trustworthiness (a. ability, b. integrity, c. benevolence).

3. Method

The sample in this study was chosen based on consumers who are willing to participate when they visit TCCM offices. These consumers are those who have engaged with the tribunal mechanism. The sample does not accurately reflect the demographic distribution of the Malaysian population, which limits the generalisability of the results. This study collected data at 11 TCCM offices in Malaysia using convenience sampling techniques due to the limitation of acquiring a sampling frame. Marketing research often employs the sampling technique to gather a range of opinions. This study also calculated Harman's single-factor test to rule out any serious common method bias (CMB) concern. The value is 42.33%, which is below the threshold of 50%. Table 2 illustrates the characteristics of participants in this study. After removing the outliers, this study used a total of 323 data points for analysis. An analysis of variance (ANOVA) was performed to assess the homogeneity of variances between initial consumers (216) and repeated consumers (107) in terms of accountability, ability, integrity, and benevolence. The results indicate all p-values are larger than 0.05, showing that the assumption of homogeneity of variances was not violated. Additionally, the ANOVA results revealed no significant difference between groups in ability [$F(1,321)=2.47$, $p=0.12$], integrity [$F(1,321)=2.26$, $p=0.13$], and benevolence [$F(1,321)=3.25$, $p=0.07$]. However, a significant difference was identified for accountability [$F(1,321)=24.33$, $p=0.001$].

Table 2: Respondent profiles

Variable	Category	Frequency	Percentage
Frequency	Initial	216	66.9
	More than 1 time	107	33.1
Age	< 25	3	0.9
	26 – 35	64	19.8
	36 – 45	170	52.6
	46 – 55	14	4.3
	> 56	72	22.3
Occupation	Self-employed	74	22.9
	Unemployed	43	13.3
	Retired	75	23.2
	Semi-skilled	71	22.0
	Clerical-skilled	27	8.4
	Professional	33	10.2
Education	Primary	6	1.9
	Secondary	130	40.2
	Pre-University	24	7.4
	Undergraduate	98	30.3
	Postgraduate	65	20.1
Income	< RM2000	36	11.1
	RM 2001 - 5000	213	65.9
	RM 5001 - 7500	48	14.9
	RM7501 - 10,000	4	1.2
	RM10001 - 12,500	22	6.8
	>RM12,500	0	0

This study developed a questionnaire and collected data using a cross-sectional survey. The questionnaire

consists of six items for accountability that are adopted from Zhao & Ki (2018) and three dimensions of trustworthiness adopted from Rousseau et al. (1998). The trustworthiness component includes five items for ability, four items for integrity, and four items for benevolence. All the items were rated on a five-point Likert scale. Confirmatory factor analysis (CFA) was performed to assess the validity and reliability of the measurement using SPSS AMOS. The measurement removed two items that show a factor loading below 0.50: one for ability and one for integrity. Table 3 illustrates the descriptive statistics, data distribution, reliability, and validity of the measurement. The final values indicate an acceptable threshold, with the following model fit values: X^2/df=2.15, RMSEA=0.06, SRMR=0.03, CFI=0.97, TLI=0.97.

Table 3: Descriptive statistics, reliability, and validity

Variables	M	SD	Skew	CR	AVE	Cronbach'α	1.	2.	3.	4.
1. Accountability	3.40	.65	.76	.87	.81	.90	**.90**			
2. Ability	3.42	.63	-0.29	.92	.74	.94	.15	**.86**		
3. Integrity	3.15	.63	.17	.89	.73	.88	.13	0.58	**0.85**	
4. Benevolence	2.84	.74	.38	.96	.87	.96	.14	0.52	0.63	**0.93**

Note: M=Mean; SD=Standard Deviation; Skew=Skewness; Bold is the square root of the AVE

4. Results

Using SPSS AMOS, this study developed a structural equation model (SEM) to test the hypotheses. As shown in Table 4, the model fitting results of the SEM model meet the assessment criteria. The results show that accountability is significantly related to ability ($p<0.05$) and benevolence ($p<0.05$). However, it was insignificantly related to integrity ($p>0.05$). Thus, accept H1(a) and H1(c), and reject H1(b). The second hypothesis, H2, was developed to compare initial consumers and repeated consumers. The p-values for all three statistical tests for differences are below 0.05; there is a difference between the initial consumer and the repeated consumer in the three relationships. Thus, accept H2(a), H2(b), and H2(c).

Table 4: Hypothesis testing results

Hypothesis	Category	Model Fit	(a)Accountability → Ability	(b)Accountability → Integrity	(c)Accountability → Benevolence
H1	All (323)	X^2/df=2.33, RMSEA=0.06, SRMR=0.03, CFI=0.97, TLI=0.96.	β=0.14; p=0.02	β =0.11; p=0.09	β =0.12; p=0.04
H2	Initial Consumer (216)	X^2/df=2.19, RMSEA=0.07, SRMR=0.03, CFI=0.96, TLI=0.95.	β=0.27; p=0.001 Mean=3.45, SD=0.63	β=0.22; p=0.004 Mean=3.18, SD=0.63	β=0.25; p=0.001 Mean=2.89, SD=0.74
	Repeated Consumer (107)	X^2/df=1.79, RMSEA=0.09, SRMR=0.04, CFI=0.95, TLI=0.94.	β=-0.01; p=0.89 Mean=3.35, SD=0.62	β=-0.02; p=0.88 Mean=3.07, SD=0.64	β=-0.01; p=0.92 Mean=2.73, SD=0.72
	Statistical significance of differences	X^2=9.72, df=3, p=0.02	X^2=7.02, df=1, p=0.008	X^2=5.32, df=1, p=0.02	X^2=7.25, df=1, p=0.007

5. Discussion and Conclusion

This study is based on how accountability influences the ability, integrity, and benevolence of CDR. Additionally, this study compares the differences between initial and repeated consumer perceptions of the relationship. This study fills the gaps of previous studies by directly testing accountability against the three dimensions of trustworthiness. Interestingly, this study found that accountability significantly influences ability and

benevolence. However, accountability insignificantly influences integrity. The result is in line with the suggestions of Sekhon et al. (2014) and Isaeva et al. (2020). The insignificant relationship between accountability and integrity may be explained by the theory introduced by Tomlinson and Mayer (2009), CAMTR; the mutual interaction between accountability and integrity might happen. As suggested by Ferry et al. (2024), the relationship between accountability and trustworthiness is complex.

This study addresses the concern of Ferreira et al. (2022) that initial and repeated consumers have different perceptions of trustworthiness. Refer to an ANOVA test that was performed at an earlier stage; this study found a significant difference between the two groups' perceptions toward the three dimensions of trustworthiness. All direct relationships between accountability and the dimensions of trustworthiness for initial consumers are significant, but not for repeated consumers. The findings indicate that an initial consumer may place greater emphasis on accountability as an attribute influencing trustworthiness. However, the familiarity of consumers with the CDR platform has not contributed to them attributing higher trust, as claimed by Gefen (2000).

This study contributed to prior research in a few ways. First, it adopted CAMTR by studying the effects of accountability (causal attribution) and the dimensions of trustworthiness on a CDR platform. This study validates the CAMTR by examining how the attribute causes specifically influence the three dimensions of trust. This new context underscores how consumers attribute trustworthiness to an organisation, hence widening the relevance of CAMTR to consumer redress procedures. This study is important because the ADR platform should build trust that can protect consumer rights. To avoid consumers or sellers bringing redress or conflict to court, ADR is a more efficient and effective way to resolve disputes. Second, this study has contributed to the body of knowledge by comparing the behaviours of initial and repeat consumers. The results clearly demonstrate that initial and repeated consumers differ in their perceptions of the relationships between accountability and the three dimensions of trustworthiness of the CDR platform. Individuals who have more than one time experience have attributes that differ from the CDR platform. Prior research was concerned with the different perceptions between initial and repeated consumers; this study further confirms that causal attribute effects toward trustworthiness and the generalisation of theory are hardly applicable to all consumers.

The CDR platform has a few practical implications to consider. The trustworthiness of the CDR platform is higher when initial consumers attribute their experiences to the platform's accountability. This study suggests that the Ministry of Domestic Trade and Cost of Living should have the skills and knowledge to organise and coordinate consumers who come over to file their claim. Consumers who have experienced it may attribute differences to the CDR platform by referring to their previous experience. In addition to annually publishing the number of cases resolved, TCCM shall regularly report case timelines, resolution rates, and the accessibility of its services across various platforms to exhibit procedural accountability, hence enhancing public trust. The justification and clarification reflect the high accountability of the CDR platform.

There are several limitations to this study. First, this study only examined one of the dimensions of causal attribution. This study only offers a narrow picture of the framework. Therefore, other causal attribution dimensions may influence trustworthiness. Future research should adopt a more comprehensive CAMTR framework to gain a clearer understanding of the consumer journey with the CDR platform. Second, this study investigated both initial and repeat consumers for the proposed framework. Future studies could focus on initial or repeat consumers to test the framework.

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Steering Through Multi-Level Contradictions: Paradoxical Leadership in the Sustainability Transition of Malaysian Higher Education

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Abstract: Sustainability leaders in Malaysian higher education navigate paradoxes embedded in institutional efforts to implement sustainability agendas. By drawing on comparative case studies of two public and two private universities, it reveals how leaders confront multi-level tensions ranging from macro-level policy ambitions to individual-level ethical dilemmas. These tensions include national policy ambitions versus limited support, organizational growth imperatives versus environmental commitments, and individual ethics versus pragmatic workload demands. Using semi-structured interviews, document analysis, and limited observation, this study investigates how these tensions are nested and cascading in nature: contradictions at one level intensify dilemmas at another. Leaders adopted dynamic strategies (e.g. symbolic gestures, temporal and spatial separation, and integrative reframing) to cope with or manage paradoxes. Notably, public and private universities differed in these tensions and the dominant logic driving responses: Public institutions leaned toward symbolic and compliance strategies due to bureaucratic constraints, while Private institutions pursued integration framed within market imperatives. The findings contribute to paradox theory by illustrating how sustainability tensions are experienced and managed across institutional levels. The study also offers practical insights into developing leadership capabilities, aligning HRM systems with sustainability goals, and fostering multi-level coherence in sustainability governance. These insights are especially pertinent for universities seeking to advance meaningful sustainability transformations amid persistent structural and ideological contradictions.

Keywords: *Sustainability Leader; Higher Education; Malaysia; Paradox Theory; Comparative Case Study*

1. Introduction

Universities and other learning institutions are likely to play a significant role in advancing sustainable development, but they often face competing pressures that make this role inherently paradoxical. Higher education institutions are simultaneously "knowledge centers" and organizational actors, subjected to financial, political, and societal demands. The Malaysian Higher Education Blueprint 2015–2025 embeds sustainability principles into the national strategy by calling on universities to develop graduates with fitting sustainability values, knowledge, and skills. Universities are urged to serve as living spaces for sustainable solutions and to inculcate social and environmentally responsible behaviors in students. The Malaysian Qualifications Agency requires undergraduate programs to integrate competencies related to global sustainability. In line with these mandates, many Malaysian universities-public and private alike-launched green campus initiatives, sustainability centers and curriculum reforms.

Nonetheless, implementation lags aspiration. Research on Malaysian higher education finds that despite widespread adoption of sustainability policies (e.g., participation in sustainability-oriented rankings), institutions encounter numerous challenges in practice (Muhiddin et al., 2023; Isa et al., 2021). Some of the challenges include limited funding for sustainability projects, a lack of training and awareness among faculty, and weak incentives for long-term transformation. Another study reported that Malaysian academics' readiness to teach and pursue sustainable education is hampered by a lack of knowledge, time, and motivation, alongside insufficient institutional support (Yang et al., 2024). Therefore, university leaders operate in an environment where they are expected to "do more with less" – championing sustainability agendas without proportionate increases in resources. These circumstances give rise to paradoxical tensions. A paradox refers to "contradictory yet interrelated elements that exist simultaneously" and persist over time, creating an ongoing dynamic that cannot be resolved by simple trade-offs (Smith & Lewis, 2011). Unlike a linear problem that can be solved sequentially, paradoxes require stakeholders to pursue dual goals at once – an often-uncomfortable balancing act. In the context of university sustainability, leaders find themselves pulled between opposing demands. For instance, a university might want to invest in solar panels, extensive community outreach, or comprehensive sustainability education, but concurrently face pressure to cut costs, maximize

student enrollment, and boost global rankings. The result is a set of enduring tensions: should the university prioritize "planet" or "profit"? Is its mission to serve the "public good" or to compete in the education market? These questions encapsulate paradoxes of purpose and performance.

Public universities in Malaysia are expected to uphold national development goals and community well-being, yet government funding mechanisms and KPI regimes emphasize research output and financial self-sufficiency. Private universities, on the other hand, are encouraged by policymakers to innovate and contribute to social outcomes, even as they receive no government bailouts and must survive on tuition revenue and market appeal. This creates what one Ministry official described as a "be altruistic but also survive on your own dime" mandate — a macro-level paradox echoed in institutional strategy and daily decision-making. Understanding how university leaders navigate these tensions is both theoretically and practically significant. Organizational theory suggests that embracing a "both/and" mindset (acknowledging and working through paradoxes) is crucial for sustainability, as opposed to an "either/or" approach that forces trade-offs. Yet, empirical studies in the higher education context remain limited. Much of the literature on sustainability in universities focuses on what universities should do (e.g., curriculum changes, campus greening) rather than how internal actors manage the conflicting demands involved (the process of change). Moreover, studies often examine a single level – for instance, analyzing sustainability policies at the institutional level, or surveying student attitudes at the individual level – without connecting these multiple levels.

This study addresses these gaps by examining sustainability leadership through a multi-level paradox lens. We focus on Malaysian higher education as a critical context: Malaysia is a nation actively pursuing sustainable development goals and urging educational reforms, yet it also contends with pressures of a developing economy and an evolving higher education landscape.

2. Literature Review

Sustainability and Paradox in Higher Education

Sustainability and Paradox in Higher Education Universities are positioned as frontrunners in sustainability transitions, integrating environmental and social responsibilities into their traditional missions of teaching, research, operations, and community engagement (Kemp & Scoffham, 2022). Accordingly, sustainable practices aiming to balance economic, social, and environmental values have gathered significant scholarly interest (Sitong, 2022). Sustainable leadership requires creating an organizational culture and strategic practices that support long-term sustainability goals without compromising academic excellence or financial stability (Lewis et al., 2014; Leal Filho et al., 2009). However, research highlights that many organizational actors still demonstrate limited awareness or capability regarding sustainable leadership practices due to insufficient training and exposure (Vesudevan et al., 2025). Empirical studies have also shown that targeted capacity-building initiatives significantly enhance university actors' understanding and engagement in sustainability (Umar et al., 2025).

The incorporation of sustainability into higher education implicates dealing with multiple conflicting demands; due to universities' complex roles as educational institutions and market actors (Blanco-Portela et al., 2017).
Existing literature conceptualizes these inherent conflicts as paradoxes—persistent tensions involving contradictory yet interdependent objectives that must be managed concurrently rather than resolved through trade-offs (Schaefer, 2019). Scholars like Hahn et al. (2015) and Van der Byl and Slawinski (2015) argue that sustainability management should move beyond an "either/or" mindset — toward a "both/and" approach, actively engaging with paradoxes to foster integrative solutions.

Empirical studies further demonstrate how paradoxes manifest in specific institutional contexts. One prevalent example is the "academic vs. commercial mission" paradox. Studies show that universities often experience identity tensions between upholding traditional scholarly values and navigating increasingly competitive market dynamics (Spinrad et al., 2022; Besharov & Smith, 2014). Quantitative research by Clarke and Crane (2018); as well as Kleinman (2010) indicates that universities prioritizing commercial imperatives may exhibit measurable improvements in short-term financial performance, but risk undermining long-term sustainability objectives and academic integrity. Qualitative studies similarly recorded how university leaders reconcile these conflicting priorities daily, often feeling compelled to balance immediate market-driven demands with their

institution's social and educational missions (Christiansen et al., 2024; Hardman, 2023). Another significant paradox highlighted in the literature is the tension between short-term performance pressures and long-term sustainability investments (Luo et al., 2020); as organizations recognize that sustainability projects (e.g. infrastructure retrofits, curricular integration) generate potential benefits, but face immediate financial, or resource limitations that make such initiatives challenging (Jay, 2013). Empirical qualitative evidence from recent case studies (de Villiers et al., 2025) reveals how faculty members navigate these temporal tensions through practices like incremental changes and symbolic compliance — leading to incomplete, or superficial sustainability results.

Systemic Multi-Level Paradoxes

The literature has increasingly emphasized the systemic nature of sustainability paradoxes across macro (external policy), meso (organizational strategy), and micro (individual actor) levels (Carmine & De Marchi, 2023; Schad et al., 2016). For instance, macro-level government mandates require universities to pursue ambitious sustainability goals without allocating sufficient resources, creating "policy vs. resources" tensions that cascade downward, impacting organizational strategy and HRM practices (Smith & Besharov, 2019). At the organizational level, universities wrestle with balancing conflicting strategic priorities-such as aligning social and environmental sustainability with financial imperatives-which in turn generate contradictions at the functional (HRM) and individual employees (Jarzabkowski et al., 2013).

The encounter between paradox theory and sustainability has been explored through various conceptual lenses. Some studies apply paradox thinking to specific organizational functions, while others examine tensions across multiple dimensions of sustainability. With particular reference to the HR function (to be discussed in more detail later in this chapter). Ehnert (2009) applies a paradox perspective to people management and highlights several key contradictions — identify an efficiency–responsibility paradox (pursuing economic performance goals while maintaining social responsibility), a consumption–reproduction paradox (deploying employees to meet immediate objectives while sustaining their long-term well-being and capacity), and a present–future paradox (addressing current workforce needs versus investing in future human resources).

Recent qualitative research by Bohunovsky et al. (2023) empirically supports these theoretical propositions, highlighting how university leaders navigate these multi-level paradoxes through strategies such as acceptance, compartmentalization, and integration. Their findings underscore that leaders often employ dynamic equilibrium strategies—actively balancing competing tensions over time rather than permanently resolving them (Smith & Lewis, 2011). This multi-level perspective, therefore, provides a comprehensive understanding of why university sustainability initiatives may falter or flourish in practice.

Contextual Differences: Public vs. Private

Institutional and contextual variances significantly influence the manifestation and navigation of sustainability paradoxes. Public universities normally face bureaucratic hurdles, resource limitations, and pressures to align closely with national sustainability goals-experiencing pronounced "mandate vs. means" paradoxes (Bohunovsky et al., 2023; Milosevic et al., 2023). Conversely, private universities, driven by market competition and branding imperatives, encounter intense "mission vs. market" tensions-often resorting to symbolic sustainability actions to improve reputational appeal (Quaresma et al., 2024).

Public institutions, constrained by regulation and financial limitations, resort to incremental and defensive responses, by negotiating tensions through pragmatic compromises and incremental adaptations (Abo-Khalil, 2024). Private universities frequently leverage sustainability initiatives as marketing tools, employing strategies such as externally visible symbolic compliance combined with internal resource prioritization (Sutawaidjaya et al., 2024; Castro-Gómez et al., 2024). By reproducing these understandings, this study strengthens the theoretical foundation of paradox management within university sustainability transitions. Moreover, it highlights the importance of empirical evidence in demonstrating the tangible impacts of paradox navigation in institutional sustainability settings.

3. Methodology

Research Design

To explore the complex ways in which sustainability leaders navigate multi-level paradoxes, this study adopted a qualitative multi-level comparative case study design. This method is fitting for this inquiry because it enables an in-depth exploration of contemporary phenomena within their real-life context and facilitates the generation of processual and contextual insights (Avery et al., 2011; Yin, 2009; Eisenhardt, 1989). I selected four case studies, each centered on sustainability leaders at a Malaysian higher education institution (through sustainability-oriented rankings), with two cases representing public universities and two representing private universities. Using multiple cases with contrasting institutional types follows a theoretical replication logic: I anticipated that all cases would exhibit the phenomenon of interest (paradoxical sustainability tensions), reinforcing the general theoretical pattern, while differences between public and private contexts would illuminate how context influences paradox navigation. This design thus allows both common themes to emerge and contextual nuances to be examined.

Each "case" in our study is defined as the experience of a sustainability leader implementing sustainability initiatives in their university, analyzed across multiple levels (macro, organizational, HRM, individual). While the leader is the focal point, we also consider their institutional environment and stakeholder interactions as part of the case. All four leaders held roles that involve steering sustainability or related change programs at their institution (e.g., Director of Sustainability Office, Deputy Vice Chancellor for Sustainability or Community Engagement, or equivalent positions). To preserve anonymity, we assign pseudonyms: Public Uni A and Public Uni B for the public university cases, and Private Uni C and Private Uni D for the private university cases. The selected public universities are large, comprehensive institutions (each with >20,000 students) with established reputations and significant government funding; the private universities are mid-sized to large (5,000–15,000 students) and among the leading private institutions in Malaysia, known for innovative programs. This selection aimed for diversity in the institutional context while ensuring that each leader had a clear sustainability mandate.

The primary objective of this study is to explore how university leaders in Malaysia interpret and manage sustainability-related paradoxes across macro, organizational, HRM functional, and individual levels. Specifically, the research seeks to answer the following questions:

- How do university leaders perceive sustainability-related paradoxes at different institutional levels?
- What strategies do university leaders employ to manage these paradoxical tensions?
- How do contextual differences between public and private universities influence paradox management?

Participants were selected using purposive sampling to identify senior leaders explicitly responsible for driving sustainability initiatives in their respective institutions. Selection criteria included individuals holding formal roles associated with sustainability, such as Director of Sustainability, Deputy Vice-Chancellor for Sustainability, or equivalent positions. Institutions were chosen based on their recognized commitment to sustainability and contrasting institutional contexts (public vs. private).

Access to participants was negotiated through formal requests to institutional gatekeepers and direct outreach. Initial participants were asked to recommend additional informants, thus employing snowball sampling to include a broader range of stakeholder perspectives. The final sample included four sustainability leaders and an additional 14 stakeholders (senior administrators, middle managers, academics, operational staff, and external representatives). Challenges in recruitment included scheduling constraints and limited access to certain senior officials. Two potential participants declined participation due to time constraints, necessitating additional snowball sampling to maintain diversity in perspectives.

Data Collection

Data were collected primarily through semi-structured interviews, complemented by limited direct observations and document analysis to enhance data triangulation. Each primary sustainability leader participated in two in-depth interviews (approximately 90 minutes each), conducted either face-to-face or via

video conferencing over a period of six months. Interviews explored participants' interpretations of sustainability paradoxes, management strategies, and contextual influences.

Additional shorter interviews (30–60 minutes) with other institutional stakeholders provided complementary insights and validation of findings. Limited direct observations were conducted at sustainability-related meetings and events in two institutions, providing contextual depth. Institutional documents such as strategic plans, sustainability policies, annual reports, and public communications were systematically reviewed to corroborate interview findings.

Data Analysis

Data were analysed using a thematic analysis approach, consistent with Braun and Clarke's (2006) six-phase method. This method was selected for its suitability in identifying patterns across a complex, multi-case dataset while allowing the researcher to remain grounded in the contextual richness of each university setting. The process was iterative and interpretive, moving between inductive coding based on participants' narratives and deductive reflection guided by paradox theory and sustainability literature:

In the first phase, all interviews were transcribed verbatim and anonymised. Transcripts were read multiple times to gain a holistic understanding of the data. Initial codes were generated using NVivo software, capturing descriptive elements such as "conflicting KPIs," "symbolic action," or "policy disillusionment." These were clustered under preliminary categories such as "macro tensions," "HR contradictions," and "emotional responses." The second phase involved a process of axial coding to identify relationships between initial codes, especially in how tensions unfolded across institutional levels. For example, codes related to "funding cuts" at the macro level were frequently linked to "coping strategies" or "symbolic sustainability" at the individual level. This informed the construction of a matrix that traced the movement and amplification of paradoxes across macro, meso, HRM, and micro layers.

To ensure analytic rigour, triangulation was employed using official documents, strategic plans, HRM reports, and external communications from each institution. These materials were cross-referenced with interview data to validate participants' accounts and enhance interpretive credibility. In one case, internal HR documents confirmed that sustainability KPIs had indeed been introduced but carried little performance weight—validating staff frustrations expressed during interviews.

Thematic categories were then finalised around recurring patterns of nested paradoxes, strategic responses, contextual contrasts between public and private institutions, and framing mechanisms. Each theme was refined to reflect conceptual clarity and empirical coherence. Reflexive memos were maintained throughout to track the researcher's interpretive decisions and emerging insights.

Finally, cross-case analysis enabled comparative interpretation. While each university presented unique circumstances, commonalities were identified in how sustainability paradoxes cascaded across levels and how leaders navigated these tensions. This multi-level lens, combined with thematic coding, allowed the study to develop a nuanced understanding of paradox dynamics in higher education sustainability leadership. The integration of theory-driven coding with empirical grounding helped ensure that the analysis was both contextually rich and analytically rigorous. This analytic approach aligned with the study's aim to explore how university leaders interpret and respond to sustainability paradoxes across institutional levels, offering new insights into the lived realities of paradox navigation in Malaysian higher education.

4. Findings

The findings will present within-case analyses of the four university cases, highlighting the key paradoxical challenges and responses at each level (macro, organizational, HRM, individual) for each organization. Then, it will provide a cross-case comparison by drawing out patterns, and contrasts between public vs. private institutions.

Case 1: Public Uni A

At the macro level, Dr. Arif operated within an environment marked by significant expectations for

sustainability alongside stark resource constraints. He described a paradox whereby national policymakers advocate sustainability initiatives, yet do not allocate adequate funding. He asserted:

"Every speech by the government praises and pushes universities for undertaking sustainability… but when budget time comes, there's no allocated fund for it."

Official budget documents confirmed these funding limitations, revealing significant cuts to sustainability-related expenditures despite high-level policy commitments. Additionally, national research performance metrics favored indexed publications, clashing with community-focused sustainability projects. As Dr. Arif clarified exemplifying tensions between local community engagement and institutional recognition:

"If we organize a community project that isn't easily publishable, it doesn't count much toward our performance metrics".

At the organizational level, Public Uni A faced tensions between its public service undertaking, and internal financial pressures to generate income through market-driven initiatives. Dr. Arif highlighted this as an ongoing struggle: *"There's always back and forth between doing the 'sustainable thing' and doing the economically feasible thing."* Strategic planning documents established these contradictions, outlining ambitious sustainability objectives alongside aggressive revenue generation targets. Moreover, leadership changes exacerbated this tension, causing disruptions to the sustainability program continuity. Dr. Arif further explained the difficulty in maintaining momentum:

"We had momentum with our urban farming project, but after the leadership change, attention shifted elsewhere, and I had to re-justify the project again."

At the HRM department, institutional reward systems remained inconsistent or misaligned with sustainability objectives. Formal appraisal criteria underlined traditional academic outputs, significantly undervaluing sustainability-related contributions. One of the faculty members frankly expressed her frustration:

"I love working on the campus recycling campaign and community collaborations, but end of the day, my tenure depends on publishing in journals."

HR policy documents verified this emphasis; detailing appraisal systems predominantly focused on research productivity metrics. Furthermore, the university's well-being initiatives, designed to promote a supportive culture, experienced limited participation due to conflicting signals from middle management prioritizing efficiency over employee wellness.

Individually, employees at Public Uni A grappled with the tension between deep personal commitment to sustainability and the practical realities of institutional constraints. The employees employed various strategies to cope, such as symbolic compliance — small, visible actions like tree-planting events designed to maintain visibility for sustainability initiatives without significant institutional investment. Reflecting on faculty disillusionment, one of the respondents stated, *"I fear the most committed people will get disheartened. We risk losing champions."* This statement underlines a significant individual-level paradox between idealistic values vs. practical career demands.

Case 2: Public Uni B

At the institutional level, Public Uni B was initially given governmental support for an experimental sustainable campus initiative but faced the abrupt withdrawal of funding following political shifts. Policy documents and government communications verified these inconsistencies, documenting the termination of funds after initial support. Prof. Beatrice described her difficulty of sustaining commitments amidst policy volatility — exemplifying a paradox of policy consistency vs. institutional continuity. Furthermore, strict regulations delayed sustainability initiatives requiring external partnerships — demonstrating a tension between public accountability vs. institutional flexibility.

Organizationally, sustainability efforts in the university were confronted by entrenched departmental

autonomy, and a compliance-driven culture. Prof. Beatrice described resistance from departments that are unwilling to adapt operations without guaranteed resources, noting specifically the facilities department's reluctance to implement recycling initiatives:

"They basically told me: we'll recycle when you find the budget to pay for extra bins and pickup. The university is already struggling financially, as it is"

The statement was corroborated with internal meeting minutes, stating departmental challenges, documenting repeated delays and hesitations due to budgetary concerns. This illustrates the paradoxical tensions of decentralized decision-making, and centralized sustainability goals.

At the HRM level, integrating sustainability in performance metrics produced mixed results. Sustainability-related KPIs were treated superficially, resulting in tokenistic actions. Prof. Beatrice commented on the subsequent staff cynicism, where sustainability activities were reduced to *"tick-box"* exercises. According to a staff survey, it revealed dissatisfaction because of the superficial nature of these initiatives. Training sessions to improve sustainability awareness were viewed as secondary distractions, rather than integral professional development opportunities — revealing tensions between immediate operational duties vs. long-term capacity building.

Individually, the employees experienced role conflict given their multiple roles and responsibilities. The majority of respondents admitted initial unaccustomedness with sustainability but developed a real passion through experience. Nonetheless, feelings of isolation have arisen from being the singular voice for advocating sustainability at senior meetings. One of the sustainability administrators said:

"At times, I felt like the only one speaking about sustainability in meetings. It was indeed isolating, but I reminded myself that even small steps matter. Celebrating little wins kept me going, even if big changes were slower to come."

In this statement, the respondent managed these tensions by celebrating incremental achievements and accepting gradual institutional change as a realistic approach.

Case 3: Private Uni C

At the institutional level, Private Uni C faced tensions stemming from sustainability initiatives that are driven by reputational motives. Strategic branding documents revealed deliberate selections to highlight sustainability initiatives for external recognition and competitive differentiation. Ms. Cahaya highlighted symbolic commitments made for external recognition without corresponding with internal resource support — capturing the paradox of authenticity vs. reputational ambition. She further elaborated:

"When we talk about sustainability at the strategic level, it always turns into a marketing exercise. I've been in meetings where we spend more time discussing how our initiatives will look on the website, than what the university actually achieves. We'd announce bold green pledges, without any budget to back them up, and that creates a disconnect among top managers. As someone who cares about this work, it was hard to realise that our authenticity is at risk."

The statement of making "bold green pledges without any budget to back them up" highlights the paradox of promoting sustainability to enhance reputation, while failing to allocate the resources needed for substantive action. This tension resonates with the macro-level finding that Private Uni C's sustainability agenda was driven by reputational motives, rather than real transformation.

Within the organization, Ms. Cahaya navigated significant mission vs. margin paradoxical tensions. Despite widely integrating sustainability into academic programs, financial viability and student recruitment imperatives took precedence. Internal correspondence indicated that sustainability measures were subordinated to marketing and enrolment objectives. She recounted scenarios where sustainability efforts, such as energy-saving measures were compromised due to concerns about student satisfaction and the university's market position. She further elaborated:

"The university says sustainability matters and even built it into our performance reviews, but in practice, research outputs and student recruitment numbers still carry the most weight. I remember proposing an energy-saving measure and being told it might make classrooms slightly warmer, which could affect the student experience."

At the HR department, although formal incorporation of sustainability criteria into performance assessments, traditional academic metrics remained dominant in actual promotion and compensation. Staff felt undervalued for their sustainability contributions, highlighting discrepancies between institutional rhetoric and practical incentives. Formal HR policy documents confirmed these discrepancies — outlining broad appraisal criteria that nonetheless heavily favoured traditional research outputs (e.g. only 2.5% towards green contributions).

Independently, the respondents balanced their background as a sustainability advocate, with institutional business constraints, developing a "bilingual", or both/and approach to communicate effectively across both domains (sustainability and market-driven domains). Although occasionally experiencing disillusionment from stalled sustainability initiatives, employees found motivation in small successes, mainly through student enthusiasm and participation.

Case 4: Private Uni D

At the macro level, Private Uni D experienced tensions occurring from corporate directives mandating rapid sustainability improvements without adequate funds. Corporate sustainability frameworks explicitly outlined ambitious targets without corresponding resource allocation, further exemplifying these tensions. Mr. Devon described situations where locally and internationally imposed sustainability targets were superficially addressed due to insufficient funding or planning time — exemplifying an efficiency vs. substance paradox.

Within the strategic or corporate sphere, the institutional expansion has caused the sidelining of sustainability concerns. Mr. Devon noted how sustainability considerations (e.g. environmentally friendly infrastructure) were deprioritized in favour of speedy facility development. Internal planning documents validated these priorities, highlighting skin-tight timelines, and rushed construction schedules that omitted substantial sustainability features.

At the HRM level, Private Uni D's efforts to institutionalize sustainability faced limitations due to structural immaturity and competing operational pressures. Mr. Devon initiated the inclusion of sustainability-related responsibilities into select job descriptions and KPIs, such as assigning departments to oversee events like Sustainability Week. However, HR records indicated that these additions were inconsistently applied and weakly enforced. Some department heads acknowledged the inclusion of sustainability goals but deprioritized them in favour of more urgent revenue or enrolment KPIs. As one internal HR respondent noted:

"Sustainability indicators have been introduced but remain largely symbolic until supported by clear performance weighting or resource allocation. At the moment, as I have explained, we have other priorities in mind"

This created a classic priority paradox of commitment without operational follow-through.

Individually, the respondents experienced deep personal commitment to sustainability, but lacked institutional recognition, role clarity, or support. Mr. Devon was appointed informally as Sustainability Coordinator, yet he received no additional compensation or authority. His faculty workload remained unchanged, forcing him to juggle academic duties with sustainability tasks. Internal email correspondence, and task logs exposed extensive self-initiated efforts, including grant applications and inter-departmental coordination, conducted outside official work hours. To navigate this tension, Mr. Dev adopted a pragmatic and relational approach, leveraging informal networks, student enthusiasm, and symbolic acts (e.g. hosting tree-planting ceremonies during corporate visits) to raise visibility. He employed humour and long-term framing — referring to himself as the *"Head Green Officer with no income"*— to normalize the sustainability paradoxes and maintain morale. Although receiving inadequate institutional backing, he remained committed to spearheading cultural change.

Discussion

This study provides empirical validation for the nested and systemic nature of sustainability paradoxes in higher education, affirming theoretical claims by Carmine & De Marchi (2023), and Schad et al. (2016)

regarding the interconnection of paradoxes across institutional levels. The cases illustrate how macro-level contradictions (e.g., sustainable policy and ambition vs. funding constraints) cascade through organizational strategies, HR practices, and individual experiences. For instance, policy-level tensions in Public Uni A and B (e.g., national mandates for sustainability without corresponding budgetary support) translated into organizational dilemmas and eventually created individual strain among leaders and faculty. On the other hand, Private Uni C and D experienced a prominent paradox in sustainable policies vs. marketing commitments that also cascaded downwards. Thus, these paradoxes were not isolated; they formed reinforcing loops as misalignments at one level exacerbated contradictions at other levels. This was particularly evident when organizational reward systems misaligned with sustainability priorities — demotivating individuals despite formal institutional commitments. Moreover, the persistence of paradox across levels required leaders to respond not only to immediate dilemmas but also to long-term structural misalignments, highlighting the enduring nature of these tensions.

Across the four cases, sustainability leaders adopted a range of paradox management/navigation strategies that align with Smith and Lewis's (2011) dynamic equilibrium model. These included:

- Integration strategies were evident — leaders sought to reconcile competing objectives by reframing tensions as complementary. Ms Cahaya at Private Uni C linked sustainability to student recruitment goals, thus aligning environmental efforts with marketing.
- Separation strategies were evident — spatial or temporal separation of conflicting goals. Mr. Devon at Private Uni D manages low-budget pilot projects, insulated from mainstream operations to test feasibility, before requesting formal institutional support.
- Acceptance strategies were evident — leaders acknowledged unresolved contradictions and focused on symbolic compliance or incremental progress. Prof. Beatrice at Public Uni B adopted this stance when state-level support was rescinded mid-project.

These strategies were not mutually exclusive; rather, leaders/managers adopted them contingent on the context, resources, and institutional culture. Furthermore, their effectiveness is mixed (e.g. integration strategies were more impactful when supported by leadership or aligned with incentives, while separation often risked marginalising sustainability as a peripheral concern). The data reveal important contextual differences in how public and private universities experience and respond to sustainability paradoxes. These differences reflect institutional logics — public service logic in public universities vs. market logic in private universities — and formed the nature, intensity, and framing of paradoxes.

Table 1: Key Differences in Sustainability Paradoxes: Public vs. Private Universities

Dimension	Public Universities (Uni A & B)	Private Universities (Uni C & D)
Macro Paradox	Policy mandates vs. lack of funding	Branding commitments vs. limited investment
Organizational Tension	Mission vs. financial sustainability	Mission vs. market growth
HRM Paradox	Standardised civil service KPIs vs. sustainability engagement	Flexible KPIs but weak enforcement of sustainability indicators
Individual Tension	Passion vs. burnout in rigid bureaucracy	Passion vs. instrumentalization under market pressures
Navigation Strategy	Symbolic compliance, defensive adaptation	Integration, compartmentalised pilots

Table 1 reviews the patterns observed across institutional types. Public universities grappled more with bureaucratic constraints, rigid HR systems, and discontinuous leadership. Sustainability initiatives were often undermined by erratic policy support and fixed-term appointments — as leaders in these settings tended to rely on defensive or compliance-based strategies. In contrast, private universities, while having greater flexibility, experienced sharper paradoxes between sustainability values vs. commercial imperatives — as their leaders leaned more toward entrepreneurial and integrative approaches but faced resistance from market-

driven boards or profit-centred authority.

Another contribution of this study is the identification of strategic framing as a cognitive and relational tool for navigating paradox. Leaders shifted their communication depending on the audience, purpose, and institutional priorities, tailoring their narratives to resonate with differing stakeholder logics. Such framing practices demonstrate the importance of leadership agility. By using translation, symbolism, and humour, leaders engaged in strategic sense-giving that helped manage institutional identity tensions, reduce resistance, and maintain momentum in contexts of ambiguity or constraint. Moreover, these framings helped manage institutional identity tensions, reduce resistance, and maintain momentum in contexts of ambiguity or constraint. The strategic framings evident in this study are explained below:

- Translational framing was adopted to connect sustainability to dominant institutional imperatives, thus enhancing its legitimacy and relevance. Dr. Arif at Public Uni A framed sustainability initiatives in terms of global university rankings, and cost efficiency to gain support from colleagues. By doing so, he reframed environmental projects not as idealistic ambitions, but as mechanisms for institutional advancement. This framing allowed him to position sustainability as contributing to both reputational capital and operational savings — creating a shared value narrative that aligned otherwise contradictory objectives.
- Symbolic framing was especially evident in public institutions when deeper structural changes were not feasible. Leaders often used public campaigns, green pledges, or highly visible events as symbolic gestures of commitment. Prof. Beatrice at Public Uni B, leveraged Earth Day activities and internal policy signings as ways to retain momentum and show action after the discontinuation of national sustainability funding —even when resources were lacking. Although these actions may not produce systemic change, symbolic framing played a role in preserving stakeholder engagement and institutional morale during times of constraint.
- Humour and relational framing emerged most clearly in the private cases, particularly Private Uni D. Mr. Devon often referred to himself humorously as the "Chief Green Officer with no income." He used self-deprecating humour to disarm resistance and build relationships. This strategy served a dual purpose: it acknowledged the institutional contradictions without directly confronting them, and it created a more human, relatable image of leadership. In contexts where authority was limited and sustainability was not yet embedded, humour helped regularize the paradox, and reduced defensiveness among colleagues.

5. Conclusion

Attaining holistic sustainability in higher education is a journey full of paradoxes. The study has shown that sustainability leaders in universities must steer through multi-level currents of tension: from the heights of policy and institutional mission down to the depths of personal conviction and everyday practice. Public and private universities, though differing in context, ultimately face the “both/and” challenge of integrating economic, social, and environmental goals into the fabric of academe. The four leaders studied did not resolve these paradoxes once and for all — instead learned to navigate them, employing strategies of acceptance, compromise, and innovation to keep progress moving forward without upsetting their institutions’ other commitments. The findings from these Malaysian universities tell us that sustainability tensions, added with a creative and resilient mindset, can transform seemingly intractable contradictions into manageable dualities.

This study offers several important contributions to both academic theory and institutional practice in the field of sustainability leadership. From a theoretical standpoint, the study extends paradox theory by applying it within the relatively underexplored context of higher education, particularly in a non-Western and multi-institutional setting. While most extant literature focuses on corporate organisations, our research demonstrates how paradoxes unfold in academic institutions characterised by unique governance models, competing missions, and diverse stakeholder expectations. The concept of systemic paradoxes is especially pertinent in universities, where macro-level policies, meso-level strategies, HRM systems, and micro-level behaviours are tightly interwoven. Our findings deepen Smith and Lewis’s (2011) dynamic equilibrium model by showing how paradoxes cascade and compound across levels, producing feedback loops that can either reinforce institutional inertia or, when managed well, stimulate innovation and engagement.

Practically, the study highlights the urgent need for multi-level alignment in sustainability management or navigation. Sustainability initiatives stall or remain symbolic because of misalignments between national policies, institutional strategies, HR practices, and individual incentives. Policymakers must consider how funding structures, performance audits, and regulatory mandates shape organisational behaviour in often contradictory ways. University administrators, meanwhile, must bridge top-down vision with bottom-up capacity — ensuring that sustainability commitments are resourced, rewarded, and routinised.

A key implication is the centrality of leadership development. Effective sustainability leadership requires more than technical knowledge—it demands emotional resilience, adaptive capacity, and political acuity. Training programmes should therefore include modules on paradox navigation, stakeholder management, and organisational change in complex settings. Institutions should also consider mentoring and peer learning models that allow sustainability champions to share strategies and support each other through the emotional demands of their roles. Furthermore, HRM systems must evolve to embed sustainability as a core performance domain rather than an ancillary interest. Current evaluation frameworks often marginalise sustainability work, discouraging staff from meaningful engagement. This study reveals the importance of embedding sustainability into promotion criteria, workload models, and professional development pathways. Institutions should audit their HR practices for misalignments and develop balanced scorecards or customised KPIs that reward long-term, integrative contributions. Finally, the study points to the value of cross-sectoral and cross-institutional learning. Public universities, despite bureaucratic limitations, often exhibit strong mission-driven values and community engagement traditions. Private universities, while facing market pressures, may have greater operational agility and entrepreneurial cultures. Collaboration across these institutional types could foster hybrid models that balance integrity with innovation. National platforms or consortia could play a vital role in facilitating such exchanges, sharing best practices and advocating collectively for enabling policy environments.

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Integrating Technology Acceptance Model and Task-Technology Fit Theory: Investigating Students' Intention to Use AI Chatbots in Public Universities

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Abstract: Technology has significantly enhanced access to education, enabling students to benefit from lower costs and higher productivity. This advancement has been further expedited by the incorporation of AI, especially through applications like AI chatbots. Despite these advancements, students in higher education- especially those enrolled in public universities in developing countries- often exhibit skepticism toward adopting AI chatbots for academic assistance. Thus, the main goal of this study is to find out how students in public universities in developing nations plan to use AI chatbots as teaching aids. The study will use a purposive sampling strategy to gather data from students at different public universities, with a focus on Malaysia. To construct a robust conceptual model that explains students' behavioral intentions toward AI chatbot usage, this research adopts an integrated framework combining the Technology Acceptance Model (TAM) and the Task–Technology Fit (TTF) theory. For data analysis, the study will use the PLS-SEM approach, a well-regarded regression technique suitable for examining complex relationships in structural models. The research's conclusions are anticipated to provide theoretical and practical insights. This study may theoretically add to the body of knowledge on AI chatbot adoption by illuminating the complex human behaviors linked to the adoption of new technologies. Practically, the findings may give governments, university administrators, and AI chatbot developers important information on how to work together to create AI chatbots that are more dependable, user-friendly, and attractive to students, especially in developing countries.

Keywords: *AI Chatbots, Task-Technology Fit, Technology Acceptance Model, Students' Intention, Public Universities*

1. Introduction and Background

With AI-based chatbots emerging as game-changers in higher education, the 21st century has brought about a surge of technological innovation (Saihi et al., 2024). Conversational agents, sometimes referred to as chatbots, are popular across a variety of industries. Intelligent conversational agents are reshaping teaching and learning by delivering real-time feedback, personalized support, and automation of routine administrative tasks (Yang & Chen, 2023). Prior studies similarly report gains in learning effectiveness when students can reflect instantly and obtain just-in-time help (Ng'ambi et al., 2016; Khan & Jawaid, 2020). Universities worldwide already operate such systems at scale: Georgia Tech's "Jill Watson" functions as a virtual teaching assistant (Mello et al., 2023); Deakin University's "Deakin Genie" keeps students organized and connected to services; and Staffordshire University's "Beacon" offers tailored guidance (Monserrat et al., 2022; Saihi et al., 2024). Taken together, these cases illustrate how chatbots can enrich the student experience while streamlining institutional workflows.

The broader push to embed emerging technologies in higher education has accelerated the uptake of AI tools (Ayanwale, 2024). Chatbots such as ChatGPT, Siri, and Alexa and academic platforms like Paperpal and Elicit are changing how students research, write, and collaborate (Ayanwale & Ndlovu, 2024), with reported improvements in accessibility, engagement, and teamwork (Bilquise et al., 2024). AI chatbots offer 24/7 assistance, removing conventional time and place constraints for students in need of help (Kamalov et al., 2023). Personalization further strengthens learning by adapting materials, feedback, and pathways to individual needs (Chang et al., 2023). Beyond pedagogy, these systems also assume administrative workloads by answering routine queries and maintaining course data, so staff can allocate more time to curriculum design and mentoring (Ahmad et al., 2022). AI chatbots are able to simulate real-world situations and promote active student participation through conversational design and natural language processing, hence promoting interactive learning (Belda-Medina & Calvo-Ferrer, 2022).

Despite the enormous potential for AI-based chatbots to revolutionize higher education, there are significant

obstacles to their acceptability and deployment (Hwang & Chang, 2023). Student perceptions hinge on trust in AI, perceived usefulness and ease of use, data-privacy assurances, and concerns about the potential dehumanization of education (Robayo-Pinzon et al., 2023). Skepticism remains a notable barrier: some learners question chatbot competence for high-stakes academic tasks (Araujo, 2018), and resistance can be reinforced by mechanical dialogue and limited socio-emotional sensitivity (Rapp et al., 2021). Where students doubt a system's ability, they are less inclined to use it fully (Adam et al., 2021). Even so, well-designed chatbots can foster interaction by making it easier to ask questions and sustain topic-focused discussion, thereby supporting more student-centered learning (Yildiz Durak & Onan, 2024).

However, AI-powered chatbots are still not widely used in higher education, especially in developing nations like Malaysia. Despite their growing potential, widespread integration is yet to be realized. Several studies have explored students' intention to adopt AI-chatbots from diverse theoretical and contextual perspectives. For instance, Yang & Chen (2023) examined the adoption intention of pre-service teachers by focusing on the perceived success and usefulness of AI chatbots. Students from different academic areas were compared in order to determine whether or not they intended to use chatbot technology (Stöhr et al., 2024). Saihi et al. (2024) explored AI-Chatbot adoption intentions among both students and educators, emphasizing the role of positive values in shaping user attitudes. The Innovation Diffusion Theory was used by Ayanwale & Ndlovu (2024) to examine the variables affecting college students' adoption of chatbots. Further, Sun et al. (2025) investigated students' intentions to use ChatGPT using the Stimulus-Organism-Response (S-O-R) paradigm. In a different approach, Bilquise et al. (2024) analyzed the functional, socio-emotional, and relational antecedents that influence students' willingness to adopt advising chatbots. Despite these important contributions, no research has yet examined students' intentions to use AI-supported chatbots by integrating the TAM and TTF theories. Therefore, the present study aims to address this gap by examining the following research questions.
Q1: To what extent does Task–Technology Fit influence Perceived Usefulness and Perceived Ease of Use?
Q2: To what extent do Perceived Usefulness and Perceived Ease of Use influence the Intention to Use an AI Chatbot?

Thus, this research may be very valuable from a managerial and theoretical standpoint. Theoretically, it may seek to advance the understanding of students' behavioral intention to adopt AI-supported chatbots by applying an integrated framework that may combine the TAM and TTF theories. By doing this, it may add to the expanding body of research on the adoption of AI chatbots and provide new information about the variables influencing students' use of this cutting-edge technology. From a management perspective, the results may offer useful recommendations for policymakers, AI chatbot developers, and institutions of higher learning. Specifically, the study may shed light on how to design and implement AI-powered chatbots that are more need-based, user-centric, and aligned with students' academic tasks. These insights may inform strategies for enhancing user experience, increasing adoption rates, and integrating chatbots more effectively into educational ecosystems. Therefore, the contributions of this study will be twofold: enriching theoretical knowledge and offering actionable implications for stakeholders aiming to optimize AI chatbot deployment in higher education.

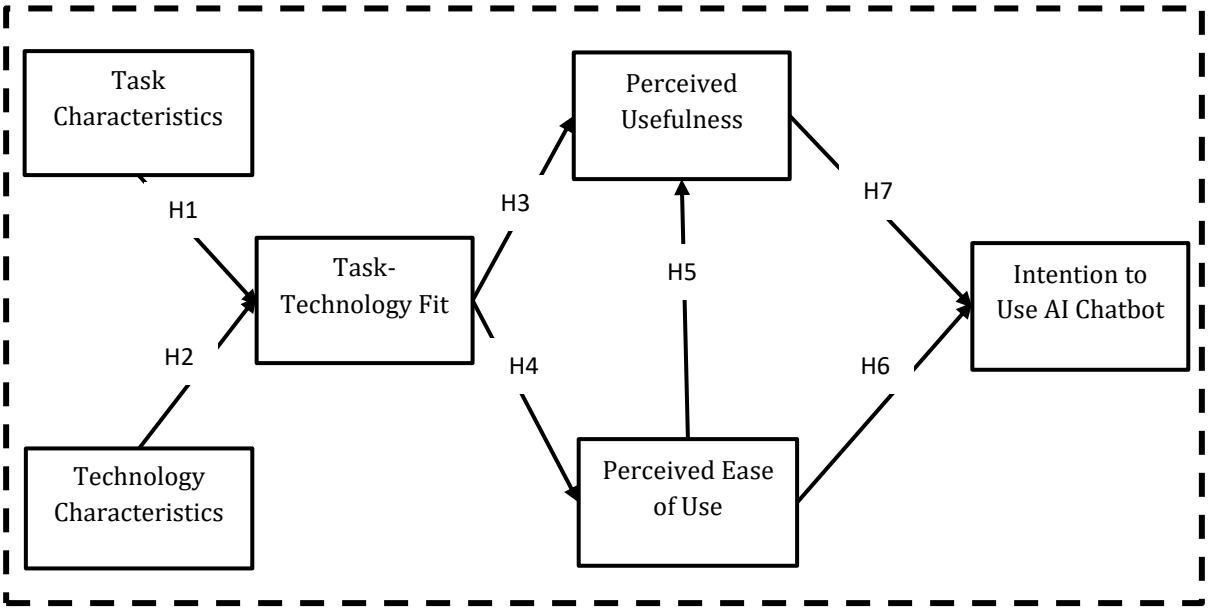
2. Literature Review

The Technology Acceptance Model (TAM) remains a mainstay for explaining and predicting consumer acceptance of information technology, which was originally developed by Davis in 1989. TAM posits that two beliefs, which are perceived usefulness (PU) and perceived ease of use (PEOU), shape users' intentions to adopt new systems, a relationship widely documented in the information systems literature (Bilquise et al., 2024). TAM has also been applied to AI chatbots, with studies reporting its value in modelling adoption intentions (Sánchez-Prieto et al., 2020; Gupta & Yadav, 2022). However, despite its strengths, TAM has been critiqued for its simplicity and limited scope. As Bagozzi (2007) argues, by focusing primarily on functional beliefs, TAM can understate the social, contextual, and affective complexities that accompany emerging technologies. To strengthen explanatory power, he recommends combining TAM with complementary theories. Following this logic, the present study integrates Task–Technology Fit (TTF) with TAM to develop a more comprehensive structural model (see Figure 1).

Introduced by Goodhue and Thompson (1995), TTF assesses the degree to which a technology's capabilities align with the demands of the tasks users must perform. When the fit is high, performance improves and

adoption becomes more likely (Wu & Chen, 2017). The model has proved useful for clarifying how information technology affects performance outcomes, for assessing the consequences of system use, and for articulating the interplay between task characteristics and technological functionality (Al-Mamary et al., 2024). Because task–technology fit is shaped jointly by task and technology attributes, it is expected to influence adoption behavior directly and indirectly. Prior work combining TAM and TTF supports this integrative approach, showing stronger explanations of new-technology adoption than either model alone (Wu & Chen, 2017).

Figure 1: Theoretical Framework



Task Characteristic (TC): The term task characteristics refers to the specific attributes and requirements of a task, such as its complexity, frequency, interdependence, and structure, that influence how the task should be performed (Lo Presti et al., 2021). These characteristics significantly impact TTF, which measures how well a technology supports task performance (Al-Emran, 2021; Al-Rahmi et al., 2023). According to TTF theory, task effectiveness and user satisfaction are enhanced when technological features are well-aligned with the task's demands (Koh et al., 2023). Research indicates that user performance and productivity improve when technology addresses elements like task complexity, interdependence, and information processing requirements (Dahri et al., 2024). In this context, if an AI chatbot aligns effectively with the needs of higher education students, such as offering assistance with writing or problem-solving, it is likely to be perceived as appropriate, thereby increasing the likelihood of its adoption and use. Al-Mamary et al. (2024) also found a strong association between the task characteristics of students and TTF. Therefore, this research can propose:
H1: Task characteristics impact Task-Technology Fit

Technology Characteristics (TEC): The qualities, functionalities, and capacities of a technology that define how well it can assist users in doing particular activities are referred to as its characteristics (Lo Presti et al., 2021). The usefulness of TECs in higher education is mostly dependent on factors like the AI chatbot's responsiveness, natural language processing skills, contextual awareness, personalization features, and user-friendly interface (Al-Rahmi et al., 2023). When these technological capabilities align with students' academic tasks—such as answering course-related queries, assisting with writing, offering feedback, or solving subject-specific problems- they create a strong TTF (Wang et al., 2021). This fit occurs because the AI chatbot is perceived as capable of meaningfully supporting students in their learning activities, thus fulfilling their task requirements efficiently (Koh et al., 2023). As a result, students are more likely to view the chatbot as a valuable educational tool, increasing both usage intention and actual performance outcomes. Almusawi & Durugbo (2024) found that the TEC of digital tools in education influences TTF by aligning with the specific needs of students. Therefore, this research can propose:
H2: Technology characteristics impact Task-Technology Fit

Task Technology Fit (TTF): TTF refers to the degree to which a technology's capabilities align with the specific requirements of a task, thereby enhancing both the effectiveness and frequency of its use in supporting task completion (Goodhue & Thompson, 1995). When an AI-powered chatbot demonstrates a high level of TTF, it efficiently supports students in carrying out academic tasks (Wang et al., 2021). These tasks may include answering complex questions, providing real-time feedback, assisting with academic writing, and offering step-by-step guidance in problem-solving processes (Al-Rahmi et al., 2023). The alignment between the chatbot's technological features and students' academic needs fosters a stronger perception of its usefulness and relevance in achieving learning goals more efficiently and effectively. As a result, students are more inclined to view the AI chatbot as a valuable academic tool—an outlook that resonates with the TAM core concept of perceived usefulness (Alturki & Aldraiweesh, 2022). Therefore, the closer the alignment between the technology and the academic tasks, the more beneficial the tool is perceived to be, increasing students' intention to adopt and consistently use the AI chatbot throughout their academic journey. This aligns with the findings of Alturki and Aldraiweesh (2022), who highlighted the relationship between TTF and perceived usefulness in the context of Google Meet adoption as an emerging educational technology.

In instances where a strong TTF is present, the functionalities of an AI chatbot are effectively aligned with the academic tasks that students are expected to perform, such as seeking detailed explanations, composing essays, or resolving subject-specific problems (Wang et al., 2021). This alignment facilitates seamless, intuitive, and efficient interactions between the students and the technology (Koh et al., 2023). Students are more likely to believe that the system is simple to use since the chatbot's capabilities are immediately incorporated into their academic workflows and reduce the cognitive and procedural effort needed to perform tasks (Lo Presti et al., 2021). The TAM states that one important aspect affecting the possibility of technology adoption is perceived ease of use (Lin, 2024). Therefore, when the AI chatbot integrates naturally within the educational environment and caters to students' academic needs with minimal complexity, it fosters greater confidence and comfort in its usage, ultimately reinforcing the perception that the tool is user-friendly and readily accessible (Al-Rahmi et al., 2023). Al-Emran (2021) found a significant relationship between TTF and perceived ease of use in the context of smartwatch adoption intention. Similarly, Alturki & Aldraiweesh (2022) also identified a relationship between TTF and perceived ease of use. Therefore, this research can propose:
H3: Task-Technology Fit impacts perceived usefulness
H4: Task-Technology Fit impacts perceived ease of use

Perceived Ease of Use (PEOU): The degree to which a person feels that using a certain technology involves little effort is known as PEOU (Lin, 2024). The PEOU of an AI-powered chatbot is crucial in determining how students view its value in the context of higher education (Pillai et al., 2024). Students are more likely to recognize the chatbot's usefulness in supporting academic assignments when they perceive it as user-friendly, intuitive, and able to provide pertinent and understandable answers with little effort (Al-Abdullatif, 2023). According to the TAM, user-friendly technologies efficiently eliminate cognitive and operational barriers, allowing users to focus on their academic goals instead of juggling complexity (Maheshwari, 2024). Consequently, students' perceptions of the AI chatbot's overall utility will be strengthened if they view it as both accessible and a helpful tool for finishing tasks, overcoming academic obstacles, and comprehending complex ideas. According to Myin & Watchravesringkan (2024), the PEOU of an AI chatbot effectively contributes to generating perceived usefulness among customers engaged in apparel shopping.

Students' intentions to use AI chatbots in higher education are also significantly influenced by PEOU (Rahman et al., 2025). Students are less likely to become frustrated or experience cognitive overload when they find the chatbot straightforward to use, which is typified by an intuitive user interface, clear instructions, and quick response times (Maheshwari, 2024). This ease of interaction fosters greater confidence and comfort, thereby reducing resistance to the technology and promoting increased engagement (Saihi et al. 2025). According to TAM, users' attitudes towards technology are positively impacted when a system is viewed as user-friendly, which in turn increases their intention to adopt and continue using it (Maheshwari, 2024). Consequently, the more user-friendly and accessible the AI chatbot appears, the more likely students are to integrate it into their academic routines as a reliable and efficient support tool. Ayanwale & Ndlovu (2024) uncovered in their study that PEOU influences Intention to Use AI Chatbot among the students in higher education. Moreover, Urbani et al. (2024) also observed a strong association between PEOU and the use intention of the AI chatbot. Therefore, this research can propose:

H5: Perceived ease of use impacts perceived usefulness
H6: Perceived ease of use impacts intention to use an AI chatbot

Perceived Usefulness (PU): The degree to which a person thinks that using a certain technology will improve their performance or make it easier to accomplish objectives is known as PU (Lin, 2024). PU is a key factor in determining students' intentions to use AI chatbots in higher education (Al-Abdullatif, 2023; Pillai et al., 2024). When students perceive that the chatbot effectively contributes to their academic success by improving assignment quality, providing timely academic support, or simplifying complex learning activities, they are more likely to adopt and consistently utilize the tool (Rahman et al., 2025). According to the TAM, when users perceive a technology as beneficial to their task performance, they are more likely to acquire a strong intention to adopt it (Lin, 2024). Consequently, the greater the perceived usefulness of the AI chatbot in meeting students' academic needs, the stronger their motivation becomes to incorporate it into their educational practices. In their study, Urbani et al. (2024) found a substantial correlation between the intention to adopt AI chatbots and PU. Moreover, Rahman et al. (2025) concluded that students' use intentions of AI chatbots in higher education are strongly influenced by their perceptions of the chatbots' usefulness. Therefore, this research can propose:
H7: Perceived usefulness impacts intention to use an AI chatbot

3. Research Methodology

Targeting students from Malaysian public universities, we will create a well-structured questionnaire based on Mikalef and Krogstie's (2020) recommendations to gather data for this study. Purposive sampling will be used to guarantee that the data gathered is highly representative. Despite being a non-probability technique, purposive sampling is frequently employed in research because of its capacity to filter questions and choose relevant respondents (Robinson, 2023). This approach will enable the study to identify and analyze the most relevant participants.

Students from different public universities in Malaysia will be the focus of the study, which aims to investigate their behavioral intention towards using AI chatbots. This is an area that has received less attention in prior research, especially when looking at developing nations. To reach these participants, the research team will utilize multiple online platforms, including social media, WhatsApp, and email. The questionnaire will be developed using Google Forms. Respondents will be free to leave the survey at any moment while filling out the questionnaire, and participation will be completely voluntary.

The process will be conducted in two separate stages to guarantee the correctness and dependability of the data collection process. In the first round, a group of students from a reputable university in Penang, Malaysia, as well as two academics from the Business School with expertise in technology management, will review the questionnaire. Their feedback will be used to refine the questionnaire, ensuring that the wording is clear, relevant, and easily understood by the target respondents. Any necessary revisions will be made based on their suggestions to enhance the overall quality and comprehensibility of the instrument. Once the clarity and validity of the questionnaire are confirmed, the final version will be prepared using Google Forms and distributed to students enrolled in various public universities across Malaysia. The G*Power statistical program was used to calculate the minimal sample size needed for the investigation. The results indicated that a minimum of 68 responses is necessary to conduct the planned analysis effectively. However, the study intends to gather a larger sample size than is necessary in order to increase the robustness and generalizability. For the measurement scales, this study will employ a 7-point Likert scale to assess the dependent variable, while a 5-point Likert scale will be used to collect data for the independent variables. This scaling approach is chosen to enhance the granularity and reliability of the participants' responses.

This study will include two screening (filtering) questions at the start of the questionnaire to guarantee the selection of suitable participants. Participants who meet the criteria based on these questions will be considered suitable for inclusion in the study. The first screening question will ask: "Are you currently studying at a public university?" Only participants who respond "Yes" will be allowed to proceed to the next stage of the survey. The second screening question will ask: "Have you used an AI-supported chatbot to assist in your studies?" Participants who respond "No" will be permitted to complete the full questionnaire. These filtering questions are designed to ensure that all respondents are students from public universities who have not

previously used AI-supported chatbots for academic assistance. By applying this screening mechanism, the research team aims to maintain the focus on the intended target group and ensure the collection of relevant, high-quality data for meaningful analysis.

Moreover, to improve the contextual understanding and dependability of the data gathered, this study will incorporate five demographic questions designed to gather background information from respondents. These demographic questions will cover Gender, Age, University Name, Education Level, and Monthly Family Income. Gathering this information will help outline the socioeconomic and educational characteristics of the student participants, providing a meaningful backdrop for interpreting the study's findings and facilitating deeper insights into potential variations in responses across different demographic groups.

In developing the questionnaire to measure both endogenous and exogenous variables, this study will adapt established items from previous scholarly works. Specifically, to assess Task Characteristics, three items will be adapted from Lu & Yang (2014). Similarly, to evaluate Technology Characteristics, three items will be drawn from the work of Rahi et al. (2020). To measure TTF, four items will be modified based on the instrument used by Wu & Chen (2017). Furthermore, to examine Perceived Usefulness and Perceived Ease of Use, four items for each construct will be adapted from Sun et al. (2025). Lastly, the construct of Intention to Use AI Chatbots will be evaluated using three items adapted from Chanda et al. (2025).

Since this research will utilize a single-source data collection method, there is a potential risk of common method variance (CMV), which could introduce bias into the results. To address this concern, the Variance Inflation Factor (VIF) test will be employed, as recommended by Kock (2015), to assess whether CMV is present in the collected data. To analyze the data and test the hypothesized relationships, this study will utilize PLS-SEM. PLS-SEM has a number of benefits over CB-SEM, especially when used in exploratory research settings. It works especially well with small sample sizes, complex models combining emerging or underdeveloped ideas, and non-normally distributed data (Hair et al., 2022). The study will first evaluate the validity and reliability of the data gathered using PLS-SEM to make sure it is appropriate for hypothesis testing. Key indicators such as factor loadings, Cronbach's Alpha (CA), Composite Reliability (CR), and Average Variance Extracted (AVE) will serve as the foundation for this assessment. To be considered reliable and valid, these values must meet or exceed the established thresholds of 0.5 for factor loadings, 0.7 for CA, 0.7 for CR, and 0.5 for AVE, as outlined by Hair et al. (2017). If these criteria are met, the study will proceed to test the hypothesized relationships.

Moreover, the HTMT criterion, which compares each construct to all others to see how much overlap exists between them, will be used in this study to evaluate discriminant validity. Henseler et al. (2015) state that when all HTMT values fall below the 0.90 criterion, demonstrating that the constructs are empirically different from one another, discriminant validity is deemed acceptable. Finally, the PLS-Predict technique will be used in this study to assess the research model's prediction accuracy within the PLS-SEM framework. PLS-Predict is especially well-suited for producing individual-level predictions at the item and construct levels, as described by Shmueli et al. (2019). To thoroughly verify the model's prediction ability, the methodology combines a 10-fold cross-validation approach with the PLS-Predict assessment procedure. It is especially effective when applied to datasets with sample sizes exceeding 200. The analysis will follow the guidelines and procedures recommended by Shmueli et al. (2019) to ensure methodological rigor and accuracy.

4. Implications of the Study

Based on the findings of this study, there are likely to be both theoretical and managerial implications that may offer valuable insights for stakeholders and future researchers alike. From a theoretical perspective, this study investigates the adoption behavior of AI-supported technologies, specifically chatbots, among public university students for academic assistance in developing countries, an area that has been largely overlooked in prior research. Consequently, the findings are expected to enrich the existing literature on AI-chatbot adoption by introducing fresh perspectives and empirical evidence. Furthermore, this study proposes a research model that integrates the TAM and TTF theory, a combination that has rarely been applied in earlier studies focused on AI-chatbot adoption in the context of higher education. This integrative approach not only addresses theoretical gaps but also offers a robust framework for understanding the unique adoption patterns of university students. Therefore, the theoretical contribution of this study is poised to be notably significant,

laying the groundwork for future investigations in this domain.

On the practical side, this study is expected to yield several valuable implications. Based on the findings, university authorities may gain a clearer understanding of why students tend to overlook or underutilize AI chatbots for academic assistance. This insight may help institutions refine their strategies and improve the integration of AI chatbot support in ways that better align with student needs and preferences. In addition, the results of this study may be beneficial for AI chatbot developers by highlighting potential shortcomings in existing systems. These insights may guide the enhancement of future chatbot features, ensuring they are more tailored and effective for educational settings. Lastly, policymakers may also benefit from this study by gaining a deeper understanding of how policy frameworks can support stakeholders involved in the development and implementation of AI chatbots in higher education. By aligning policy support with the needs of both developers and educational institutions, the efficiency and effectiveness of AI chatbot systems can be significantly improved. As a result, this collaborative and evidence-driven approach may have the potential to maximize the impact of AI chatbot technologies in delivering meaningful academic support to university students.

5. Conclusion

In an era where AI is increasingly integrated into educational support systems, AI-powered chatbots have emerged as vital components of digital transformation in higher education. These intelligent systems simulate human-like interactions and are designed to assist students, faculty, and administrative staff by delivering timely, personalized, and automated support across a wide array of academic and administrative functions. In educational contexts, AI chatbots are commonly used to facilitate academic advising, respond to frequently asked questions, guide students through enrollment processes, provide information on course schedules, and even support learning by offering explanations, reminders, and feedback. Even with these encouraging uses, students frequently have doubts about AI chatbots' efficacy, especially when it comes to offering individualized, need-based assistance.

Concerns about the usefulness, ease of use, and overall relevance of such technology contribute to a relatively low adoption rate, especially in developing countries like Malaysia. This is particularly evident among students in public universities, where digital transformation may progress at a slower pace due to infrastructural and contextual limitations. Therefore, the purpose of this study is to look at what factors influence public university students' intentions to use AI chatbots. Data will be gathered from students at several public universities in Malaysia using a purposive sampling technique. PLS-SEM, a commonly used quantitative method in social science research that works particularly well for exploratory investigations involving complicated models, will be used to examine the data that will be gathered in this study. The study may suggest theoretical and managerial implications in light of the findings of this study. The results are expected to offer valuable insights to both stakeholders and researchers. For stakeholders, the results may be useful in determining how to improve student interaction with chatbots that are powered by AI in classrooms. For researchers, the study may provide a deeper understanding of students' behavioral intentions regarding the adoption of emerging technologies in academic support systems.

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Appendix

Measurement items

Constructs	Items	Questions	Sources
Task Characteristics	TC1	I often have to solve problems I come across while studying.	Lu & Yang (2014)
	TC2	I frequently need to gather information to support problem-solving in various courses throughout my studies.	
	TC3	I often ask for advice when dealing with problems in my courses.	
Technology Characteristics	TEC1	The AI chatbot offers prompt and efficient service.	Rahi et al. (2020)
	TEC2	The AI chatbot offers me support anytime and anywhere.	
	TEC3	The AI chatbot ensures the delivery of secure services.	
Task-Technology Fit	TTF1	AI chatbots are well-suited for my learning needs.	Wu & Chen (2017)
	TTF2	AI chatbots fit well with my educational practice.	
	TTF3	It is straightforward to identify the appropriate tool to use in AI chatbots.	
	TTF4	AI chatbots are highly effective in assisting me with completing my courses.	
Perceived Usefulness	PU1	AI-Chatbot significantly enhances the learning experience of students.	Sun et al. (2025)
	PU2	AI-Chatbot helps save time when looking up educational information.	
	PU3	AI-Chatbot gives students more ways to engage with their learning content.	
	PU4	Overall, AI-Chatbot makes it easier for students to get educational support.	
Perceived Ease of Use	PEOU1	AI-Chatbot facilitates easy access to information pertinent to educational tasks.	Sun et al. (2025)
	PEOU2	AI-Chatbot streamlines the decision-making process concerning educational activities.	
	PEOU3	Using an AI chatbot for educational inquiries demands little cognitive effort.	
	PEOU4	Overall, AI-Chatbot makes it easy for students to connect with educational resources.	
Intention to Use AI Chatbot	ITUAIC1	I intend to use the AI-supported chatbot to assist me with my coursework.	Chanda et al. (2025)
	ITUAIC2	I intend to recommend the use of the AI chatbot to others for academic support.	
	ITUAIC3	I intend to utilize the AI-supported chatbot to address issues related to my academic inquiries.	

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Navigating Borderline Personality Disorder (BPD) and addiction to Online Impulse Purchases – A Malaysian Take

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Abstract: Mental illness has been posited as one of the leading factors of online impulse purchases. The impact of impulse purchases caused by borderline personality disorder (BPD) is not clearly established in Malaysia, although Malaysia has among the highest spending consumers in the region, with mental illness increasing steadily in the community. The importance of identifying the effect of BPD on impulse buying is important because there is a need for intervention to eliminate the negative impact impulse buying has on finances, relationships, hoarding problems, wastage, and mental health in a person with BPD. The objective of this conceptual paper is to investigate existing literature on the level of impulse purchases of Malaysian consumers and their relation to mental illness, specifically borderline personality disorder (BPD), and propose a framework to depict the relations of selected factors. Stimulus-Organism-Response (SOR) Theory is adopted as the underpinning theory for the conceptual framework. The stimulus element is online shopping usage, the organism element is BPD, and the response element is impulse buying. The lack of research in Malaysia, despite the dire consequences of impulse buying by a person with BPD, points out that future empirical study is needed with progression to the development of intervention and prevention policies. Finally, the success factors for implementing the proposed framework and some thoughts on future research directions have been discussed.

Keywords: *Online purchases, borderline personality disorder, impulse buying, SOR Theory*

1. Introduction and Background

Although it is through necessities that we as consumers undergo purchases, there comes a time when this act becomes a disservice. As a aftermath of the COVID-19 lockdown, along with increasingly reliable telecommunication infrastructure, consumers have gained the ability to search for products online through various platforms easily and are able to buy goods directly from their gadgets at the click of a button. The effect of this convenience, although in general seems like a good idea, is unfortunately detrimental to some individuals due to unnecessary purchases, poor decision-making, and ill reasons. Repeated purchases could lead to economic and psychological issues when misappropriation happens (Billieux, Rochat, My Lien Rebetz, & Van der Linden, 2008). A term coined for this behaviour is compulsive buying, considered a type of behavioural addiction (Griffiths, 2005).

Advertising, easy finance facilities, and e-commerce are named as some factors inducing purchases of unneeded items (Roberts, 1998), a phenomenon in industrialized countries marked by obsessive consumption (Weinstein et al., 2016). Since the past decade, researchers have pointed out that compulsive buying is detrimental to finance and quality of life in the long run (Billieux et al., 2008; Lawrence et al., 2014; Roberts, 1998; Zander et al., 2016). Furthermore, studies have linked compulsive buying and impulse buying as a similar addictive behaviour that has comorbidity with other personality disorders (Billieux et al., 2008) and among those that have a huge impact is borderline personality disorder (Maraz et al., 2016).

Borderline personality disorder is a condition where an individual has problems with self-image, instability in affect regulation, impulse control, and interpersonal relationships (Hooley & Masland, 2016). It is a serious illness that has dire consequences, including a high suicide rate. It is common for borderline personality disorder patients to attempt to regulate their self via abnormal means to self-soothe, which includes impulsive buying (Melca et al., 2015). Combining both borderline personality disorder and impulsive buying with the current technology in hand, i.e., online purchase platform, is bound to result in disastrous outcomes to be bear by the individual and society from an economic and mental point of view.

Malaysia's online purchasers have steadily risen, with evidence to back the scenario. By the end of 2023, Malaysia's e-commerce sector is projected to generate RM 8.75 billion, reflecting an annual increase of

approximately 10%. Looking ahead, the market is expected to expand at a compound annual growth rate (CAGR) of 13.26%, reaching around RM14.40 billion by 2027. Simultaneously, the number of online shoppers in Malaysia rose by 8.3% year-over-year, with roughly 15.63 million Malaysians purchasing consumer goods online in early 2023 In 2022, total eCommerce spending was estimated at RM 9.08 billion, distributed across several categories; fashion (RM 2.73 billion), electronics (RM 2.83 billion), toys & hobbies (RM 1.11 billion), personal care (RM 1.08 billion), and food & beverages (RM202 million) (Factory, 2023) It is important to know from this significant growth in online shoppers, there are hidden issues that would show its impact in the society before long. Hence, this conceptual paper suggests plans to fill the gap by discovering the situation in Malaysia by examining the mental health of online purchasers, borderline personality disorder that is prevalent here, and the effect these factors have on online purchasers.

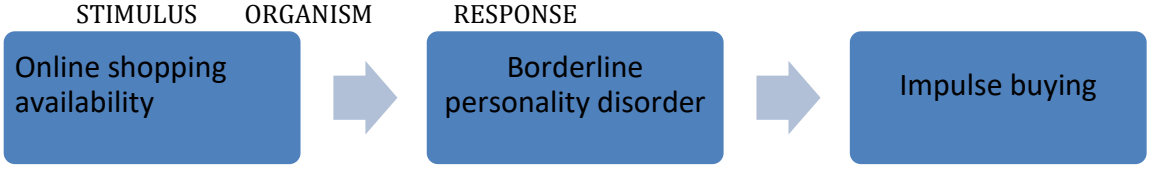
2. Literature Review

S-O-R Model

The underpinning theory for this conceptual paper is the S-O-R (Stimulus – organism – response) model. The realistic S-O-R (Stimulus-Organism-Response) model illustrates that human reactions and behaviours are influenced by stimuli through an internal organismic component (Buxbaum, 2016). The stimulus agent in this study is the online shopping availability to the buyers, the organismic component includes both biological elements—such as sensory organs, the nervous system, and muscles—and psychological aspects. Psychological functioning is understood through scientific concepts like perception, learning, emotion, motivation, and cognition. A broader framework is the idea of mental activity, which can be divided into mental states (like emotions, mental images, and thoughts) and mental processes (such as reasoning, reflection, or self-questioning), all shaped by factors like stimuli, motivation, prior experience, and knowledge.

The following Figure 1 visually depicts the adaptation of the S-O-R model for borderline personality disorder impulse buying in the online shopping environment.

Figure 1: A conceptual S-O-R model for Borderline personality disorder impulse buying in online shops.



Perception and mental activity, grounded in neural system functions, are essential to self-regulation during interactions with people, animals, machines, or objects. Self-regulation involves aligning one's current state (including external stimuli and internal mental states) with a desired or required state. This target state is driven by a dominant motive—whether it's a basic value, need, obligation, duty, or interest (Buxbaum, 2016). From the response perspective of the S-O-R model, pathological buying (PB) involves an unhealthy fixation on purchasing and shopping, leading to repeated acquisition of consumer goods as a way to alleviate stress or negative emotions—such as anxiety, depression, tension, or boredom—and to temporarily boost low self-esteem (Zander et al., 2016).

Impulse Buying

Earlier studies have consistently emphasized the significant role of impulsivity in pathological buying. Impulsivity is viewed as a complex trait that involves acting hastily without weighing future outcomes (Barratt, 1985; Cyders & Smith, 2008), a tendency to seek new and exciting experiences (Cloninger, 1994), and a strong approach response driven by heightened sensitivity to rewards (Gray, 1970). In this conceptual paper, pathological buying is interchanged with impulsive buying driven by the internal condition of the buyer as borderline personality disorder, stimulated by the online purchase availability, thus committing to impulse buying detrimentally. Hence, this conceptual paper posits that impulse buying exists among online shoppers in Malaysia.

P1: Some Malaysian online users have impulse buying issues

The next discussion is on the organism element of the S-O-R model.

Borderline personality disorder

Individuals with impulse buying will often purchase items that they do not need or cannot afford (Zander et al., 2016). When the items purchased are not bought out of necessity, the products are finally left unused or thrown away. The act of buying is the ultimate goal for a borderline personality disorder individual, mostly because they simply are not able to control their own urges and actions (Zander et al., 2016). The Diagnostic and Statistical Manual of Mental Disorders (DSM) IV outlines the nine criteria for borderline personality disorder, as defined in the International Classification of Diseases, 10th Revision, which is classified as a subtype of emotionally unstable personality disorder (Hooley & Masland, 2016). The criteria agreed for borderline personality disorder symptoms suggested are affective disturbance, disturbed cognition, impulsivity, and intense, unstable relationships (Hooley & Masland, 2016). Impulsive buying is inferred as repetitive, irresistible, and overpowering urges to purchase goods that are frequently useless and/or unused items. Furthermore, impulsive buying regularly results in substantial debts, legal problems, personal distress, and marital conflict (Weinstein et al., 2016).

Common among individuals receiving treatment, one study of a community-based sample of children and adolescents found that borderline personality disorder had a prevalence of 11% between the ages of 9 and 19, and 7.8% between the ages of 11 and 21. The disorder appeared more frequently in girls than in boys. However, it's unclear whether borderline personality disorder is more prevalent in children than in adults, as a study used a less-than-ideal method for assessing symptoms (Hooley & Masland, 2016). Due to the impact that borderline personality disorder can bring upon someone's life and others around them, the extent to how much this mental health issue affects Malaysian online purchasers is worth investigating.

To date, research into the prevalence of borderline personality disorder and other personality disorders within Malaysia remains very limited. Malaysia, a multicultural nation in Southeast Asia and a former British colony, has a population of around 32.7 million, with approximately 70% Malay Muslims, 22.6% Chinese, and 6.8% Indian (DoS, 2020). A convenience-sampling study at a tertiary general hospital found that 14% of individuals hospitalized due to deliberate self-harm met the criteria for borderline personality disorder (Hamidin, 2008). In a separate study at a drug rehabilitation center, borderline personality disorder was identified as a common psychiatric comorbidity, affecting 2.9% of female inmates (Varma et al., 1998). This proposed study on borderline personality disorder would contribute to understanding the level of impact the disorder has on commerce, society, and individuals in Malaysia as a start. Hence, the second proposition is as follows:

P2: Some impulse buyers among online shoppers in Malaysia have Borderline personality disorder (BPD).

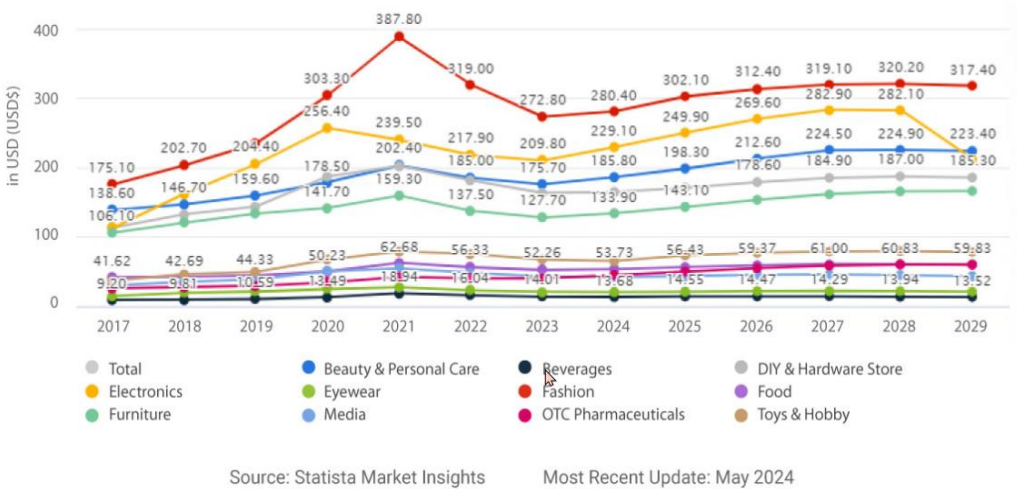
Online shopping availability

As mentioned above, Malaysia's eCommerce sector is projected to generate RM 8.75 billion, reflecting an annual increase of approximately 10% (Factory, 2023). Additionally, as shown in Figure 2, according to Statista Market Insights, there will be a steady increase in online shopping total, markedly starting from the year 2021 to 2029 across major industries such as OTC Pharmaceuticals, electronics, personal and beauty care, and others, as reported in the Corp Global article (Narainasamy, 2024). This scenario is fuelled by the high internet penetration of 80% of Malaysian's population and diverse services by online shopping platforms such as Shopee, Lazada, Mudah, Carousell, Zalora, and many more (Narainasamy, 2024). The ease, convenience, abundance, and availability of shopping options at the fingertips are the main contributors to the immense increment of online purchasers.

The indiscriminate availability of shopping choices to all users, including people with personality disorders, is bound to induce repercussions eventually (Lu et al., 2017; Zadra et al., 2016). As reported in previous research, there are relations between online purchases and personality disorders such as BPD, internet addiction, and compulsive buying disorders (Zander et al., 2016; Maraz et al., 2016). Hence, by way of the underpinning theory adopted, the third proposition is formed, representing the conceptual framework.

P3: The availability of online shopping detrimentally stimulates a person with BPD and causes impulse buying

Figure 2: The Rise of E-commerce in Malaysia



Note. The data is from E-commerce in Malaysia: Trends and Phenomenal Growth 2024 by In.Corp Global (M) Sdn. Bhd, 2024, (https://malaysia.incorp.asia/blogs/future-of-e-commerce-in-malaysia/). Copyright 2024 by In.Corp Global (M) Sdn. Bhd.

The three propositions suggested above are derived from previous studies with different parameters and factors from different populations. Table 1 below is a summary of selected literature on borderline personality disorder and impulse buying related to this paper's area of discussion.

Table 1: Summary of selected literature

Research title	Authors	Variables	Methodology & Findings	Limitations
1. Online purchases among consumers during the COVID-19 pandemic in Malaysia	Raman, A. (2024)	Attitude, Perceived Benefits & Intention, Self-Isolation Intention, Consumer Behavior	-Quantitative survey - a combination of online purposive sampling techniques and a combination of probability and non-probability sampling methods - 201 complete and accurate responses, Malaysia. - web-based questionnaire - online shopping behavior includes perceived benefits like cost savings, time efficiency, and access to information	Did not concentrate on a certain disorder
2. Relationship between borderline personality symptoms and Internet addiction: The mediating effects of mental health problems	Lu, Wei-hsin Lee, Kun-hua Ko, Chih-hung Hsiao, R A Y C Hu, Huei-fan Yen,	Borderline personality symptoms, Internet addiction, Mental health problems	- advertisement posted on websites targeting college students aged from 20 to 30 years, 500 respondents - interpersonal sensitivity, depression, anxiety, and hostility - four mental health problem indicators are highly interactive	All participants were college students, and the findings in this study might not be generalizable to other populations. Rating scales in this study are self-administered; hence, the validity may be less than structured,

	Cheng-fang, 2017			interview-based assessments.
3. The association between Internet addiction and personality disorders in a general population-based	Zadra, S., Bischof, G., Besser, B., Bischof, A., Meyer, C., John, U., & Rumpf, H. J. (2016)	Internet addiction (IA), self-esteem, high impulsiveness, and ADHD	-German general population-based sample - 15,023 participants - Individuals with IA have more often personality disorders than individuals without IA - IA is showing more often borderline personality disorder	Some socio-demographic inequalities The whole sample consisted of individuals showing a problematic extent of Internet usage.
4. Impulsive Behaviors in Patients with Pathological Buying	Zander, Heike Claes, Laurence Voth, Eva M. De Zwaan, Martina Müller, Astrid (2016)	pathological buying (PB), impulsive behaviors,	-Compulsive Buying Scale -Impulse control disorder (ICD) - Symptoms of borderline personality disorder, self-harming behaviors, binge eating, and symptoms of attention deficit and hyperactivity disorder (ADHD) More impulsive behaviors in patients with and without PB compared to healthy controls	Interview-based findings were restricted by the lack of rater blindness and the absence of information on inter-rater reliability. The sample sizes of the three groups were relatively small.
5. Borderline personality disorder and compulsive buying: A multivariate etiological model	Maraz, Aniko Urbán, Róbert Demetrovics, Zsolt (2016)	Compulsive buying disorder (CBD) borderline personality disorder (BPD)	-Shopping mall customers - N = 1409 - self-esteem and impulsivity strongest mediating effects	Self-selected and self-reported nature of the Hungarian-only data Should consider using clinical interviews

Five main studies conducted in different settings shared their findings of how mental disorders negatively impact online shoppers that resulting in pathological or impulse buying (Raman, 2024; Lu et al., 2017; Zadra et al., 2016; Zander et al., 2016; Maraz & Demetrovics, 2016). Multiple instruments were used to measure the level of impulse buying severity and also mental disorders of the respondents, which included Impulsive Behavior Scale (Billieux et al., 2008) and self-report instruments to evaluate OCD symptom profiles (Florida Obsessive–Compulsive Inventory) (Storch et al., 2007), and the degree of impulsiveness (Barratt Impulsiveness Scale) (Patton et al., 1995).

As proposed, individuals who have access to online shops and have borderline personality disorder are prone to impulsively purchase things that are unnecessary, wasteful, and neglected. There is a need to explore Malaysia's predicament in this area since evidence points to high purchases made online here and increasing mental health issues in society. This conceptual paper is a beginning to consider awareness or intervening programs to curb the impact of impulse buying.

3. Research Methodology

For future research, the main agreement from previous articles is to empirically test mental disorders and impulse buying to be carried out in alternative scenarios. This conceptual paper suggests elaborating the objective of this article, which is to propose an adaptation model to explore the role of BPD on impulsive buying

of online shoppers in Malaysia using the S-O-R (Stimulus – organism – response) model, and proposes three propositions for future empirical research. According to Raman (2024), a quantitative survey via online method is aligned with the profile of the targeted respondents. A combination of online purposive sampling techniques and a combination of probability and non-probability sampling methods is found to be a suitable sampling method for an unknown sample size and total sample population.

The construct for this survey will be adapted from previous studies, Impulsive Behavior Scale (Billieux et al., 2008), OCD symptom profiles (Florida Obsessive–Compulsive Inventory) (Storch et al., 2007), and degree of impulsiveness (Barratt Impulsiveness Scale) (Patton et al., 1995). Diagnostic and Statistical Manual of Mental Disorders (DSM) IV, the nine criteria for borderline personality disorder as defined in the International Classification of Diseases, 10th Revision, are classified as a subtype of emotionally unstable personality disorder (Hooley & Masland, 2016).

4. Conclusion

This paper reviews past studies on pathological buying and borderline personality disorder, with the intention of preparing for the next research phase. Other researches were conducted in different settings and population samples, and this proposed study plans to explore Malaysia's context of the online purchasers. Due to the enormous impact of impulse buying has on finance, livelihood, and wastage, this proposal could provide evidence for authorities to initiate programs for mental awareness and prevention schemes to be rolled out. It is imperative to understand to what extent these factors impact the online shoppers in Malaysia and can be a guide to clinical practitioners to handle the negative consequences of uncontrolled purchases by vulnerable individuals.

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Integrating ESG and Shariah Frameworks for Enhanced Equity Market Returns

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Abstract: Most of the existing studies primarily focus on the impact of ESG and Shariah-compliant on the financial performance instead of the share price performance. The objective of this study is to investigate the share performance of ESG (Environmental, Social, and Governance) and Shariah-compliant stocks in the Malaysian equity market, which is benchmarked against the FBMKLCI from the period of 2019 to 2023. It evaluates the ability of the stocks to surpass the benchmark and outperform the FBMKLCI by 5% and 10% respectively. This study examines the share price performance which leverages the Stata software to identify p-values (<0.1) as indicators of marginal statistical significance. The results demonstrated a mixed performance for ESG-rated stocks, with social and governance variables emerging as a more consistent driver of outperformance compared to environmental dimensions. Even though the ESG and Shariah-compliant combination demonstrated a mixed set of results in the outperformance of the stocks, it has provided some evidence that the integration of ESG and Shariah-compliant stocks may enhance the equity market returns. It promotes the alignment of ESG and Shariah-compliant stocks to institutional investors, policymakers, and retailers who strive to achieve better equity market performance. This research underscores the pivotal role of integrating ESG and Shariah-compliant frameworks in driving share price performance while ensuring that ethical standards are taken into consideration.

Keywords: *ESG, Shariah, sustainability, equity, investing.*

1. Introduction and Background

In the past few years, there has been a growing emphasis on sustainability and ethical investing that has reshaped the way equity investing is conducted. The Environmental, Social, and Governance (ESG) and Shariah-compliant investing have gained traction among investors around the world, especially among institutional investors. Both ESG and Shariah-compliant investments share a common ground that promotes sustainability and ethical investing, which attracts investors who believe in social responsibility in the selection of stocks.

In terms of ESG ranking, Malaysia is still in its infancy stage, in which some listed companies still do not have ESG scoring. Nevertheless, the ESG issue is gaining prominence in Malaysia and more listed companies have been complying with ESG scores to increase their visibility and compliance. In fact, the Bursa Malaysia has recently launched the ESG Advisory in July 2022, which intends to help small and medium-sized publicly listed companies improve their ESG disclosure by leveraging internationally recognized standards and best practices (Bursa Malaysia rolls out ESG Advisory Services, 2023). However, the mere encouragement to include ESG in the investment portfolio may not be so enticing if the adoption of ESG would lead to a lower equity portfolio return. Hence, the objective of this research is to prove that the investment in higher ESG-rated stocks would eventually lead to higher equity performance for listed companies.

In terms of ESG issues, there is also a lack of studies done on the influence of ESG scoring on the Malaysian equity market. The majority of ESG studies are usually confined to developed markets, which do not specifically focus on the Malaysian equity market. This research, which focuses on the Malaysian equity market, studies the impact of individual ESG ratings on the share price performance of Malaysian stocks over a period of 5 years (2019 to 2023). The Malaysian equity market is chosen as it is an emerging market that has been emphasizing ESG practices and is also a global hub for Islamic finance and investment. Malaysia also fits the criteria for a country that has both elements of ESG ratings and Syariah-compliant stocks.

Despite Malaysia being included in the ESG research done by Kilic et al. (2022), Malaysia was merely one of the 19 developing countries being researched. In addition, Kilic et al. (2022) analysis did not include the ESG rating

of individual listed companies. In analyzing the Malaysian stock market, Kilic et al. (2022) merely use a single MSCI ESG global index to represent the listed companies in Malaysia, which may not be a good representation of whether ESG impacts the Malaysian equity market. As such, it basically assumes that all listed companies in Malaysia only have a single ESG rating that will influence the Malaysian stock market, which could be oversimplistic. Therefore, it is important to study the ESG ratings of individual companies to determine if ESG ratings affect the share price performance of Malaysian stocks.

It would be intriguing to examine emerging markets like Malaysia, since the effect of ESG on listed companies may differ between developed and emerging nations. In the findings by Naeem et al. (2022), the impact of ESG on the financial performance is higher in developed countries compared to emerging countries. The study concluded that the financial value or profitability based on ESG from emerging companies remains insignificant. A similar study was also conducted by Chen et al. (2023), which explored how ESG leads to better financial performance for companies.

This study is slightly different as it analyzed the impact of ESG ratings on the share price performance. Since Malaysia is considered an emerging country, it would be interesting to explore if the ESG ratings would have a significant relationship with the share price performance instead of financial performance which is similar to the study by Naeem et al. (2022) and Chen et al. (2023). As investors of listed companies are more likely to be interested in the impact of ESG on the share price rather than financial performance, this research would be more impactful to investors of publicly listed companies.

Aydogmus et al. (2022) conducted a similar study, whereby the findings suggested that the overall ESG score has a significant association with the firm value. Aydogmus et al. (2022) also segregated the individual scores for environment, social, and governance. It was based on 5000 publicly listed firms in the world from the Bloomberg database. However, the analysis was too broad-based between different countries and it did not focus on any specific country. Based on the findings, only the individual social and governance segment has a positive and significant relationship with the firms' profitability, while the environment aspect does not seem to have an impact on the firms' profitability. Since this research also segregates the ESG scores of environmental, social, and governance with the focus on the share price performance instead of profitability, it may be more relevant to investors of publicly listed companies.

While many studies have already been conducted to analyze the impact of ESG ratings in more developed countries, there has been limited research on the impact of ESG ratings on emerging markets like Malaysia. As such, this study could be an extension of the research conducted by Ruhani & Mat Junoh (2023), which examines the variables that would affect the Malaysian stock market. While Ruhani & Mat Junoh (2023), which focused mainly on fundamental and technical analyses, is comprehensive, more variables like ESG and Shariah-compliant stock could be incorporated as further research to enhance the analysis.

For a more comprehensive framework, the Shariah element is also included in the study. As this research would be separating the conventional stocks from the Shariah-compliant stocks, it may provide a more in-depth analysis of ESG through the inclusion of Shariah-compliant stocks.

The objective of this research is to examine the intersection of ESG and Shariah-related stocks and whether the inclusion of higher-rated ESG-rated stocks and Shariah stocks would lead to the enhancement of share price performance. This allows a more comprehensive analysis of the synergies between ESG and Shariah-compliant investing and its impact on the share price performance. It would be a balance between ethical investing and outperformance of the portfolio performance which may highlight the importance of a combined approach.

2. Literature Review

Even though an investigation into the effects of ESG on Malaysian companies was conducted by Mohammad & Wasiuzzaman (2021), it was primarily limited to the financial performance of the companies. It was found that the increase in ESG disclosure would boost the financial performance of the companies. However, the impact of ESG on stock price performance was not included in the study. By incorporating the effects of ESG ratings on the share price performance in the Malaysian stock market, this study would be an expansion on the study

conducted by Mohammad & Wasiuzzaman (2021).

So far, there have been limited research papers that explore the significance of ESG ratings on stock returns solely based on Malaysian listed companies. Previous research on similar topics was conducted in other nations, but not in Malaysia. Feng et al. (2022) have done a similar study to investigate the relationship between ESG ratings and stock price crashes. Based on the study conducted by Feng et al. (2022), higher ESG ratings are less likely to result in a stock price crash in China. Similarly, Qian et al. (2024) research has exhibited that a high green commitment index, which is related to ESG, tends to achieve higher stock returns without additional risks. It is consistent with Huang et. al (2024) research in which the overall ESG disclosure and its individual dimensions have helped to reduce the risks of a crash in corporate share price.

This study would be an extension of the investigation done by Feng et al. (2022) and Qian et al. (2024), as this study would demonstrate that the incorporation of higher ESG-rated stocks may lead to outperformance of the stock compared to the benchmark index. Perhaps, similar research that has been done so far would be the changes in ESG ratings' effect on stock prices. Shanaev & Ghimire (2022) claimed that ESG ratings upgrades are usually associated with relatively insignificant positive abnormal returns and downgrades consistently have a negative impact on stock performance.

In a related study, López Prol & Kim (2022) examined the ESG equities portfolio listed on the New York Stock Exchange (NYSE). However, the results of López Prol & Kim (2022) were different from those of Shanaev & Ghimire (2022). High ESG portfolios have been found by López Prol & Kim (2022) to have reduced volatility and even lower returns, which results in poorer Sharpe ratios.

Similarly, Cheng & Huang (2024) have demonstrated that the combined ESG scores were significantly negatively correlated with the stock market performance of listed companies. As such, it has contradicted the notion that higher ESG scoring would lead to better stock market performance. Cheng & Huang (2024) argued that the inverse relationship between the ESG combined scores with stock returns for S&P 500 index companies could be due to the substantial cost of ESG activities. Despite ESG investing gaining prominence in recent years due to ethical considerations, the existing literature has a mixed set of empirical results on the impact of ESG on the share price performance.

Hence, the contradiction in the research is worth exploring as the ESG topic has emerged as a prominent topic in sustainability investing. As the share price performance is also largely driven by the market sentiment, this research investigates whether the ESG ratings would lead to outperformance in the share price compared to the benchmark return. By incorporating the benchmark return in the context of this research, it effectively reduces the influence of market sentiment and focuses more on the effects of the ESG ratings on the outperformance or underperformance of the share price of the listed companies. As such, the evaluation based on benchmark return is more effective than one based solely on share price performance.

Nevertheless, the changes in ESG scoring in most literature were mainly focused on developed markets, and there is a limited study on the effects of ESG scoring on the share price performance in ASEAN countries like Malaysia. Although Ha et al. (2024) conducted an empirical study on the impact of ESG on share prices, it was only based on 30 listed companies in Vietnam. Its findings showed that there is a positive correlation between stock prices and ESG disclosure. Based on the individual pillars of ESG, the environmental segment is considered the most important to market participants. As this research also includes the effect of the individual pillars of ESG components on share price performance based on the Malaysian equity market, it may provide a further extension to the existing literature.

On the aspect of Shariah investing, Shear & Ashraf (2022) found that Shariah-compliant stocks demonstrated relatively milder negative reactions and were more resilient and performed better during the Covid-19 crisis. The empirical study in the research may lend support to Shear & Ashaf's (2022) research, in which Shariah-compliant stocks may lead to better outperformance in share price that is beyond the Covid-19 crisis.

Meanwhile, Hasan et al. (2021) contradicted the study conducted by Shear & Ashraf (2022). Based on the Dow Jones Index and FTSE index, Hasan et al. (2021) found that the Covid-19 pandemic created volatility in both the

stock market and the Shariah screening process failed to provide immunity to the Islamic stock market against the financial crisis. The mixed set of results of Shariah-compliant stocks during an economic crisis would be worth exploring further for the benefit of investors, especially those who need to invest in Shariah-compliant stocks. As this research study extended beyond the COVID-19 crisis, it may give a more comprehensive framework on the impact of Shariah-compliant stocks on the share price performance.

Meanwhile, Ghaemi Asl et al. (2024) analysis covered a wider range of period of more than 10 years. It demonstrated that Shariah-compliant portfolios outperformed the conventional portfolios based on risk-adjusted portfolio measures. Nevertheless, Ghaemi Asl et al. (2024) used the S&P Global 1200 Index, which captured the global market that is more developed, and there is still a lack of studies done on the Shariah-compliant stocks in countries like Malaysia. As Malaysia is on track to become a Global Islamic Financial hub, it would be interesting to study the implications of its Shariah-compliant stock on its share price performance.

Hoque et al. (2020)'s finding based on the Malaysian stock exchange was rather interesting as it demonstrated that the performance of an Islamic stock portfolio provided better return with a lower level of systematic risk compared to a conventional stock portfolio when it is compared between sectors. However, its findings were not consistent, as the performance of the Islamic stock portfolio and the conventional portfolio as a whole did not show any significant difference. Besides, the portfolio excluded certain sectors due to insufficient Islamic stocks, which may be slightly biased. In this research, the stocks that are Shariah-compliant or non-Shariah are selected based on the FBM100 stocks, which may provide further insights as to whether Shariah-compliant stocks would increase the share price performance.

The existing studies often treat the ESG and Shariah-compliant as two distinct variables, and there remains a critical gap in understanding how these two ethical investment frameworks can be applied concurrently. As there is a lack of existing studies that analyze the combined approach of ESG and Shariah-compliant particularly in the emerging markets like Malaysia, this research would be able to bridge the gap between ESG and Shariah-compliant stocks in enhancing the equity market returns. It basically shifts away from a siloed way of ethical investing towards a more holistic approach of how ethical and religious investment criteria can converge to improve the share price performance.

Perhaps a more similar study to this research is Lee & Isa (2023), in which the implications of ESG and Shariah on Malaysian companies were discussed. The main difference is that this research analyzed the implications of ESG and Shariah-compliant stocks on the outperformance of share prices of listed companies instead of financial performance. While the financial performance is crucial, investors of publicly listed companies would be more interested in the share price performance rather than the financial performance, as the share price performance will have a more direct impact on the equity portfolio returns. A higher financial performance may not necessarily lead to a higher share price return, as it is only one of the variables that may contribute to the higher share price performance.

The incorporation of both ESG and Shariah-compliant stocks has been argued not just from an equity market perspective. It has also been advocated by Husain et.al (2024) that the Islamic and Green bonds have shown impressive results for stability and resilience for the European financial markets. Its findings exhibited that the incorporation of Islamic and green financial instruments could be a good strategy for fixed fixed-income securities market. As such, Husain et.al (2024) have been strong advocates for the inclusion of sukuk and green bonds, which is in line with this research that supports the notion for the fusion of ESG and Shariah-compliant investment products in the investment strategy.

One of the possible reasons that the interaction between ESG and Shariah-compliant share price performance is hardly explored is because of the prolonged bearish trend in the Malaysian equity market over the past few years, particularly between 2019 to 2023. When the equity market is bearish, it is usually hard to prove that ESG or Shariah compliance has a positive influence on the share price performance. The benchmark-based assessment on ESG and Shariah-compliant may serve as a better indicator to assess the impact of ESG and Shariah on the share price, as it effectively removes the influence of equity market sentiment. This study, which investigates the impact of ESG and Shariah principles for enhanced equity market returns, would be more relevant as investors are usually more concerned with the capital returns of their equity investment.

Stakeholder Theory and Hypotheses Development

Apart from generating higher equity performance, investors be institutional or retail investors should also consider stakeholder theory when selecting the stock for investment. Consistent with the stakeholder theory, the ESG aspect and Shariah-compliant stocks should also be considered in selecting a stock, whereby the environmental, social, and corporate governance impact on the community is taken into consideration when selecting a stock for investment purposes.

According to stakeholder theory, there is an interwoven relationship between the company and its core and secondary stakeholders. Customers, employees, suppliers, financiers, and communities are the primary stakeholders. Secondary stakeholders include the government, rivals, consumer advocacy groups, media outlets, and special interest groups. Stakeholder theory emphasizes that the corporation should provide value for all stakeholders, not only shareholders (Freeman et al., 2010, p. 172). According to the stakeholder theory, businesses' obligations extend beyond traditional fiduciary duties to shareholders, and businesses are obliged to act responsibly towards stakeholders (Camilleri, 2017, p. 11).

Despite the prominence of ESG concerns in today's society, some critics believe that when companies try to balance stakeholder interests, they may deviate from their fundamental goal of maximizing economic value (Camilleri, 2017, p. 12). Nonetheless, there should be a proper balance of value maximization and stakeholder theory.

According to agency theory, the managers of companies act as agents for shareholders. Furthermore, the management would be irresponsible if they took any significant action that would benefit anyone other than the shareholders (Freeman et al., 2010, p. 88). In the case of institutional fund managers managing the funds for the investors, the fund managers should be practicing both the stakeholder theory and the agency theory for the interest of both shareholders and stakeholders. Based on the literature review and ethical theories mentioned, this research explores the hypotheses as below:

H1: The outperformance of the share price return has a positive relationship with higher ESG ratings.

Justification: A higher ESG rating means that companies that are highly involved in ESG activities would have a tendency to register better share price performance, which aligns with the agency theory. From the stakeholder theory perspective, a higher ESG rating or ESG disclosure shows a commitment to ethical conduct that benefits the interests of the stakeholders.

H2: The outperformance of the share price return has a positive relationship with Shariah-compliant stocks.

Justification: The Shariah-compliant companies align with the stakeholder theory as it involves ethical business activities. As managers of the companies cannot be freely engaged in unethical business, it may reduce the conflict between managers and shareholders in the agency theory.

H3: The outperformance of the share price return has a positive relationship with higher ESG ratings and Shariah-compliant stocks.

Justification: The combination of ESG and Shariah compliance exhibits a more holistic commitment to ethical governance, which aligns with the stakeholder theory. The dual compliance or dual filters act as a compounded governance mechanism that reinforces the agency theory.

Through the incorporation of stakeholder and agency theories throughout the framework, this study provides a dual compliance in reinforcing ethical governance. If higher ESG ratings and Shariah-compliant stocks would lead to capital gains, it would be supportive of both the agency theory and the stakeholder theory because it is acting in the best interest of both the shareholders (share price appreciation) and stakeholders (ethical consideration).

3. Research Methodology

Sample

It is noted that ESG ratings in Malaysia are still in the early stages of development; hence, there may be instances when listed companies lack full ESG information. As a result, Malaysian listed firms with insufficient ESG ratings

have been excluded from this study.

The sample chosen is based on the 100 stocks listed in the FBM100 index as at end-2023. The FBM100 comprises of FTSE Bursa Malaysia KLCI and the FTSE Bursa Malaysia Mid 70 Index (FTSE Bursa Malaysia Indices, 2024). The reason FBM100 is chosen is mainly because it consists of big to mid-capitalization stocks, which are more liquid, and it is usually on the radar of institutional investors. The small capitalization stocks were excluded from this study as there is less liquidity, and the reporting of the ESG data may not be as timely as the bigger capitalization stocks.

Within the FBM100 (100 stocks), only 59 companies were chosen in this research, as the 59 companies have ESG ratings in Bloomberg for at least 5 years. The period that is being analyzed is from the year of 2019 to 2023.

The ESG ratings were extracted from the Bloomberg terminal, which is deemed to be reliable and credible. The time frame used for the ESG is yearly basis instead of monthly or weekly, as the publication of ESG by Bloomberg is on a yearly basis. The data, which is extracted from the Bloomberg terminal is based on back-testing of historical data. Since the equity market is dynamic and not static, this study is based on the assumption that there would not be a significant difference between historical and future data.

The sample can be further divided between conventional and Shariah-listed companies. By separating the listed stocks between conventional and Shariah-compliant stocks, it would provide a more comprehensive study of ESG-rated stocks. The 59 stocks examined were verified to be Shariah or non-Shariah based on the List of Shariah-Compliant Securities published by the Shariah Advisory Council of Securities Commission Malaysia. For consistency purposes, the Shariah list for the period of 2019 to 2023 is based on the end of November of each year.

Since Shariah-Compliant Securities Screening takes financial ratio benchmarks into account, it means that Shariah stocks already have an embedded fundamental analysis for it to be qualified as a Shariah-compliant stock. According to the Shariah-compliant securities screening methodology, the debt over total assets ratio must be less than 33%. (Shariah-Compliant Securities Screening Methodology, 2024) This means that to be qualified as a Shariah-compliant stock, a strong balance sheet is part of the screening criteria. It is essential to have companies with a strong balance sheet or a lower level of gearing ratio, which could increase the likelihood of overcoming a financial crisis better. In addition, the higher level of funds from a strong balance sheet could be used for further expansion strategies. The fact that Shariah-compliant securities screening in Malaysia is stringent may not be supportive of Anwer et al. (2023) findings on the dataset of Dow Jones US Indices, which suggested that Shariah-compliant firms may have lower governance quality compared to non-Shariah-compliant firms.

In Malaysia, the listed companies would be classified as Shariah-compliant only if their business activities and financial ratios fulfilled the benchmark requirements. (Shariah-Compliant Securities Screening Methodology, 2024) which are outlined and governed by the Securities Commission Malaysia. In addition to the standards established by the Securities Commission, it also considers how the public views the company's operations from an Islamic teaching standpoint.

Measurement of the dependent variable

The benchmark used in this research is the FBMKLCI, which is the main index of the Malaysian equity market. The outperformance of the stocks is used rather than the share price performance, as it is a better reflector of returns. Moreover, the Malaysian equity market has been bearish over the past 5 years, from 2019 to 2023. This also makes the Malaysian market a unique market for analysis, as it would be interesting to study if the selection of stocks based on ESG and Shariah-compliant variables would have any implication on an equity market like FBMKLCI, which has registered a negative return of 14.0% over the period of 2019 to 2023. The only year in which the FBMKLCI registered a positive return in the 5 years was in the year 2020, with a net gain of 2.4% mainly due to the spectacular performance of the rubber gloves industry in which Malaysia is one of the world’s top producers.

Since the FBMKLCI has been registering negative returns in the period of study, higher ESG or Shariah stocks

may not show a positive impact on the share price performance. Hence, the relationship between ESG-rated and Shariah-compliant stocks should be compared with the benchmark index to evaluate the impact of ESG rating and Shariah-compliant stocks on the share price performance.

The stock market return is based on yearly data, which is synchronized with the ESG ratings. The share price return is measured using the following equation:

$$\text{Yearly return of a stock's price} = \frac{\text{Share price}_{t+1} - \text{Share price}_{t}}{\text{Share price}_{t}}$$

Where:
t +1 = one-year period
t = before one year

The share price return is further analyzed by comparing the share price return with the benchmark of FBMKLCI to determine the outperformance of the stock as below:

Share price return > Benchmark return of FBMKLCI = Outperformance
The outperformance is further analyzed by comparing the share price performance with the FBMKLCI by more than 5% and 10% respectively.

Outperformance 1= difference >0 = Difference between share price and FBMKLCI index

Outperformance 2= difference >0.05 = Difference between share price and FBMKLCI index by 5%

Outperformance 3= difference >0.10 = Difference between share price and FBMKLCI index by 10%

Measurement of the independent variables
Table 1 is the statistical range of the ESG data used in this research. It has provided guidance for the tabulation of the ESG threshold used in the Stata analysis.

Table 1: Minimum, maximum, mean, and median for the ESG data used (Year 2019 to Year 2023).

	ESG	Environmental	Social	Governance
Minimum	23.68	0.42	0.00	51.51
Maximum	75.85	80.88	62.12	96.12
Mean	50.72	34.71	34.11	83.22
Median	51.32	35.70	33.22	83.59

Source: Bloomberg

ESG ratings
The ESG overall ratings threshold that is used for this research is above 40 and above 50. The reasons ratings of above 40 and above 50 are used because their means or medians are 50.72 and 51.32, respectively. As for the individual variables like environmental and social, the thresholds used are above 30 and 40, respectively, as their mean and median for the period of 2019 to 2023 hovered around that range. The environmental thresholds that are used in the research are above 80 and above 90, respectively, as the mean and median for the period hovered around 83.22 and 83.59, respectively.

Shariah-compliant stocks
The dummy variable for the Shariah-compliant stocks and non-Shariah-compliant stocks is known as follows:
Shariah-compliant stocks = 1 Non-shariah compliant stocks = 0

ESG ratings combined with Shariah-compliant stocks
This study also examines the combination of ESG-rated stocks with Shariah-compliant stocks and their impact on the share price performance.

Relationship between variables through binary indicators

The relationship between ESG scores and Shariah-compliant stocks involves creating binary indicators for each variable and generating the p-value test of their association using the chi-square test. For instance, the ESG score is converted to a dummy variable to signify that it is above a certain threshold. Similarly, the Shariah-compliant stocks are also assigned with dummy variable. The stock performance relative to the FBMKLCI benchmark is also captured using a dummy variable to signify outperformance using the Stata commands. These binary variables are then cross-tabulated using Stata's command and chi-square test. It produces a two-way contingency table of independent variables (ESG and Shariah) compared to the dependent variable (outperformance compared to the FBMKLCI), in which the p-values or association between these variables are derived.

The ESG and Shariah variables are transformed into binary (dummy variables) based on predetermined thresholds (e.g., ESG>50, ESG >60, ESG>50 + Shariah) while the outperformance is also based on a binary outcome (e.g., outperformance>5%, outperformance>10%). Since it is categorical data, the chi-square test would be more suitable for the evaluation of the relationship between variables.

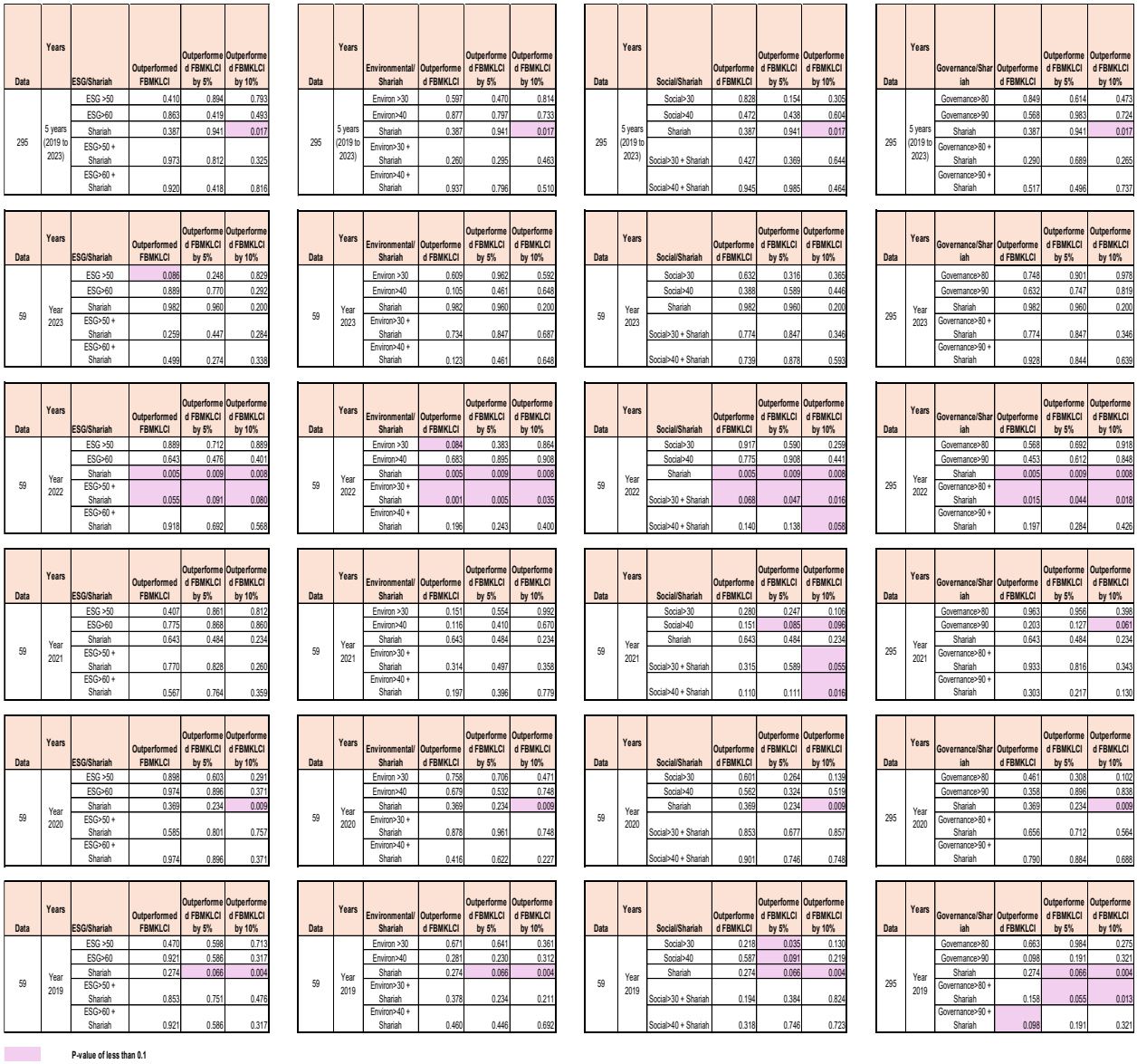
Since this study uses categorical (dummy) variables with a chi-square test, endogeneity or omitted variables would not be a relevant concern. Endogeneity would typically arise in a regression-based model. Since this study does not use any regression-based modelling, there is no issue with endogeneity. The chi-square test is used to determine whether there is a statistically significant association between ESG ratings and Shariah-compliant stocks, with the outperformance of the stock as the dummy variables are being used in this study.

4. Results

Based on the independent and dependent variables using the Stata command, the data analysis is summarized in Figure 1. It involves the relationship between the overall ESG ratings and their individual rating, namely environmental, social, and governance, and Shariah-compliant investment compared to the FBMKLCI benchmark across the timeframe of 2019 to 2023. The statistical significance of the relationship is assessed using the p-value that is generated by Stata software. It assumes that the p-value (<0.1 or highlighted in purple) is an indicator of some statistically significant relationships between the ESG ratings and Shariah-compliant stocks with the outperformance of the stocks.

Given the complexity of financial markets that is always evolving, a 10% significance level has been employed as a more sensitive detection of the association between the outperformance of share price with ESG and Shariah-compliant variables.

Figure 1: P-value of the ESG and Shariah-compliant data using the Chi-square test (The years 2019 to 2023)



Data	Years	ESG/Shariah	Outperformed FBMKLCI	Outperformed FBMKLCI by 5%	Outperformed FBMKLCI by 10%
295	5 years (2019 to 2023)	ESG >50	0.410	0.894	0.793
		ESG>60	0.863	0.419	0.493
		Shariah	0.387	0.941	0.017
		ESG>50 + Shariah	0.973	0.812	0.325
		ESG>60 + Shariah	0.920	0.418	0.816

Data	Years	Environmental/ Shariah	Outperformed FBMKLCI	Outperformed FBMKLCI by 5%	Outperformed FBMKLCI by 10%
295	5 years (2019 to 2023)	Environ >30	0.597	0.470	0.814
		Environ>40	0.877	0.797	0.733
		Shariah	0.387	0.941	0.017
		Environ>30 + Shariah	0.260	0.295	0.463
		Environ>40 + Shariah	0.937	0.796	0.510

Data	Years	Social/Shariah	Outperformed FBMKLCI	Outperformed FBMKLCI by 5%	Outperformed FBMKLCI by 10%
295	5 years (2019 to 2023)	Social>30	0.828	0.154	0.305
		Social>40	0.472	0.438	0.604
		Shariah	0.387	0.941	0.017
		Social>30 + Shariah	0.427	0.369	0.644
		Social>40 + Shariah	0.945	0.985	0.464

Data	Years	Governance/Shariah	Outperformed FBMKLCI	Outperformed FBMKLCI by 5%	Outperformed FBMKLCI by 10%
295	5 years (2019 to 2023)	Governance>80	0.849	0.614	0.473
		Governance>90	0.568	0.983	0.724
		Shariah	0.387	0.941	0.017
		Governance>80 + Shariah	0.290	0.689	0.265
		Governance>90 + Shariah	0.517	0.496	0.737

Data	Years	ESG/Shariah	Outperformed FBMKLCI	Outperformed FBMKLCI by 5%	Outperformed FBMKLCI by 10%
59	Year 2023	ESG >50	0.086	0.248	0.829
		ESG>60	0.889	0.770	0.292
		Shariah	0.982	0.960	0.200
		ESG>50 + Shariah	0.259	0.447	0.284
		ESG>60 + Shariah	0.499	0.274	0.338

Data	Years	Environmental/ Shariah	Outperformed FBMKLCI	Outperformed FBMKLCI by 5%	Outperformed FBMKLCI by 10%
59	Year 2023	Environ >30	0.609	0.962	0.592
		Environ>40	0.105	0.461	0.648
		Shariah	0.982	0.960	0.200
		Environ>30 + Shariah	0.734	0.847	0.687
		Environ>40 + Shariah	0.123	0.461	0.648

Data	Years	Social/Shariah	Outperformed FBMKLCI	Outperformed FBMKLCI by 5%	Outperformed FBMKLCI by 10%
59	Year 2023	Social>30	0.632	0.316	0.365
		Social>40	0.388	0.589	0.446
		Shariah	0.982	0.960	0.200
		Social>30 + Shariah	0.774	0.847	0.346
		Social>40 + Shariah	0.739	0.878	0.593

Data	Years	Governance/Shariah	Outperformed FBMKLCI	Outperformed FBMKLCI by 5%	Outperformed FBMKLCI by 10%
295	Year 2023	Governance>80	0.748	0.901	0.978
		Governance>90	0.632	0.747	0.819
		Shariah	0.982	0.960	0.200
		Governance>80 + Shariah	0.774	0.847	0.346
		Governance>90 + Shariah	0.928	0.844	0.639

Data	Years	ESG/Shariah	Outperformed FBMKLCI	Outperformed FBMKLCI by 5%	Outperformed FBMKLCI by 10%
59	Year 2022	ESG >50	0.889	0.712	0.889
		ESG>60	0.643	0.476	0.401
		Shariah	0.005	0.009	0.008
		ESG>50 + Shariah	0.055	0.091	0.080
		ESG>60 + Shariah	0.918	0.692	0.568

Data	Years	Environmental/ Shariah	Outperformed FBMKLCI	Outperformed FBMKLCI by 5%	Outperformed FBMKLCI by 10%
59	Year 2022	Environ >30	0.084	0.383	0.864
		Environ>40	0.683	0.895	0.908
		Shariah	0.005	0.009	0.008
		Environ>30 + Shariah	0.001	0.005	0.035
		Environ>40 + Shariah	0.196	0.243	0.400

Data	Years	Social/Shariah	Outperformed FBMKLCI	Outperformed FBMKLCI by 5%	Outperformed FBMKLCI by 10%
59	Year 2022	Social>30	0.917	0.590	0.259
		Social>40	0.775	0.908	0.441
		Shariah	0.005	0.009	0.008
		Social>30 + Shariah	0.068	0.047	0.016
		Social>40 + Shariah	0.140	0.138	0.058

Data	Years	Governance/Shariah	Outperformed FBMKLCI	Outperformed FBMKLCI by 5%	Outperformed FBMKLCI by 10%
295	Year 2022	Governance>80	0.568	0.692	0.918
		Governance>90	0.453	0.612	0.848
		Shariah	0.005	0.009	0.008
		Governance>80 + Shariah	0.015	0.044	0.018
		Governance>90 + Shariah	0.197	0.284	0.426

Data	Years	ESG/Shariah	Outperformed FBMKLCI	Outperformed FBMKLCI by 5%	Outperformed FBMKLCI by 10%
59	Year 2021	ESG >50	0.407	0.861	0.812
		ESG>60	0.775	0.868	0.860
		Shariah	0.643	0.484	0.234
		ESG>50 + Shariah	0.770	0.828	0.260
		ESG>60 + Shariah	0.567	0.764	0.359

Data	Years	Environmental/ Shariah	Outperformed FBMKLCI	Outperformed FBMKLCI by 5%	Outperformed FBMKLCI by 10%
59	Year 2021	Environ >30	0.151	0.554	0.992
		Environ>40	0.116	0.410	0.670
		Shariah	0.643	0.484	0.234
		Environ>30 + Shariah	0.314	0.497	0.358
		Environ>40 + Shariah	0.197	0.396	0.779

Data	Years	Social/Shariah	Outperformed FBMKLCI	Outperformed FBMKLCI by 5%	Outperformed FBMKLCI by 10%
59	Year 2021	Social>30	0.280	0.247	0.108
		Social>40	0.151	0.085	0.096
		Shariah	0.643	0.484	0.234
		Social>30 + Shariah	0.315	0.589	0.055
		Social>40 + Shariah	0.110	0.111	0.016

Data	Years	Governance/Shariah	Outperformed FBMKLCI	Outperformed FBMKLCI by 5%	Outperformed FBMKLCI by 10%
295	Year 2021	Governance>80	0.963	0.956	0.398
		Governance>90	0.203	0.127	0.061
		Shariah	0.643	0.484	0.234
		Governance>80 + Shariah	0.933	0.816	0.343
		Governance>90 + Shariah	0.303	0.217	0.130

Data	Years	ESG/Shariah	Outperformed FBMKLCI	Outperformed FBMKLCI by 5%	Outperformed FBMKLCI by 10%
59	Year 2020	ESG >50	0.898	0.603	0.291
		ESG>60	0.974	0.896	0.371
		Shariah	0.369	0.234	0.009
		ESG>50 + Shariah	0.585	0.801	0.757
		ESG>60 + Shariah	0.974	0.896	0.371

Data	Years	Environmental/ Shariah	Outperformed FBMKLCI	Outperformed FBMKLCI by 5%	Outperformed FBMKLCI by 10%
59	Year 2020	Environ >30	0.758	0.706	0.471
		Environ>40	0.679	0.532	0.748
		Shariah	0.369	0.234	0.009
		Environ>30 + Shariah	0.878	0.961	0.748
		Environ>40 + Shariah	0.416	0.622	0.227

Data	Years	Social/Shariah	Outperformed FBMKLCI	Outperformed FBMKLCI by 5%	Outperformed FBMKLCI by 10%
59	Year 2020	Social>30	0.601	0.264	0.139
		Social>40	0.562	0.324	0.519
		Shariah	0.369	0.234	0.009
		Social>30 + Shariah	0.853	0.677	0.857
		Social>40 + Shariah	0.901	0.746	0.748

Data	Years	Governance/Shariah	Outperformed FBMKLCI	Outperformed FBMKLCI by 5%	Outperformed FBMKLCI by 10%
295	Year 2020	Governance>80	0.461	0.308	0.102
		Governance>90	0.358	0.896	0.838
		Shariah	0.369	0.234	0.009
		Governance>80 + Shariah	0.656	0.712	0.564
		Governance>90 + Shariah	0.790	0.884	0.688

Data	Years	ESG/Shariah	Outperformed FBMKLCI	Outperformed FBMKLCI by 5%	Outperformed FBMKLCI by 10%
59	Year 2019	ESG >50	0.470	0.598	0.713
		ESG>60	0.921	0.586	0.317
		Shariah	0.274	0.066	0.004
		ESG>50 + Shariah	0.853	0.751	0.476
		ESG>60 + Shariah	0.921	0.586	0.317

Data	Years	Environmental/ Shariah	Outperformed FBMKLCI	Outperformed FBMKLCI by 5%	Outperformed FBMKLCI by 10%
59	Year 2019	Environ >30	0.671	0.641	0.361
		Environ>40	0.281	0.230	0.312
		Shariah	0.274	0.066	0.004
		Environ>30 + Shariah	0.378	0.234	0.211
		Environ>40 + Shariah	0.460	0.446	0.692

Data	Years	Social/Shariah	Outperformed FBMKLCI	Outperformed FBMKLCI by 5%	Outperformed FBMKLCI by 10%
59	Year 2019	Social>30	0.218	0.035	0.130
		Social>40	0.587	0.091	0.219
		Shariah	0.274	0.066	0.004
		Social>30 + Shariah	0.194	0.384	0.824
		Social>40 + Shariah	0.318	0.746	0.723

Data	Years	Governance/Shariah	Outperformed FBMKLCI	Outperformed FBMKLCI by 5%	Outperformed FBMKLCI by 10%
295	Year 2019	Governance>80	0.663	0.984	0.275
		Governance>90	0.098	0.191	0.321
		Shariah	0.274	0.066	0.004
		Governance>80 + Shariah	0.158	0.055	0.013
		Governance>90 + Shariah	0.098	0.191	0.321

P-value of less than 0.1

Source: Bloomberg and Stata

ESG ratings and Shariah-compliant stocks

The overall ESG ratings with a threshold of above 50 exhibited some relationship with the outperformance of the FBMKLCI. For individual years, the year 2022 demonstrated that there is some evidence of a significant relationship between the Shariah and outperformance in the share price. In the year 2022, the ESG metrics with a threshold of more than 50, which is combined with Shariah-compliant, outperformed the KLCI index with a p-value of less than 0.1.

Environmental variables

The environmental factor alone seems to have a less significant relationship with outperforming the FBMKLCI. Nevertheless, the year in the year 2022, the environmental metrics (Environment>30) combined with the Shariah-compliant stocks showed strong significance ($p<0.05$) in outperforming the FBMKLCI benchmark return.

Social variables
Generally, the social variables (Social>30 and Social>40) showed a weak relationship with the FBMKLCI performance when it is considered in isolation. However, when it is combined with Shariah (Social>30+Shariah), it reveals a marginally significant relationship, especially in the year of 2022.

Governance variables
Meanwhile, the governance variables alone (Governance>80 or Governance>90) exhibited varying significance across the period of 2019 to 2022. However, the governance variables play a crucial driving force in the outperformance when it is combined with Shariah-compliant stocks. For instance, both Governance>80+ Shariah (year 2022 and 2019) and Governance>90+Shariah (year 2019) indicated some significant relationship in outperforming the FBMKLCI market.

Shariah-compliant variables
Except for the years 2023 and 2020, Shariah-compliant variables alone exhibit a significant relationship across the period of study (2019 to 2023). Essentially, Shariah-compliant stocks may have the ability to improve the outperformance of the stock.

ESG with Shariah-compliant variables
Based on all the dimensions in the study, the combination of individual dimensions of ESG with Shariah compliance improves the likelihood of outperformance against the FBMKLCI. This suggests that integrating Shariah compliance into the ESG framework may provide an additional value in enhancing the stock performance. Among the ESG variables, the social and governance variables emerge to be more consistent drivers compared to the environmental variables.

Validity of the hypotheses
Although the data analysis from Stata software exhibits a mixed set of results, the findings provided some empirical evidence to support the validity of the following hypotheses:

H1: The outperformance of the share price return has a positive relationship with higher ESG ratings.

H2: The outperformance of the share price return has a positive relationship with Shariah-compliant stocks.

H3: The outperformance of the share price return has a positive relationship with higher ESG ratings and Shariah-compliant stocks.

At a 10% significance level, the analysis indicates that ESG ratings and Shariah-compliant stocks exhibit some statistically significant relationship with the outperformance of the stocks. The findings suggest that both ESG and Shariah-compliant variables may contribute to the outperformance of the equity market, either individually or collectively. Therefore, it highlights the potential significance of ESG and Shariah-compliant factors in driving better investment returns in the equity market.

5. Findings and Recommendations

The objective is to study the relationship between ESG and Shariah-compliant stocks with the stock market performance in emerging equity markets like Malaysia. Ultimately, the ESG and Shariah-compliant stocks increase the shareholders' value through better equity returns. Since there is some evidence of a positive relationship between ESG and Shariah-compliant stocks and stock market performance in Malaysia, it would encourage more investors, especially institutional fund managers, to include high ESG-rated stocks or Shariah-compliant stocks in their equity portfolio. It would be consistent with the stakeholder approach to business, which emphasizes providing as much value as possible for stakeholders with no trade-offs. (Freeman et al., 2010, pp. 117). It also reinforces the agency theory, as both ESG applications and Shariah-compliant stocks are behaving in the best interests of the shareholders.

Since the higher ESG ratings of stocks and Shariah-compliant stocks might lead to the outperformance of listed securities, it may encourage the shifting in priorities of investors towards ethical investing. This may

incentivize a paradigm shift among both institutional and retail investors towards higher ESG-rated and Shariah-compliant stocks without compromising on stock returns. In fact, there is a higher possibility of outperformance in stocks driven by sustainability investment with higher ethical standards. Although there is a growing influence of many institutional funds to focus on ethical investing, more empirical research would provide a more convincing approach towards ethical investing.

The enhanced equity performance may drive more innovative financial products that emphasize ESG and Shariah-compliant stocks. Financial institutions and fund managers have been increasingly incorporating ESG metrics and Shariah principles into their investment mandates. Despite a more stringent approach, as there are more criteria and guidelines in place, it is probably necessary to foster outperformance in the equity market while ensuring that ethical values are taken into consideration.

The fact that there is some evidence of a positive relationship between ESG and Shariah compliance with the share price performance, the findings may reveal that increasingly investors are more sensitive to non-financial disclosure, such as ESG and Shariah compliance, in equity investment decision-making. The ethical considerations in investment decisions could reflect a shift from solely relying on valuation-based models to a broader assessment framework that emphasizes environmental, social, governance, and Shariah adherence. The shift in market behavior could influence how capital would be allocated, especially within institutional funds, which emphasize the role of integrity. Hence, there would be a tendency that higher-rated ESG and Shariah compliance companies would be traded at a higher valuation due to a scarcity premium.

The integrated framework may encourage regulatory bodies such as Bursa Malaysia and Securities Commission Malaysia to promote both ESG and Shariah principles concurrently for Islamic funds rather than on an isolated basis. Both ESG and Shariah principles are inherently aligned, as both are grounded in the pursuit of ethical, responsible, and sustainable investment practices. In fact, both frameworks converge on the concept that profit should not come at the expense of environmental, social, and governance well-being. As such, ESG and Shariah principles are reinforcing each other rather than being mutually exclusive.

The integration of ESG and Shariah principles forms a dual-screening mechanism that promotes the long-term value creation by improving the share price of listed companies on a long-term basis. From a policy perspective, the dual-screening dimensions could be introduced in regulating Islamic funds, which enables a more comprehensive investment screening criteria that employ both ethical and Shariah principles, which may benefit shareholders in the long run through potentially higher capital appreciation.

Its findings have far-reaching implications, offering valuable insights for financial institutions, firms, pension funds, regulators, universities, and equity market participants. The results of this study support a compelling narrative for the integration and harmonization of ESG and Shariah-compliant in stock selection strategies.

Limitations and future research

Since this study is mainly confined to the Malaysian equity market, there is a limitation of a geographical and single equity market focus. Having said that, Malaysia offers a compelling case study of an emerging equity market whereby the ethical investment filters such as ESG and Shariah-compliant have a pivotal role in shaping the investors' behavior, especially among fund managers that are managing Islamic funds. Since Malaysia is an open economy, its equity market is also highly affected by the global equity market sentiment, which means that this study can be applicable in most regional equity markets.

As the study mainly focuses on Malaysia, the same empirical framework could be applied to other developed and emerging equity markets for comparison purposes. More countries that are being applied to the research would lead to a multi-equity market comparison. It would be interesting to study whether there is any differentiation in the results across different countries globally. Nevertheless, other countries may not have Shariah-compliant filtration like Malaysia, as Malaysia is a leading global hub for Islamic finance. It is also for this reason that the Malaysian equity market is chosen for this study, as it has all the necessary data for Shariah-compliant products. In addition, the data for ESG in Malaysia is now more readily available, especially in the past few years, as Malaysia is now advocating ethical investing among institutional investors.

Although this study has extensive quantitative measures, it did not include the non-quantitative data. Future research could include the integration of qualitative approaches to the analysis. Interviews could be conducted with fund managers on the aspect of ESG and Shariah-compliant applications in the fund management industry. The integration of quantitative analysis with qualitative inquiry, or known as the mixed method of research, would uncover the conceptual framework behind the analysis. (Saunders et al., 2019, p.175) The incorporation of mixed-method analysis may lead to more contextually grounded stock selection criteria that are more applicable and practical for investors.

The current study is mainly concentrated on the listed firms in the FBM100 index. In the future, the research study could include the FBM Small Cap index, which consists of companies within the top 98% of Bursa Malaysia Main Market that exclude the constituents of the FBM 100 index companies. (FTSE Bursa Malaysia Indices, 2024). The inclusion of the FBM Small Cap index would give a more comprehensive evaluation of listed companies in Malaysia. Nevertheless, the ESG data for the small capitalization stocks may not be so easily available as compared to bigger capitalization companies. Over time, as small capitalization stocks have a longer duration of years for ESG ratings, future research can be conducted on the FBM Small Cap index for a more comprehensive study with deeper insight.

Conclusion

Generally, not all investors would consider ESG issues when deciding which stocks to include in their equity investment portfolio. It is usually institutional fund managers with a portfolio mandate that mandates a particular minimum ESG rating who are more likely to include ESG ratings in their stock selection process. Although Malaysia is working to have more listed firms get ESG rated, it is still in the early stages. It is envisaged that this research will encourage more investors be in institutional or retail investors to take ESG ratings into consideration to outperform the equity market in ASEAN markets like Malaysia and beyond.

Although the core of this research lies with the impact of ESG ratings on the share price performance, the inclusion of Shariah-compliant stock has provided a more in-depth to the ESG-rated stocks. The integration of ESG and Shariah-compliant stocks lends credence to the existing literature, as there is a limited study on their combined impact on the equity share price performance.

This research demonstrated a comprehensive analysis of the interplay between the components of ESG (Environmental, Social, Governance) and Shariah-compliant stocks. Using the Stata software, the study identified the significance of a p-value of less than 0.1 to highlight the relationship between ESG and Shariah-compliant stocks with the outperformance of the stocks compared with the benchmark index. Although the ESG and Shariah-compliant combination demonstrated a mixed set of results in the outperformance of the stock, it has provided some evidence that the inclusion of ESG and Shariah-compliant stocks may improve returns in the equity market.

Among the ESG variables, the social and governance variables emerge as more reliable drivers in outperforming the equity market compared to the environmental variables. The consistency underscores the critical role of both social and governance in improving equity market returns. One of the possible reasons for such findings could be that the social and governance issues tend to receive more regulatory oversight or public attention compared to environmental issues, especially in emerging markets. From the investors' point of view, both the retail and institutional investors could be more attuned to social and governance indicators such as labor practices, community work, regulatory compliance, and financial reporting, which could have more immediate implications on the risks and companies' share price performance. On the other hand, environmental issues often involve long-term risks that may not be fully priced in the emerging equity market.

This study also emphasizes the necessity of segregating the ESG dimensions to provide a more meaningful and in-depth analysis. The aggregated ESG scores often mask the vast differences in the individual components of ESG. By isolating these dimensions, this study offers a deeper insight into the specific roles of each pillar of ESG in driving the outperformance of the stock. In addition, the integration of Shariah-compliant criteria offers an additional complexity to the analysis. In certain years, the integration of ESG and Shariah-compliant factors performed better than its standalone.

Overall, this research highlights the importance of the inclusion of ethical dimensions in the construction of equity portfolios, especially in markets with significant demand for ESG and Shariah-compliant stocks. It is hoped that through this study, more investors, policy makers, and institutional funds will enhance social and governance practices while incorporating the environmental aspect. The novelty of this research lies in underscoring the pivotal role of integrating ESG and Shariah-compliant frameworks in driving share price performance. Instead of treating ESG and Shariah-compliant criteria as separate paradigms, this research provides a new insight into how their intersection can potentially improve the performance of equity returns.

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Validation of the Educator-Targeted Bullying Measurement

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Abstract: Previous research and practitioners typically concentrate on a limited operational definition of bullying when examining educators' experiences with bullying in higher educational institutions (HEIs). This study employs the term Educator-Targeted Bullying (ETB) to denote a more precise variable, owing to the narrow definition of academic bullying. This study aims to validate a 47-item instrument that assesses three forms of bullying-related stress among academics in higher education institutions. Upon reviewing previous literature on educator bullying, three prevalent forms are identified: workplace bullying, cyberbullying, and teacher-targeted bullying. Exploratory and confirmatory factor analyses were conducted to evaluate factorial structures based on a total of 210 survey responses. This study categorizes seven dimensions of ETB: student direct bullying, devaluation bullying, indirect private bullying, pictorial cyberbullying, task bullying, relational cyberbullying, and student physical bullying. Consequently, the factors significantly influence the operational definitions of educator bullying.

Keywords: *Educator-Targeted Bullying (ETB), Measurement, Higher Educational Institutions (HEIs).*

1. Introduction and Background

Workplace bullying has been associated with various negative mental health outcomes and behaviours. Manuel et al. (2023) indicated that 84% of the members of higher education institutions (HEIs) in a global survey experienced academic bullying. Educators are likely to experience bullying at a rate three times higher than that of other professions (Jacobs & de Wet, 2018). Research on academic bullying predominantly focuses on adolescents, as educational institutions significantly influence future generations' preparation (e.g., Adewusi, 2021). However, little attention has been directed towards educators positioned between the superiors and students (Asio, 2019). In examining academic bullying among educators, diverse and inconsistent dimensions or measurements for workplace bullying are employed. For example, Wei et al. (2013) concentrated exclusively on class size, while Winding et al. (2022) highlighted students' aggressive behaviour, and Asio (2019) surveyed students' perceptions of bullying towards educators. Several tools for assessing different bullying have been described and developed. Building on the gaps, this study aims to validate the operational definitions of academic bullying among educators in higher education institutions to establish a multifaceted measurement. Studies conducted in Malaysia have brought attention to the prevalence of workplace bullying in higher education institutions. For instance, Malaysian university staff reported verbal abuse and intimidation from superiors and colleagues, which had an impact on their psychological health and job satisfaction, according to Rahman et al. (2020). Likewise, Abdul Halim et al. (2023) pointed out that bullying at work is a common but underreported problem in Malaysian academics, frequently connected to power struggles and a lack of institutional support. These results highlight the necessity of localizing bullying concepts and creating reliable assessments that are suitable for Malaysian educators.

Given the importance of educators in national growth and the cultivation of future talent, there is an urgent necessity for the validation of academic bullying measurement to provide a comprehensive and accurate assessment. This study contributes to the body of knowledge by validating various workplace bullying measurements from past studies for educators. Additionally, research on academic bullying can assist university administrators in creating healthier working environments and educators' well-being.

2. Literature Review

Workplace bullying occurs when an employee is systematically and constantly targeted for unfavourable

actions, either work-related or personal (Van den Brande et al., 2016). De Wet (2011) explained that three principal components are present in the definitions of workplace bullying: the impact on the victim, negative consequences, and persistence. Workplace bullying develops when a power disparity exists between the victim and the perpetrator, creating a victim unable to defend themselves over an extended duration (Farley et al., 2023). Adewusi (2021) argued that the disruptive behaviour may not be consistently repeated but is merely identified as bullying. The theory of humiliation has been adopted by Adewusi (2021) to explain the behaviour of bullying. The theory posits that humiliation arises when a more dominant individual publicly highlights the deficiencies of a victim who perceives the treatment as unjust. Therefore, bullying victimisation is considered a form of humiliation that can occur in any context. For the study of Oksanen et al. (2021), the social identity theory (SIT) was used. SIT explains the tendency for individuals to exhibit greater empathy toward in-group members compared to out-group members, whereas harassers focus their aggressive behaviour on those considered out-group members.

The term academic bullying widely refers to a teacher as the perpetrator and students as the victims. Therefore, Burns et al. (2020) refined the term to "teacher-targeted bullying," referring to the harassment behaviour that educators face from students and parents. Blase et al. (2007) referred to all negative behaviour, including bullying, as workplace mistreatment or abuse. The study of teacher-targeted bullying is intricate and unclear, as educators are presumed to occupy a position of power. To have a more generalisable term that can be applied to educators in HEIs, this study expands the concept to educator-targeted bullying (ETB). Based on the review of past literature, ETB is defined as any form of mistreatment directed against educators that jeopardises their well-being.

Collie and Mansfield (2022) found three sources of educator stress: workload, student behaviour, and expectation-related stress. Two sources of stress pertain to external factors, while expectation stress is linked to the educator's expectations. Unlike the study of Burns et al. (2020), students and parents are the sources of bullying. Additionally, De Wet (2011) and Blase et al. (2007) have explored leadership and institutions as a source of bullying. Oksanen et al. (2021) stated that offline bullying often occurs in university settings; however, the necessity for online engagement has led to an increase in online victimisation. Table 1 illustrates the studies that focused on various types of bullying related to educators. Collectively, prior literature offers insights into many forms of bullying for educators. Nevertheless, the literature has concentrated on a diverse range of bullying forms that have led to confusion. Three major forms of bullying related to educators are workplace bullying (De Wet, 2010; Wei et al., 2013), ETB (Asio, 2019; Adewusi et al., 2021; Burns et al., 2020; Winding et al., 2022), and cyberbullying (Oksanen et al., 2021; Tolentino, 2016).

Table 1: Literature on Educators' Bullying

Citations	Types of bullying	Country	Respondent	Research Design
Kauppi & Porholo (2012)	Teachers bullied by students (direct and indirect)	Finland	Primary and lower secondary school teachers	Survey
Wei et al. (2013)	Work-related (Physical assault, Nonphysical violence)	US	Kindergarten teachers	Survey
Tolentino (2016)	Emotional, verbal, physical, and cyberbullying	Philippines	School teachers	Phenomenological
Asio (2019)	A student bullying the teacher	Philippines	Students of HEI	Survey
Burns et al. (2020)	Teacher-targeted bullying	Australia	-	Literature Review
Adewusi (2021)	Teacher-targeted bullying by learners (written, verbal, physical, electronic)	South Africa	Secondary school teachers	Phenomenological

Oksanen et al. (2021)	Online harassment	Finland	Researchers and teachers of HEI	Survey
Winding et al. (2022)	Pupil's aggressive behaviour (harassment, threats, and violence)	Denmark	Primary and lower secondary school teachers	Survey
Gul et al. (2022)	Teacher-targeted bullying	Lahore	Teachers of tertiary education institutions	Survey
Al Ali et al. (2025)	Bullying victimisation	Jordan	Grade 7 and 8 students of public schools	Survey

3. Research Methodology

A cross-sectional convenience sampling was used to collect the data. This study randomly collected academicians' email addresses from various university directories to ensure the representativeness of the sample. An email with a cover letter that explicitly delineates the aim of this survey, assures confidentiality and anonymity of responses, and includes the questionnaire link has been sent. This study's full analysis set, after removing outliers, was 210. Hair et al. (2019) suggested a sample size of 200 or larger according to the number of variables. Harman's single-factor test, which accounts for only 31.34% of the total variation, suggests that common method bias (CMB) is not a significant issue. The participant profiles are presented in Table 2.

A total of 210 academicians from different higher education institutions (HEIs) around Malaysia made up the final sample. The majority of participants (80.5%) were female, with only 19.5% being male. The largest age group of respondents (25.7%) was between the ages of 36 and 40, while the majority of respondents (48.6%) were between the ages of 36 and 45. In terms of the income distribution, 63.3% of participants were in the M40 income range (RM4360–RM9619), followed by the T20 group (24.3%) and the B40 group (12.4%). The largest percentage of respondents (32.4%) had between 10 and 15 years of work experience, followed by those with 5 to 10 years (21.9%) and more than 20 years (21.4%). 33.3% of participants were from private universities, whilst the bulk (66.7%) were from public ones. These traits point to a varied and knowledgeable population, which bolsters the findings' applicability in the context of Malaysian higher education.

Table 2: Participant Profile

Variable		Frequency	Percentage
Gender	Male	41	19.5
	Female	169	80.5
Age	26 to 30	3	1.4
	31 to 35	38	18.1
	36 to 40	54	25.7
	41 to 45	48	22.9
	46 to 50	37	17.6
	51 to 55	14	6.7
	56 to 60	11	5.2
	Above 61	5	2.4
Income	RM4360 and below (B40)	26	12.4
	RM4360 – RM9619 (M40)	133	63.3
	RM9619 and above (T20)	51	24.3
Experience	Below 1 year	1	0.5
	1 to 5 years	22	10.5
	5 – 10 years	46	21.9
	10 – 15 years	68	32.4
	15 – 20 years	28	13.3
	Above 20 years	45	21.4

Types of HEI	Public	140	66.7
	Private	70	33.3

This study developed a questionnaire that includes three types of bullying: workplace bullying, cyberbullying victimisation, and ETB. A total of 47 items were used to measure the various forms of bullying (Table 3). The respondent was asked to rate a five-point Likert scale, ranging from never to always, to indicate how often they have experienced the following during the last year. This study calculated Cronbach's alpha before performing the exploratory factor analysis (EFA). The 12 items were adopted from Said and Tanova's (2021) study, which yielded a Cronbach's alpha value of 0.92. The 15 items of cyberbullying victimisation adopted from Wong and McBride (2018) were used in measuring cyberbullying among secondary schools and showed a Cronbach's alpha value above 0.70. Kauppi and Porhola (2012) developed the 20 items for ETB for school teachers, and the Cronbach's alpha for this study was 0.92.

Table 3: Measurement

Variable	Citation	Dimensions	No. of Items	Cronbach's alpha
Workplace bullying	Said & Tanova (2021)	-	12	0.92
Cyberbullying victimisation	Wong & McBride (2018)	Relational Pictorial Verbal Extortion	15	0.85
ETB	Kauppi & Porholo (2012)	Direct verbal Direct nonverbal Physical Indirect private Indirect public	20	0.92

4. Results

EFA was performed to discover the underlying patterns for a large number of variables. Eigenvalues larger than 1 would be used to interpret the number of factors in the data set. The Kaiser-Meyer-Olkin (KMO) test indicated the value of 0.89 exceeded the 0.60 threshold; the Bartlett's test was significant, $p<0.001$, which determines the factorability of the dataset. The results from EFA confirmed that all items in the measurement were loaded into 10 factors (eigenvalue larger than 1), with a cut-off of loadings greater than 0.60. Table 3 shows that 14 items were loading below the cut-off of 0.60.

The 14 items had factor loadings below the suggested cut-off value of 0.60, according to the EFA results (Hair et al., 2019). These items were removed from additional analysis in order to guarantee a strong measurement structure. Since keeping poorly loaded items could jeopardise construct validity and increase measurement error, this step is in line with psychometric norms. In order to assess the model fit and construct validity, only the remaining items with appropriate loadings (≥ 0.60) were kept and employed in the Confirmatory Factor Analysis (CFA).

Table 4: Pattern Factor Loadings for EFA of Stressors (N=210)

	Eigenvalue	14.78	4.15	3.33	2.23	1.87	1.65	1.48	1.23	1.17	1.13
Item	Statements/Factor	1	2	3	4	5	6	7	8	9	10
WB1	Being given tasks with clearly unreasonable targets or deadlines					.70					
WB2	Being exposed to an unmanageable workload					.77					
WB3	Systematically being required to carry out tasks that clearly fall outside your job description.					.73					
WB4	Being assigned a different role against your will					.73					
WB5	Persistent, unreasonable criticism of your work and effort		.77								

WB6	Inappropriate attempts to find fault with your work	.78					
WB7	Repeated reminders of your errors and mistakes	.81					
WB8	Being humiliated or ridiculed in connection with your work	.82					
WB9	Being the subject of excessive teasing or sarcasm	.69					
WB10	Being the target of practical jokes carried out by people you do not get along with	.62					
WB11	Offensive remarks or behavior with reference to your race or ethnicity						
WB12	Unwanted sexual attention				.60		
CB1	Some delete or block you purposefully and ask others to do the same to you.						
CB2	Some put you through a “public trial” or “public shaming”						
CB3	Some isolate or boycott you on the internet.			.73			
CB4	Some blacklisted you			.67			
CB5	Some make insulting/unflattering edits to your photos and post them onto the internet.		.78				
CB6	Some make insulting/unflattering videos of you and upload them onto the internet.		.86				
CB7	Some take unflattering videos or photos of you and upload them to the internet to insult you.						.74
CB8	Some share insulting/unflattering edited photos of you on the internet.					.75	
CB9	Some write insulting posts to offend you.						.67
CB10	Some curses or swear at you						
CB11	Some bombard you with senseless or offensive messages						
CB12	Some send you personal attacks, e.g., abusive remarks about your body type or intelligence.						
CB13	Some make and post unflattering screen captures of you to make fun of/insult you.						
CB14	Some steal or hack into your account.						
CB15	Some people post their private photos or conversations on the internet.						
SB1	Obscene or inappropriate comments	.65					
SB2	Refusal to cooperate	.75					
SB3	Repeated lying	.76					
SB4	Making fun of or laughing at you	.63					
SB5	Denouncing or name-calling						
SB6	Insulting gestures						
SB7	Hiding or repeatedly coming late to class	.77					
SB8	Unjust disparagement of your professional skills	.71					
SB9	Mimicking your characteristic features						
SB10	Repeated disregard of your presence	.60					
SB11	Threatening		.67				
SB12	Violation of physical integrity						
SB13	Damaging or stealing of property		.66				
SB14	Subjecting you to inappropriate attention in public places		.77				
SB15	Spreading unfounded gossip		.64				
SB16	Improper insinuation about the teacher’s private matters		.68				
SB17	Physical violence				.74		
SB18	Making unfounded reports or complaints against you						

SB19	Irritating sexually tinged remarks or propositions		.78
SB20	Violation of personal space or improper touching	.75	

Table 5: Standardized Factor Loadings

Item	Statement	Factor	Factor Loading
SB1	Obscene or inappropriate comments	F1	0.71
SB2	Refusal to cooperate	F1	0.71
SB4	Making fun of or laughing at you	F1	0.75
SB8	Unjust disparagement of your professional skills	F1	0.84
SB10	Repeated disregard of your presence	F1	0.72
WB5	Persistent, unreasonable criticism of your work and effort	F2	0.87
WB6	Inappropriate attempts to find fault with your work	F2	0.88
WB7	Repeated reminders of your errors and mistakes	F2	0.77
WB8	Being humiliated or ridiculed in connection with your work	F2	0.86
WB9	Being the subject of excessive teasing or sarcasm	F2	0.75
WB10	Being the target of practical jokes carried out by people you do not get along with	F2	0.67
SB11	Threatening	F3	0.77
SB13	Damaging or stealing of property	F3	0.70
SB14	Subjecting you to inappropriate attention in public places	F3	0.74
SB15	Spreading unfounded gossip	F3	0.88
SB16	Improper insinuation about the teacher's private matters	F3	0.88
CB5	Some make insulting/unflattering edits to your photos and post them onto the internet	F4	0.83
CB6	Some make insulting/unflattering videos of you and upload them onto the internet	F4	0.93
WB1	Being given tasks with clearly unreasonable targets or deadlines	F5	0.72
WB2	Being exposed to an unmanageable workload	F5	0.80
WB3	Systematically being required to carry out tasks that clearly fall outside your job description	F5	0.82
WB4	Being assigned a different role against your will	F5	0.90
CB3	Some isolate or boycott you on the internet	F6	0.70
CB4	Some blacklisted you	F6	0.79
SB17	Physical violence	F7	0.61
SB19	Irritating sexually tinged remarks or propositions	F7	0.82

Table 6 illustrates the discriminant validity of the factors. All the factors have excellent convergent validity, as the Average Variance Extracted (AVE) values are above 0.50. The values of Composite Reliability (CR) indicate that the internal consistency is reliable, as all values are above the threshold of 0.70, except for Factor 7, which is slightly below 0.70. The AVE is above 0.50, which supports Factor 7. The matrix shows the correlation coefficient (r) between the factors. The discriminant validity of the factors is supported because the squared root of AVE is larger than the correlation coefficient (r). This study uses the correlation matrix to assess the nomological validity. The relationship between all the factors should be positive. However, a negative r was found between Factor 4 and Factor 7, but the relationship is not significant. The consistency of the other relationships renders this single outlier insignificant (Hair et al., 2019). Thus, the result supports nomological validity.

Figure 1: CFA for Educator-Targeted Bullying

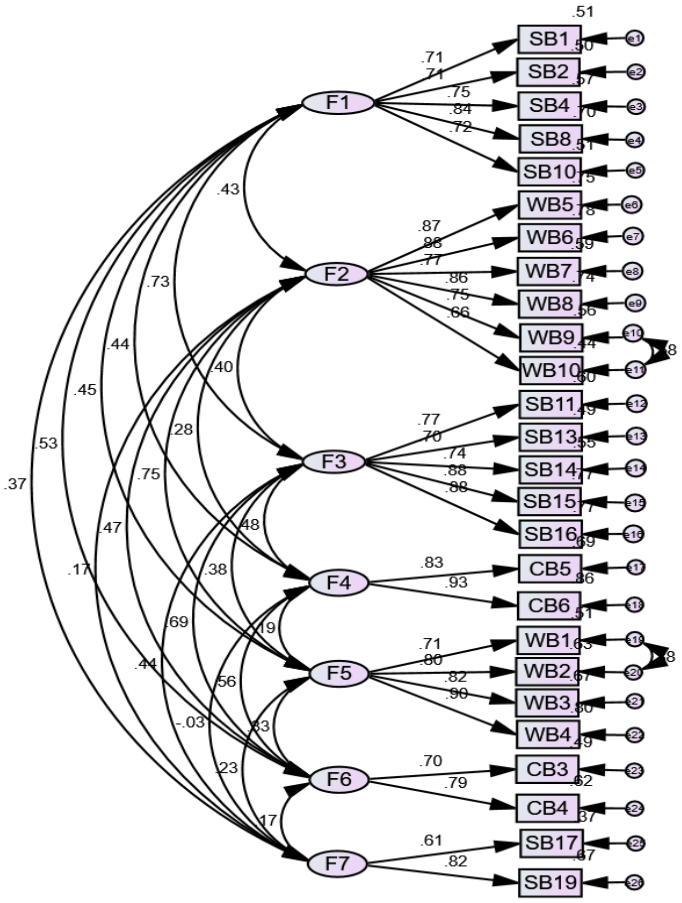


Table 6: Discriminant Validity of the Factors

Factor	CR	AVE	F1	F2	F3	F4	F5	F6	F7
F1	0.89	0.66	**0.81**						
F2	0.94	0.65	0.43**	**0.81**					
F3	0.86	0.56	0.65**	0.38**	**0.75**				
F4	0.90	0.64	0.33**	0.27**	0.40**	**0.80**			
F5	0.87	0.78	0.40**	0.68**	0.33**	0.18*	**0.88**		
F6	0.71	0.56	0.42**	0.41**	0.54**	0.45**	0.26**	**0.75**	
F7	0.68	0.52	0.29**	0.14*	0.36**	-0.03	0.16*	0.13	**0.72**

Note: *<0.05, **<0.01; the bold is square root of AVE

Based on the loading of the items, the factors are named as follows. Student-directed bullying is the name given to Factor 1, comprising five items (SB1, SB2, SB4, SB8, SB10) associated with the negative feedback and criticism from students. Factor 2 is designated as devaluation bullying, encompassing six items (WB5 – WB10) related to adverse treatment and harm over job execution. Student indirect private bullying is named for Factor 3, five items (SB11, SB13, SB14, SB15, SB16) about student behaviours that undermine the educator in a public setting. Factor 4 illustrates pictorial cyberbullying, comprising two items (CB5, CB6) that involve the humiliation of educators through images or videos online. Task bullying is the name given to Factor 5, which encompasses the four workload-related items (WB1 – WB4). This study designates Factor 6 as relational cyberbullying; the two items (CB3, CB4) reflect the erosion of an educator's online reputation. Student physical

bullying is the name given to Factor 7, comprising items SB17 and SB19, indicating unpleasant behaviour associated with physicality.

Discussion

This study validates a 47-item scale measuring three forms of bullying-related stressors among academics in Higher Education Institutions (HEIs). This study tested the dimensions of ETB by measuring workplace bullying, cyberbullying, and teacher-targeted bullying. Past literature has separately examined the measurement of three forms of bullying to understand how bullying influences stress. Thus, this study tested the factorial structure of three bullying instruments used by past literature (Said & Tanova, 2021; Wong & McBride, 2018; Kauppi & Porholo, 2012). The items used in the three forms of bullying may be redundant and repetitive due to one measure related to work, one to online, and one to students. The EFA and CFA showed that seven factors are to be used as measurements of ETB. The overall reliability and validity of the 26 items were adequate. This study found seven dimensions of ETB, namely, student direct bullying, devaluation bullying, student indirect private bullying, pictorial cyberbullying, task bullying, relational cyberbullying, and student physical bullying. Two dimensions relate to workplace bullying, as Said and Tanova (2021) suggested. Said and Tanova (2021) suggested a unidimensional view of workplace bullying, but this study found the measurement divided into two dimensions (task bullying and devaluation bullying). This study supports two dimensions suggested by Wong and McBride (2018), namely pictorial cyberbullying and relational cyberbullying. For the five dimensions of bullying from the students (Kauppi & Porholo, 2012), this study confirms three dimensions: student direct bullying, student indirect private bullying, and student physical bullying. This study offers a new insight into designing a measurement on ETB covering three bullying types.

5. Conclusion

This study presents multiple implications for both practice and future research. Researchers who are interested in studying educator bullying must ensure their measurements account for its multifaceted nature. For example, a previous study has investigated a particular type of bullying in isolation. Future research should investigate ETB through a multifaceted approach to enhance the study's accuracy. Human resource departments at higher education institutions should formulate a comprehensive strategy and policy to address bullying behavior within the organization. A healthy working environment should address a complete range of strategies and policies, including workplace, as well as student interactions, and the cyber environment. It is important to acknowledge the limitations of this study. This study aimed to include a larger number of participants from both public and private higher education institutions to conduct an advanced comparative analysis. The diverse characteristics of public and private higher education institutions necessitate a larger sample to facilitate comparative analysis and establish a measure of generality. To conduct CFA for two distinct respondents, a larger dataset is required to produce a robust and precise model fit evaluation. Therefore, we must carefully assess the population's representativeness, and we can only apply the study's findings to a population that shares similar cultural and characteristic traits.

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Population Growth, Available Resources and Quality of Life: A Goal Programming Model Approach

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Abstract: The study examined population growth, available resources, and quality of life using an optimization tool of goal programming. The decision variable of the goal programming analysis was generated from the 4-year average of key variables of interest, namely population growth, available resource proxied by energy consumption, and quality of life proxied by the human development index, ranging from 2000 to 2023. The optimization technique of simplex goal programming analysis was adopted for the analysis. Based on the decision variables obtained from the averages of the relevant variables, the goal programming solutions could not satisfy any of the aspirational targets; hence, the non-optimization of the objective function after substituting the respective deviations into the objective function. The study, therefore, highlights the endemic flashpoint of the Nigerian economy wherein potentials and resource endowment are not sufficiently harnessed, hence the poor quality of life. The study therefore recommends urgent government intervention in the form of a broad-based master plan on how to harness our resource endowment, both human and material, for the sole aim of promoting increased and sustainable improvement in the quality of life.

Keywords: *Goal programming, Human Development Index, Resource Endowment, Decision Variable, Optimization.*

1. Introduction and Background

Sustainable improvement in the quality of life has become the ultimate preoccupation of governments in both developed and developing economies of the world. This agenda is brought about through deliberate government monetary cum fiscal policies program primarily orchestrated with the ultimate improvement of the welfare of the citizen in mind (Malhotra, 2023). These programs cannot be realized in the absence of human and material resources that are naturally or artificially domiciled within the geographical space of a given economy. Quality of life could be seen as a highly subjective measure of happiness, but strongly associated with financial factors beyond the necessities of food and shelter. According to the 2024 world population review analysis, countries with the best quality of life include Norway, Denmark, Finland, Switzerland, and the Netherlands etc. These countries were carefully selected based on safety, health care, economic factors, and education. These metrics and indices bring to bear clearly what characterizes quality of life, which in most cases is determined by the natural endowment/available resources of a given economy.

Available resource, as a matter of fact, forms the lynching pad and economic catalyst upon which a given economy depends to address its numerous challenges and equally solve its problems through its policies and programs. While some economies are richly endowed with mineral resources/deposits, others have to create strategic means of sustaining their people and achieving their macroeconomic goals. Several theories have tried to explain resource endowment and its relation with the welfare of its people, namely the Demographic transition theory, Malthusian population theory, Dutch disease hypothesis, the rentier state theory, etc. These theories bring to the fore the possible distortions, mostly artificially created, that largely hamper the ability of a given economy to explore maximally its productive potentials. Several studies have been conducted aimed at seeing how the quality of life of citizens has fared, given the resource endowment that a given economy is endowed with. Interestingly, studies by Mohammed (2021) on quality of life and its association with natural endowment found an inverse relationship between population growth and development, even as both variables significantly impact but differently on quality of life. In sharp contrast with the finding of Mohammed (2021) is the study by Jordan (2009) who found that quality of life together with low productivity boost metropolitan population growth even as the studies failed to mention whether the increase in population is associated with migration or entirely a function of government proactiveness in creating a sustainable city plan and amenities that are peoples' friendly. The divergence of opinion based on studies and also on theoretical review tends to compound the argument of the direction effect and possible way of guaranteeing improved quality of life, thus prompting a mathematical evaluation of the optimization of the quality of life, given the population growth and the natural endowment that a given economy is endowed with.

2. Literature Review

Several studies have been reviewed, with each adopting a different approach and consequently concluding differently based on the technique employed in its analysis. Yufeng Chen, Adnan Khurshid, Abdur Rauf, Hanyao Yang, and Adrian Cantemir Calin (2023) in their studies found that good governance, in the light of human and material endowment, guarantees sustained improvement in the standard of living and quality of life. This presupposes that the endowment of resources does not automatically translate to improvement in the quality of life of citizens. The study suggested a suitable policy for the better utilization of resource rents, which, together with good governance, will engender inclusive growth and development.

Timur Madreimov and Leiming Li (2019), in their study on the natural resource dependence and life expectancy using fixed effect and panel corrected standard error regression estimator, found that natural resource dependence hampers human development; an observation that grossly corroborates the two leading resource curse theories. In what appears to be a twist in the direction of the effect of the key contending variables is the discovery from the study "Increasing Importance of Quality of Life" by Rappaport (2009). The study found that quality of life, together with low productivity, boosts metropolitan population growth by several percentage points. The study stressed that a region with amenities for which individuals would initially pay 5% (a small fraction) of their income grows slightly faster than an otherwise identical place. Badiora & Abiola (2017) in their study on the quality of life of rural dwellers in Nigeria found that the majority of the residents were living below the poverty line. The study further revealed that residents were less satisfied with key qualities of life indicators, especially availability of portable water, electricity, quality of recreational facilities, cleanliness of the area, and access to waste disposal facilities, among others. What appears obvious is the fact that the indicators of quality of life in the study do not in any shape or form coincide with the indices of quality of life as put forward by the 2024 World Population Review, which includes safety, health care, economic factors, and education. This brings into question the uncertainty of indices that constitute the presence or absence of quality of life in any locality.

Onah (2022) in his study on the incidence of population explosion in Nigeria and its implication on the quality of life highlighted the challenges of high population growth without visible sustainable provision to includes low per capita income, shortage of food, unemployment, kidnapping, general insecurity, etc. The study pointed out the bleak condition of the welfare of the masses owing to the visible fact that rapid population growth appears not to be consistent with national development, thus evidently hampering the quality of life of city dwellers. The study inferred (in the light of evidence from the UN report that depicts rising population at the expense of declining growth rate) that the culture and religion of the people have rekindled the population increase in Nigeria. This evidence casts doubt on the sustainability of the efficiency of resource use and consequent declining quality of life.

year	Population	Growth rate	Unemployment rate	Human Development Index
1990	94,398,550	2.63%	10.20	0.39
2000	121,351,477	2.54%	13.60	0.41
2010	157,315,944	2.71%	21.10	0.47
2019	199,805,437	2.67%	25.40	0.53

Source: United Nations Department of Economic and Social Affairs: Population Division (2019).

It is also important to state that further empirical discovery shows that other socio-economic indicators like the human development index, which is integrally composed of per capita income, literacy rate, and life expectancy, the unemployment rate, etc. within this period under review did not show sign of robust improvement as they were consistent in reflecting the declining growth rate following the rise in population. Extrapolating the findings and comparative assessment of key socio-economic indicators of countries relatively at par with Nigeria, like India, China, Malaysia, and South Africa, shows some astonishing empirical patterns that point to weaknesses of institutions and a lack of a broad-based master plan that keeps the economy on the growth path despite population upsurge. For instance, these economies have sustained an upward trajectory (within the limit of their respective endowed resources) with respective HDI indices of 0.685, 0.788, 0.81, and

0.717, not withstanding their population surge within the period under review. This empirical position yields to the view of Yufeng Chen, *et al* (2023) that highlights the importance of goods governance even with an abundance of human and material resources.

Mohammed (2021) in his study on the population and development vs Quality of life found that while population and development are inversely related, both impact on the quality of life. Appraising the strength and content of Mohammed's (2021) study, the researchers failed to categorically state the exact measure of development, or rather, the type of development that is being referred to. Secondly, the proxy for the quality of life was not stated. The study, just like the Malthusian theory, recommended control of population (which can also be controlled through an increase in literacy and education) to achieve development, and, in its conclusion, could guarantee improvement in quality of life.

Theoretical literature

Demographic transition theory: The theory of demographic transition (initially introduced by Warren Thompson in 1929 and later expanded by Frank W. Notestein) describes the historical shift in population trends that occurs as societies progress from pre-modern to modern conditions, characterized by societal transformations from high birth and death rates to low birth and death rates. The demographic transition theory is relevant to this study as it provides a framework for understanding the relationship between population dynamics and socio-economic development. The theory, when sufficiently x-rayed, highlights that there is always a socio-economic dimension to increasing population in satellite cities, as pointed out (even though loosely) by Mohammed (2021). Despite its application, the theory has been criticized on several fronts. Firstly, Critics argue that the theory has a Eurocentric bias, as it was originally formulated based on demographic changes observed in European countries. This limits its applicability to European contexts even as its assumptions may not hold universally. Secondly, the theory overly emphasizes the role of economic development in driving demographic changes. Critics contend that socio-cultural factors, government policies, and other non–economic derivatives are equally significant in shaping population dynamics.

Malthusian population theory: The Malthusian population theory, as proposed by Reverend Thomas Robert Malthus in 1798 in his well-known work titled "An Essay on the Principle of Population could also find significant expression in this study. The theory posits that population growth tends to outpace the growth of resource endowment, leading to a condition of overpopulation and consequent impact on economic development. Malthus argued that while population increases geometrically (exponentially), the production of food and resources increases arithmetically (linearly). According to this theory, if left unchecked, population growth will eventually exceed the capacity of the resource endowment, which will eventually have a far-reaching effect on the standard of living. The Malthusian population theory, even though it offers a historical perspective on how population dynamics may influence resource availability and economic development, fails to acknowledge the importance of technological advancement in boosting means of sustenance, a weakness that calls into question the veracity of the Malthusian theory.

The dependency theory: The dependency theory is the theory of underdevelopment proposed by a group of scholars referred to in literature as dependency theorists, namely Frank, Sunkel, Furtado, Santos, Emmanuel, and Amin (Jhingan, 2007). The theory explores the relationship between the number of dependents (children and the elderly) and the working-age population in a given society. It posits that the ratio of dependents to the working-age population has significant implications for economic well-being. The theory suggests that a high dependency ratio can significantly strain economic resources and potential, thus stifling economic development. However, critics have argued that the theory succeeded in oversimplifying the relationship between the dependency ratio and economic productivity, thus neglecting factors such as technological advancements and workforce skill levels, which have the tendency to advance the course of development.

Resource curse theory: Resource curse theory demonstrates how countries underperform economically despite benefitting from valuable natural resources. The theory could be attributed to Richard Auty, who wrote about the concept in his 1993 book titled Sustaining Development in the Mineral Economies: The Resource Curse Thesis. The theory could be seen as a paradoxical situation in which countries with an abundance of non-renewable natural resources experience stagnant economic growth as a result of deliberate neglect of investment in other major sectors of the economy. The relevance of the theory in explaining the present study

cannot be overemphasized. This presupposes that, following the argument put forward by Mohammed (2021) in his study, underperformance or neglect of other major sectors of the economy has the tendency to hamper the quality of life of the citizen.

Neoclassical Growth Theory: The neoclassical growth theory, also known as the exogenous growth model, was postulated independently by Solow (1956). The centre piece of the standard neoclassical growth model is an aggregate production function of the form;
$Y_t = F(K_t, L_t, A_t)$

Where: Y is output, K is capital, L is labor, and A is an index of technology or efficiency. The model posits that F has the usual neo-classical properties, that is, characterized by constant returns to scale, decreasing returns to each input, and a positive and constant elasticity of substitution. Technological change replaced investment (growth of K) as the primary factor explaining long-term growth, and its level was assumed by Solow and other growth theorists to be determined exogenously, that is, independently of all other factors, including inflation.

Neo–classical economists believe that to raise an economy's long-term trend rate of growth requires an increase in the labor supply and an improvement in the productivity of labor and capital. This model assumes that countries use their resources efficiently and that there are diminishing returns to capital as labor increases. Thus, technological knowledge brought about by human capital, such as education, training, and skill acquisition, is capable of raising the productivity of individuals, which leads to improvement in overall productivity and hence economic development. The neo-classical theories find their relevance in explaining a sequence of effects between the key variables (namely population growth, resource availability, and quality of life) as partially enunciated by Mohammed (2021). The theoretical framework of this study lies on the template of the neo-classical theories, even as it remains to be seen the effect the two key variables will have on the quality of life proxied by the human development index.

Goal programming hypothesis

The concept of goal programming was introduced by Charnes and Cooper (1961). The model was informed by the need to solve complex programming problems arising from conflicting resource constraints. Lee (1972), cited in Ekezie and Onuoha (2013), affirmed that the distinguishing feature of goal programming is that it allows for an ordinal solution. Ignizio (1976) holds that the goal programming technique often represents a substantial improvement in modelling and analysis of multi-objective problems. Many researchers, such as Kwak et al (1991), Ignizio (1985, 1989), Hallefjord and Jornsten (1988), Hemaida and Kwak (1994), Bryson (1995), Easton and Rossin (1996), etc., concentrated more on the techniques for solving multiple objective mathematical programming problems. The distinguishing feature of the preemptive goal programming approach as used by Ekezie and Onuoha (2013) is that the goal is arranged in order of priority. This means that the solution of the goal programming problem following the preemptive approach involves achieving the higher goal first before the lower goals are considered. Distinguishing between the weighted GP and the pre-emptive GP technique holds that although both methods convert the multiple goals into a single objective function, they do not generally produce the same solution. Thus, none of the methods is superior to the other because each technique is designed to satisfy certain decision-making preferences. Notable writers share different views and opinions about the novelty of the goal programming approach. Chowdary and Slomp (2003) considered the goal programming technique as an appropriate, powerful, and flexible technique for decision analysis of the troubled modern decision maker who is burdened with achieving multiple conflicting objectives under complex environmental and operational constraints. Tipparate (2005) stated that Goal programming extended itself by re-engineering many of the prior single objective linear programming with multiple and/or trade-off. Wikipedia (2006) described the goal programming technique as a generalization of the Linear Programming approach with a specific interest in handling multiple conflicting objective measures.

Model formation of the General Goal Programming Equation

Charnes and Cooper (1977) presented the general goal programming model, which can be expressed mathematically as:

$$\text{Minimize } Z = \sum_{j=1}^{m} d_i^{+}\, d_i^{-1}$$

Subject to the linear constraint
Goal constraint

$$\sum_{j=1}^{n} a_{ij}x_j - d_i^+ d_i^{-1} = b_i, \text{ for } i=1,\ldots m$$

System constraint

$$Sum \sum_{j=1}^{n} a_{ij}x_j \begin{bmatrix} \leq \\ = \\ \geq \end{bmatrix} = b_i, \text{ for } i=m+1,\ldots m+p$$

With $d_i^+, d_i^{-1}, x_i \geq 0$, for i =1, …, m; for j = 1,…, n.
Where there are m goals, p constraints and n decision variables
Z = objective function or achievement function (summation of all deviations from the goals)
a_{ij} = the coefficient associated with the variable in the jth Goal.
x_j = The jth decision variable
b_j = the associated right-hand side value.
d_i^- = negative deviation variable from the ith goal (underachievement)
d_i^+= positive deviation variable from the ith goal (overachievement)
Both overachievement and underachievement of a goal cannot occur simultaneously. Hence, either one or both of these variables must have a zero value; that is
$d_i^+ . d_i^- = 0$

Category of goal programming technique

a. Lexicographic goal programming (Preemptive goal programming)

The lexicographic goal programming model is a form of goal programming where the goal at the upper priority level is given the utmost attention, more than other goals. Ignizio (1985) re-echoed that preemptive goal programming or the lexicographic goal programming model should be employed. There exists a clear priority ordering among the goals to be achieved. Other presumption of the preemptive goal programming model is that it is assumed that no two goals have equal priority and are absolute. More so, the goals have equal ordinal ranking and are called preemptive priority factors with a relationship stated thus; $P_1 >> P_2 >>> P_i >>> P_{i+1} >>> P_m$. The priority relationship implies that multiplication n However larger it may be cannot make the lower-level goal as the higher goal ($P_n > P_{n+1}$).
The proposed pre-emptive model is given as. $Minimize\ \mathbb{Z} = \sum_{i=1}^{n} p_i\{(d_i^+ + d_i^-)\}$
$Subject\ to$

$$\sum_{(i=1)}^{m} (a_{ij}\, x_j + d_i^- - d_i^+) = g_i$$

$(i, k = 1,2, \ldots\ldots, n)$
$(j = 1,2, \ldots, m)$
$d_i^-, d_i^+, x_j \geq 0$
Where d_i^+ and d_i^- are deviational variables;
x_j = decision variables;
a_{ij} = decision variables coefficients;
Where w_i^+ and w_i^- Are non-negative constraints representing relative weights;
p_i = The preemptive factor/priority level assigned to each relative goal in rank order (that is $p_i > p_2 > \ldots > p_n$).

b. Weighted goal programming model

The weight goal programming approach is deployed when the decision maker is more interested in the indirect comparison of the goals. The weighting of deviational variables at the same priority level shows the relative importance of each deviation. Charnes and Cooper (1977) stated that the weighted goal programming model can be specified thus.
In the weights method, the single objective function is the weighted sum of the functions representing the goals of the problem.
The weights goal programming model is of the form:$CapCapMinimize\ \mathbb{Z} = \sum_{i=1}^{n}\{(w_i^+ + w_i^-)d_i)\}$
$Subject\ to$

$$\sum_{(i=1)}^{m} (a_{ij}\, x_j + d_i^- - d_i^+) = g_i$$
$(i = 1,2, \ldots\ldots, n)$
$(j = 1,2, \ldots, m)$
$d_i^-, d_i^+, x_j \geq 0$

Where w_i^+ and w_i^{-1} These are non-negative constraints representing the relative weight to be assigned to the respective positive and negative deviation variables. The relative weights may be any real number, where the greater the weight, the greater the assigned importance to minimize the respective deviation variable to which the relative weight is attached. This model is a non-preemptive model that seeks to minimize the total weighted deviation from all goals stated in the model. While Ijiri (1955) had introduced the idea of combining preemptive priorities and weighing, Charnes and Cooper (1977) suggested the tool programming model as;
The proposed pre-emptive model is given as

$$..Minimize\ \mathbb{Z} = \sum_{i=1}^{n} P \sum_{i=1}^{n} \{w_{ik}^+ d_i^+ + w_{ik}^- d_i^-\}$$

Subject to

$$\sum_{(i=1)}^{m} (a_{ij}\, x_j + d_i^- - d_i^+) = g_i$$
$(i, k = 1,2, \ldots\ldots, n)$
$(j = 1,2, \ldots, m)$
$d_i^-, d_i^+, x_j \geq 0$
Where d_i^+ and d_i^- are deviational variables;
$x_j =$ decision variables;
$a_{ij} =$ decision variables coefficients;
Where w_i^+ and w_i^- are non-negative constraints representing relative weights;
$p_i =$ The preemptive factor/priority level assigned to each relative goal in rank order (that is $p_i > p_2 > \ldots > p_n$).

Research Gap

Based on the reviewed study, it appears mixed the results from different studies. While some studies are looking at population growth and development, others were dealing with population growth and quality of life or resource dependence and life expectancy (which is identical close proxy of quality of life). The present study discovered a topic gap by deviating from previous studies and looking at population growth, available resources and quality of life, i.e., integrating the two contending variables into one equation. While population growth proxied by the population growth rate is critical in these studies because of how uncontrolled population rise can create pressure on available infrastructural facility which consequently will affect standard of living and welfare of the populace, the choice of energy consumption as measure of is influenced by paucity of data and also the believe that energy consumption will offer a good measure of the available resources of a given economy. Finally, the Quality of life is proxied by the human development index (developed by Mahbub Haq, a Pakistani Economist, in 1990)- a composite measure of the standard of living, life expectancy and literacy rate, which together and respectively are outcomes for GDP per capita income, health and education investment outcomes.

Technique gap was equally discovered as the present study adopted a mathematical approach of goal programming to ascertain the optimization of quality-of-life given population growth and available resources, which, based on the study by Mohammed (2021), were found to be inversely related with both impacting concurrently on quality of life.

3. Research Methodology

The study adopts an *ex post facto* design. In specific terms, while the general model of the goal programming model will guide the actualization of the objective of the study, the neo-classical growth framework depicted as $Y_t = F(K_t, L_t, A_t)$, Offers a mechanism and theoretical anchor of the study wherein the human development

index, as a measure of quality of life, is affected by population growth and available resources (proxied by energy consumption). The leeway to this choice of methodology was rightly informed by Ekezie & Onuoha (2013).

Model Specification: Goal programming optimization model

The general form of the goal programming model is given as;

$$Minimize\ Z = \sum_{m=1}^{M}\sum_{n-1}^{N} P_m^n \left[\sum_{i=1}^{I}\sum_{j=1}^{J}\sum_{t=1}^{T}\left(d_{ijt}^{+} - d_{ijt}^{-}\right)\right]$$

Subject to:

System constraint

$$X_{it} - \sum_{k} a_{ikt}X_{kt} + d_{it}^{+} + d_{it}^{-}: \quad \begin{matrix} i & = & 1,2 \ldots . . I \\ k & = & 1,2 \ldots . . K \\ t & = & 1,2 \ldots \ldots T \end{matrix}$$

Goal constraint

$$\sum_{I} a_{ijt}\, X_{it} + d_{jt}^{-} + d_{jt}^{-} = C_{jt}: \quad \begin{matrix} j & = & 1,2 \ldots \ldots J \\ t & = & 1,2 \ldots \ldots T \end{matrix}$$

$X_{i,j,k,t};\ d_{i,j,t}^{-};\ d_{i,j,t}^{-} \geq 0\ \forall\ \ i, j, k\ and\ t\ non-negativity\ constraint$

Where:

$P_m^n = priority\ level\ m\ attached\ to\ goal\ or\ objective\ n$

$d_{jt}^{+}\left(d_{jt}^{-}\right) = positive\ (negative) deviational\ variable\ denoting\ overachivement$

$(underachievement\ of\ goal\ n\ representing\ system\ or\ non\ goal\ constraint$

$X_{it}(X_{kt}) = endogenous\ (decisions)\ and\ exogenous\ variables\ respectively\ at\ time\ t$

$I = \ number\ of\ endogenous\ (decision)\ variables$

$K = \ number\ of\ exogenous\ variable\ in\ each\ system\ constraints$

$N = \ number\ of\ goal\ and\ non\ goal\ (system)\ constraints.$

$M = \ number\ of\ priority\ level$

$J = \ number\ of\ goals$

$T = time\ period$

$B_{it} = right\ hand\ side\ value\ of\ system\ constraint\ i\ at\ time\ t$

$C_{jt} = right\ hand\ value\ of\ goal\ constraints\ j\ representing\ the$
$aspiration\ level\ of\ target\ at\ time\ t$

$a_{ik} = regression\ coefficient\ of\ exogenous\ variable, X_k, in\ the\ system$
$constrant\ representing\ decision\ variable\ X\ at\ time\ t$

$a_{ijt} = technological\ coefficient\ of\ the\ decision\ variable\ , X_I\ corresponding$
$to\ goal\ constraint\ j\ at\ time\ t$

The major policy goals that the goal programming technique seeks to achieve as clearly stated in the objective, clearly incorporated in the objective function/achievement function of the general goal programming framework, which entails minimizing the underachievement of the desired quality of life, minimizing the overachievement recorded in the population growth rate and minimizing the underachievement of available resources. These goals are clearly stated according to priority based on the tenets of the adopted weighted-preemptive goal programming framework.

4. Results

Goal programming formulation for population growth, available resources and quality of life

Using four data points from 2000 to 2024, the decision variable as well as the aspirational target were determined. The functional coefficient of the decision variables will be based on the average of the decision variables. Recall that the aspirational target goal to be achieved would be set based on these data points. The decision variable can be determined as follows.

Table 1: Average of core variable

ITEM(GOAL)	MEAN (2000 - 2005)	MEAN (2006 - 2011)	MEAN (2012 - 2017)	MEAN (2018 - 2023)	TOTAL
ARES	84.0	84.3	84.5	86.1	338.9
POPG	2.67	2.73	2.61	2.43	10.4
HDI	0.44	0.48	0.51	0.54	1.96
Total	87.1	87.2	87.6	89.1	351.3

Table 1 is an outline of the data for Available resources, Population Growth rate and Human development index (proxy for Quality of life) over the period of twenty-three years (2000 - 2023), represented as means for four-year intervals each.

Table 2: Coded data over the period of twenty-three years (2000 -2023)

ITEM(GOAL)	MEAN 1	MEAN 2	MEAN 3	MEAN 4	TOTAL
ARES	8.4	8.43	8.5	8.6	33.9
POPG	0.267	0.273	0.261	0.243	1.04
HDI	0.044	0.048	0.051	0.054	0.197
Total	11.1	11.2	11.16	8.90	35.2

Table 2 gives the coded data of the Available resources, Population Growth rate and Quality of life (proxied by human development index). The reason for the coding is to enable one to work with small figures in the analysis.

Assignment of weights to the goals

The objective function coefficient for the variables associated with the goal is called the weight for the goal. Justification of Weight of these weight could be deduced from early theorist like the Warren Thompson of the demographic transition theory of 1929 (and further expanded by Frank W. Notestein) who highlighted the importance of resources endowment in its analysis of the demographic transition- a premise and discovery that formed the basis for assigning a higher weight of 6 to available resources, then followed by the population growth rate (significantly influenced by the socio-economic activities around available resource which in political economy balance is referred to as the super structure) which weights 4 and finally the consequent outcome of these socio-economic activities of the demographics- quality of life, taking the weight of 2 in the goal programming weight assignment. Therefore, let w_i Be the weights for goals, ranging from 6,4 and 2 in a descending order of importance of these weights.

Table 3: Coded data with weights

ITEM(GOAL)	MEAN 1	MEAN 2	MEAN 3	MEAN 4	TOTAL	w_i
ARES	8.4	8.43	8.5	8.6	33.9	6
POPG	0.267	0.273	0.261	0.243	1.04	4
HDI	0.044	0.048	0.051	0.054	0.197	2

The table above gives the coded data and the assigned weights to the goals.

Aspiration level (Target value) of the Goals

The aspirational target of each of the weighted goals is influenced by the data point averages and the prevailing stance of these variables in Nigeria. For instance, the HDI of Nigeria currently stands at a little above 0.50; a figures that validate the chosen aspirational target used in the study. The same applies to the population growth target of 2 percent and the Energy consumption target of .80 as a measure of available resources. The goal statements are given as follows.

Goal 1: Raise the Energy consumption measure by at least 80 percent
Goal 2: Reduce population growth rate by at most 2 percent
Goal 3: Raise the quality-of-life measure by at least 0.50

The goal formulation

Let X_i = mean of data for Available resources, Population growth and economic development for the years 2000 – 2023

Let x_1 = mean of data for Available resources, Population growth and economic development for the year 2000 – 2005

x_2 = mean of data for Available resources, Population growth and economic development for years 2006 – 2011

x_3 = mean of data for Available resources, Population growth and economic development for the years 2012 – 2017

x_4 = mean of data for Available resources, Population growth and economic development for the year 2018 – 2023

Where x_1, x_2, x_3, x_4 These are decision variables.

The goals can be stated mathematically as follows:

$8.4x_1 + 8.4x_2 + 8.5x_3 + 8.6x_4 >= 8$ (Available resource constraint)

$0.27x_1 + 0.27x_2 + 0.26x_3 + 0.24x_4 =< 0.2$ (Population growth rate constraint)

$0.04x_1 + 0.05x_2 + 0.05x_3 + 0.05x_4 >= 0.5$ (Quality of life constraint)

$X_1, X_2, X_3, X_4 >= 0$.

The goal programming formulation

Let d_i^+ = the amount by which the aspirational target exceeds the ith goal.

Di^- = amount by which the aspirational target is less than the ith goal.

Let ~~Z~~ = be the weighted sum of the objective function.

Using the weighted goal programming model, the goal formulation can be mathematically stated as follows:

Min ~~Z~~ = $6d_1^+ + 4d_2^- + 2d_3^+$ (objective function)

Subject to:

$8.4x_1 + 8.4x_2 + 8.5x_3 + 8.6x_4 + d_1^- - d_1^+ = 8$

$0.27x_1 + 0.27x_2 + 0.26x_3 + 0.24x_4 + d_2^- - d_2^+ = 0.2$

$0.04x_1 + 0.05x_2 + 0.05x_3 + 0.05x_4 + d_3^- - d_3^+ = 0.5$

$x_1, x_2, x_3, x_4, d_1^+, d_2^+, d_3^+, d_1^-, d_2^-, d_3^- >= 0$

The input data

Table 4:

Basic variables Name of variables	x_1	x_2	x_3	x_4	x_5 d^{1+}	x_6 d^{2+}	x_7 d^{3+}	x_8 d^{1-}	x_9 d^{2-}	x_{10} d^{3-}		RHS
Minimize Z	0	0	0	0	6	0	2	0	4	0		
Constraint 1	8.4	8.4	8.5	8.6	-1	0	0	1	0	0	=	8
Constraint 2	0.27	0.27	0.26	0.24	0	-1	0	0	1	0	=	0.2
Constraint 3	0.04	0.05	0.05	0.05	0	0	-1	0	0	1	=	0.5

In the above table, let:

$x_5 = d^{1+}$, $x_6 = d^{2+}$, $x_7 = d^{3+}$.

$x_8 = d^{1-}$, $x_9 = d^{2-}$, $x_{10} = d^{3-}$

Excel Solver was applied to the table above to obtain the table below:

0	0	0	0.930	0	0	0.023	0	0	0.453	Solution	Min Z	0
x_1	x_2	x_3	x_4	ued^{1+}	ued^{1-}	$dued^{2+}$	$dued^{2-}$	ued^{3+}	$dued^{3-}$			
0	0	0	0	6	0	0	4	2	0	Coefficients		
Constraints												
8.4	8.4	8.5	8.6	-1	1	0	0	0	0	8	>=	8
0.27	0.27	0.26	0.24	0	0	-1	1	0	0	0.2	<=	0.2
0.04	0.05	0.05	0.05	0	0	0	0	-1	1	0.5	>=	0.5

The Excel solver application gives the optimum solution as follows:
Z = 0, x_1 = 0, x_2= 0, x_3 = 0, x_4 = 0.93
d^{1+} = 0, d^{2+} = 0.023, d^{3+} = 0
d^{1-} = 0, d^{2-} = 0, d^{3-}= 0.453.

Available resource-constrained Evaluation
From the Excel solver, we have that;
$x_1 = 0; x_2 = 0\ ;\ x_3 = 0\ : x_4$ = 0.930
Substituting these values into constraint 1 (Resource constraint), we have;
$8.4x_1 + 8.4x_2 + 8.5x_3 + 8.6x_4 >= 8$
$8.4(0) + 8.4(0) + 8.5(0) + 8.6(0.930) \geq 8$
$7.998 \geq 8$ Constraint unsatisfied (approximately)
$\therefore\ d_1^- = 0.002;\ d_1^+ = 0$

2. Population growth-constraint Evaluation
From the Excel solver, we have that;
$x_1 = 0; x_2 = 0\ ;\ x_3 = 0\ : x_4$ = 0.930
Substituting these values into the population growth constraint, we have;
$x_1 = 0; x_2 = 0\ ;\ x_3 = 0\ : x_4$ = 0.930
$0.27(0) + 0.27(0) + 0.26(0) + 0.24(0.930) \leq 0.2$
$0.223 \leq 0.2$ Constraint unsatisfied
$\therefore\ d_2^- = 0.023;\ d_2^+ = 0$

3. Economic development (Quality of life) constraint evaluation
$0.04x_1 + 0.05x_2 + 0.05x_3 + 0.05x_4 \geq 0.50$
$0.04(0) + 0.05(0) + 0.05(0) + 0.05(0.930) \geq 0.5$
$0.047 \geq 0.50\ \ constraint\ unsatisfied$
$\therefore\ d_3^- = 0.453;\ d_3^+ = 0$
To check for the optimization of the objective function, we substitute the value of the respective deviation from the constraint into the weighted objective function and we have;
$Min\ Z = 6(0) + 4(0.023) + 2(0)$
Recall that Z is minimized when Z=0; otherwise, the objective function is not minimized.
$Min\ Z = 6(0) + 4(0.023) + 2(0)$
$Min\ Z = 0.092$

5. Discussion and Conclusion

We conclude that since Z. ≠ 0, therefore, the objective function is not satisfied.

Interpretation of the solution
The application of the simplex GP method by Excel Solver gives the optimum solution as follows:
$CapCapZ$ = 0.092, x_1 = 0, x_2 = 0, x_3 = 0.45, x_4= 0.930, d_1^+ = 0, d_2^+ = 0, d_3^+= 0, d_1^- = 0, d_2^-= 0.023, d_3^- = 0.453 Since the value of Z is not approximately equal to zero, it shows that the objective function of the goal programming formulation was not minimized (optimized). Based on the decision variables obtained from the averages of the relevant variables, the goal programming solutions could not satisfy any of the aspirational targets; hence, the

non-optimization of the objective function after the careful substitution of the respective deviations into the objective function. Recall the lingering argument of Malthusian population theories, which one could argue finds an explanation in the study area. Based on the outcome of the goal programming iteration, the aspirational target of a 2 percent population growth rate could not be met. An affirmation that the Nigerian population keeps growing with little or no intervention to curtail the surge; a development that could worsen the quality-of-life argument that was supported by Mohammed (2021) and also by the critics of demographic transition theory who strongly hold that non–economic derivatives are equally significant in shaping population dynamics. Furthermore, following the goal programming practice of assigning weight, one could equally observe that there is no way the goal three, which is the quality of life (measured by the human development index), target could be meet without first meeting the aspiration target of goal one (the available resource proxied by energy consumption) hence the non-optimization of the weighted objective function. It is also important to highlight that the problem of Nigeria, far from resource non-optimization, is the endemic problem of institutional failure (a non-economic factor), which finds expression in the inability of the Nigerian system to enjoy optimal resource allocation and consequently poor quality of life, proxied by the human development index. Therefore, it could be summarized that there is consistency in the constraint evaluation, where all the aspirational targets showed strong evidence of not being satisfied.

Policy Recommendations

However, the result portends great potential, but on the condition that the government needs to come up with a broad-based master plan on how to harness our resource endowment for the sole aim of promoting increased quality of life. Secondly, increased investment in research and development cannot be ignored, as the outcome of such investment will portend a far-reaching effect on the quality of life of an average Nigerian.

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Enterprise Risk Management Maturity in Malaysia's Banking Industry: A Conceptual Assessment

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Abstract: Enterprise Risk Management (ERM) has emerged as a critical framework for ensuring the stability, resilience, and long-term sustainability of financial institutions. In Malaysia, the banking industry has made significant progress in embedding ERM, guided by Bank Negara Malaysia (BNM) regulatory frameworks and global best practices. However, the maturity of ERM practices varies across institutions, particularly in areas such as governance, culture, risk reporting, and technology adoption. The objective of this concept paper is to design an integrated framework to assess the ERM maturity of the Malaysian banking industry. This concept paper proposes an integrated ERM maturity assessment by examining ten key dimensions that reflect compliance with international standards and regulatory requirements. Findings are expected to provide insights for regulators, policymakers, and banking institutions to strengthen ERM practices, support sustainable financial growth, and stay resilient.

Keywords: *Enterprise Risk Management, ERM maturity, risk assessment, banking industry.*

1. Introduction and Background

The Malaysian banking industry plays a central role in supporting economic growth and financial stability. However, banks face increasing complexity and volatility arising from global economic shifts, digital transformation, cyber threats, and stringent regulatory requirements. The Malaysian banking industry operates in an increasingly complex and volatile environment shaped by globalization, digitalization, regulatory reforms, and emerging risks such as cyber threats and climate change. As financial intermediaries, banks are expected not only to safeguard their institutions but also to maintain public trust and contribute to national financial stability.

The banking industry in Malaysia is required to comply with the Risk-Based Capital Framework and the Internal Capital Adequacy Assessment Process to ensure sound risk management practices and adequate capital levels commensurate with their risk profiles. The Basel III framework, introduced in response to the 2007 global financial crisis, further intensified these requirements by introducing stringent liquidity standards to enhance banking sector stability (Zainudin et al., 2019). The core tenet of these regulations is to ensure that banks maintain sufficient capital buffers to mitigate potential losses from idiosyncratic and systemic risks (Anisa & Sutrisno, 2020). This rigorous regulatory oversight necessitates that financial institutions implement sophisticated risk management practices that extend beyond mere compliance, embedding a proactive risk culture throughout their operations (Rasid & Rahman, 2012).

Given the increasing exposure of Malaysian banks to diverse financial and non-financial risks, assessing ERM maturity is crucial for ensuring competitive risk-adjusted returns on capital and maintaining compliance with prudential guidelines (Vallabh, 2005). This involves a continuous cycle of identification, assessment, mitigation, monitoring, and reporting of all material risks across the enterprise, moving beyond siloed departmental risk functions towards a holistic view (Liu et al., 2013). ERM maturity within the banking sector refers to the sophistication and embeddedness of an institution's risk management frameworks and practices. This encompasses the progression from basic compliance-driven approaches to integrated, strategic risk oversight that actively informs business decisions and value creation (Vij, 2019). A mature ERM framework transcends mere regulatory adherence, establishing a robust system where risk management is intrinsically linked to organizational performance indicators and strategic objectives (Raizada, 2019). This comprehensive approach integrates both internal and external risk considerations, recognizing that effective risk management extends

beyond operational boundaries to encompass broader social and environmental factors (Fitriana & Wardhani, 2020).

The banking sector, in particular, benefits significantly from a high level of ERM maturity given its inherent exposure to diverse and complex financial, operational, and reputational risks, which necessitate a robust and integrated risk management framework to maintain stability and ensure sustained profitability. This heightened emphasis on ERM in the financial sector is further driven by legislative requirements and evolving regulatory frameworks, which mandate sophisticated risk assessment and mitigation strategies (Whittle & Nel-Sanders, 2022). A mature ERM framework enables financial institutions to not only comply with these stringent regulations but also to strategically leverage risk insights for competitive advantage and enhanced decision-making (Sakrabani & Ping, 2022). Additionally, a mature ERM framework fosters a culture of informed risk-taking, allowing banks to strategically pursue opportunities while maintaining financial stability and regulatory compliance

While BNM mandates ERM adoption, there is limited empirical evidence on the maturity of ERM implementation across the sector. A structured evaluation of ERM maturity is therefore critical to determine how well banks are equipped to anticipate and respond to risks, integrate risk considerations into strategy, and build a risk-aware culture. Despite the recognized importance of robust ERM, many institutions, including those in healthcare, often lag in adopting sophisticated approaches, frequently operating at basic to evolving maturity levels (Catalyst, 2018). This disparity underscores a critical need for enhanced understanding and implementation of advanced ERM frameworks across all sectors, particularly in finance, where the implications of insufficient risk management can be widespread and severe (Habib et al., 2014).

Therefore, a deeper exploration into the factors influencing ERM maturity, particularly within the banking sector, is warranted to identify pathways for enhancing risk management capabilities and fostering greater financial resilience. This study aims to address this gap by investigating the critical factors that drive ERM maturity within the banking sector, offering insights into best practices and potential areas for improvement. Despite the growing acknowledgment of ERM's significance, particularly within high-risk sectors such as banking, there remains a notable research gap concerning the precise mechanisms through which its components contribute to overall effectiveness and the institutional, individual, and organizational factors influencing its adoption and maturity (Anton & Nucu, 2020; Bromiley et al., 2014).

This study further investigates the specific factors contributing to ERM maturity within the Malaysian banking industry, identifying both the drivers and impediments to comprehensive risk integration. This paper endeavours to bridge this gap by examining the interplay of these factors to provide a comprehensive understanding of ERM maturity in the banking industry.

2. Literature Review

This section consists of two sections, namely a discussion on the progress of ERM maturity in the Malaysian banking industry and a review of previous studies on the area of ERM maturity.

Evolution of ERM Maturity in the Malaysian Banking Industry

The Malaysian banking industry provides a compelling context for studying ERM maturity, given its proactive stance on ESG developments and the evolving regulatory landscape. This is particularly evident given that Malaysia exhibits a more robust system for ERM research, adoption, practices, and compliance compared to other regional counterparts (Shatnawi et al., 2020). For instance, Malaysia has been at the forefront of encouraging sustainable finance practices, which naturally align with and reinforce the principles of integrated risk management. This regulatory impetus and demonstrated performance link underscore the importance of assessing ERM maturity within the Malaysian banking industry, particularly in understanding how these frameworks are effectively implemented at divisional levels to bridge potential gaps in practice (Abidin et al., 2019).

This progressive regulatory environment, coupled with the industry's exposure to diverse financial risks, necessitates a deep understanding of ERM implementation effectiveness. This unique setting allows for an in-

depth analysis of how Malaysian banks are adapting their ERM frameworks to incorporate sustainability risks and opportunities, thereby enhancing their overall resilience and competitive advantage. Such an examination is crucial given that previous research has highlighted the significant role of sustainability reporting quality in explaining corporate financial performance globally, a finding highly pertinent to the Malaysian context. Moreover, the Malaysian financial landscape, characterized by its status as an emerging market, presents a distinct environment for assessing ERM's value creation, especially in terms of cost savings and revenue enhancement (Chen et al., 2019)

Despite the acknowledged importance of ERM, its implementation and maturity levels can vary significantly across different sectors and regions, often influenced by specific regulatory environments, organizational culture, and resource availability (Habib et al., 2014; Zhao et al., 2015; Vij, 2019). In Malaysia, for instance, nearly half of the listed companies are classified as financially distressed under PN17 and GN3, highlighting a critical need for enhanced corporate financial performance through strategic risk management (ElSayed et al., 2011). This situation underscores the imperative for Malaysian financial institutions to adopt robust ERM frameworks to proactively identify, assess, and mitigate risks, thereby fostering greater resilience and stability within the financial sector. The high proportion of financially distressed companies in Malaysia suggests potential deficiencies in current risk management practices or an inadequate focus on holistic enterprise risk management that integrates financial, operational, and strategic risks.

Furthermore, the prevalence of traditional management accounting practices, focusing primarily on financial performance and budgetary control, within Malaysian financial institutions may limit their ability to comprehensively address emerging risks and adapt to a dynamic economic landscape (Rasid & Rahman, 2012). This highlights a gap in the adoption of more sophisticated ERM methodologies that could encompass a broader spectrum of risks, including non-financial and emerging risks, which are crucial for long-term organizational health and competitiveness (Lima et al., 2019; Syrová & Špička, 2022). Therefore, a comprehensive assessment of ERM maturity within the Malaysian banking industry is essential to identify areas for improvement and guide the development of more resilient financial systems. This assessment would involve evaluating the current risk governance structures, risk identification and measurement techniques, risk monitoring and reporting mechanisms, and the integration of risk insights into strategic decision-making processes.

ERM Maturity Model

ERM Maturity Model, developed by the Committee of Sponsoring Organizations of the Treadway Commission (COSO), offers a framework for organizations to enhance their enterprise risk management processes, though it has been noted for its conceptual abstractness and recent updates aim to improve its applicability (Rubino, 2018). This model emphasizes the integration of risk considerations into strategic planning and performance management, moving beyond traditional compliance-focused approaches to embed risk awareness throughout the enterprise (Zulfitra et al., 2022). The 2017 update to the COSO ERM Framework, specifically, focuses on integrating ERM with strategy-setting and performance, recognizing the crucial roles of governance and culture in this process (Prewett & Terry, 2018). Despite its widespread adoption, the COSO framework often presents challenges in practical implementation due to its high-level guidance, necessitating further research into its operationalization within diverse organizational contexts.

Similarly, the RIMS Risk Maturity Model (RIMS) provides a robust framework for assessing an organization's risk management capabilities across 25 different competency attributes, enabling a granular evaluation of its maturity level and offering actionable insights for advancement. This model allows organizations to benchmark their risk management practices against industry standards and identify specific areas for development, thereby fostering continuous improvement in their ERM capabilities. Although less prescriptive than COSO or RIMS, the Deloitte Risk Intelligence Framework provides a valuable lens through which organizations can understand their risk posture and develop intelligence-driven risk management strategies, emphasizing proactive identification and response to emerging risks (Prasanna & Saidireddy, 2021).

These frameworks, despite their individual nuances, collectively aim to guide organizations towards higher levels of ERM maturity, characterized by comprehensive risk integration and a proactive stance on risk management (Burnaby & Hass, 2009). The convergence of these theoretical frameworks with practical application is crucial for companies to adopt robust risk management practices that move beyond mere

compliance to strategic value creation (Ching & Colombo, 2014). This integration is particularly pertinent given the increasing reliance on data analytics, which introduces complex and decentralized risk environments necessitating updated risk governance frameworks to effectively manage new processing risks. The increasing complexity of global financial relationships, alongside rapid technological advancements and evolving regulatory landscapes, necessitates sophisticated risk management frameworks to ensure continuous organizational resilience and sustainability (Oko-Odion & Angela, 2025). This holistic view of risk management, therefore, extends beyond financial perils to encompass a broader spectrum of operational, strategic, and emergent risks, particularly within a volatile global economic landscape.

3. Conceptual framework of ERM maturity for the banking industry

This section elaborates on the assessment of ERM maturity that consists of ten key dimensions and five levels of ERM maturity. The ERM maturity is assigned based on the ERM maturity index score.

Key Dimensions of ERM Maturity

The maturity of an Enterprise Risk Management framework is often assessed through various dimensions, including the comprehensiveness of its risk identification, assessment, and mitigation processes, as well as its integration with strategic planning and corporate governance. A mature ERM system not only identifies potential risks but also quantifies their impact, enabling organizations to prioritize responses and allocate resources effectively. Furthermore, a high level of ERM maturity signifies a proactive stance towards emerging risks, such as climate change and cybersecurity threats, by embedding these considerations into the organizational strategy and operational workflows, thereby enhancing overall organizational resilience (Mensah & Gottwald, 2016).

Assessing ERM maturity involves evaluating several key dimensions, including risk governance, risk culture, risk appetite, and the integration of risk management into strategic planning and operational processes (Sookye & Mohamudally-Boolaky, 2019). These dimensions collectively determine an organization's capacity to manage risks effectively and proactively respond to an evolving risk landscape. Effective ERM necessitates a comprehensive understanding and strategic alignment of these dimensions to foster organizational resilience and enable sustained value creation. Furthermore, it integrates risk management principles throughout the organization, transforming it from a mere compliance function into a strategic enabler for achieving business objectives (Viscelli et al., 2016; Kaya, 2017).

Based on the integration of the above-mentioned models, this research proposes the key dimensions of risk maturity that consist of ten key dimensions as follows:-

- Risk Governance
- Three Lines of Defence
- Competency of the Risk Management Function
- Risk Appetite, Tolerance, and Targets
- Risk Management Framework, Policies, and Procedures
- Risk Management Tools, Processes, and Assessment Methodology
- Risk Taxonomy and Heatmap
- Risk Reports and Dashboards
- Risk Culture, Awareness, and Continuous Improvement
- Adoption of Technology to Strengthen Risk Management

Risk Governance refers to oversight at the Board and Senior Management Level. Strong risk governance is essential for effective ERM. The Board of Directors holds ultimate accountability for risk oversight, supported by board-level risk committees. Senior management translates board directives into actionable policies. Maturity is reflected in the degree of board engagement, independence of risk committees, and the integration of risk considerations into strategic decision-making.

Three lines of defense reflect accountability and effectiveness within an organization. ERM maturity depends on the clarity and effectiveness of the three lines of defense. The first line represented by business units owning

and managing risk. The second line, represented by risk management and compliance functions, provides oversight. The third line represented by the internal audit provides independent assurance. Mature banks demonstrate well-defined accountability, strong coordination, and effective challenge between these lines.

Competency of the risk management function refers to ERM effectiveness relies on the skills, expertise, and capacity of the risk management function. Current gaps in Malaysia include shortages in specialized areas such as cyber risk, climate risk, and quantitative risk modelling. Moreover, robust cybersecurity practices, which are often immature or underfunded in many businesses, are integral to effective risk management and necessitate a proactive stance against evolving digital threats (Blum, 2020).

Risk appetite, tolerance, and targets should be articulated as a risk appetite statement (RAS) that defines the boundaries within which banks operate. Maturity is reflected in the alignment between risk appetite, tolerance levels, and measurable risk targets. Advanced institutions integrate RAS into capital planning, business performance, and remuneration structures. This integration ensures that risk considerations are embedded in all levels of decision-making, from strategic allocation of resources to individual performance incentives, thereby fostering a holistic risk-aware culture.

ERM maturity requires comprehensive risk management frameworks that are formally documented and regularly updated. Policies and procedures should cover all material risks (credit, market, operational, liquidity, cyber, and ESG-related risks). Maturity is demonstrated when policies are not just regulatory-driven but strategically embedded. Banks employ a variety of tools such as risk registers, stress testing, scenario analysis, and key risk indicators (KRIs). Maturity depends on the sophistication, consistency, and integration of these tools across business units. Advanced practices include forward-looking risk assessments and dynamic stress testing.

A standardized risk taxonomy provides a common language across the bank, ensuring consistency in risk identification and reporting. Risk heatmaps visually prioritize risks based on likelihood and impact. Mature institutions employ dynamic, data-driven taxonomies and real-time risk visualization to guide decision-making. Timely, accurate, and insightful risk reports are critical for decision-making. Mature institutions produce risk dashboards tailored to different stakeholders (board, senior management, business units) with forward-looking indicators. Integration of financial and non-financial risks in reporting is a hallmark of maturity.

A strong risk culture that promotes transparency, accountability, and ethical conduct is detrimental to ERM maturity. Training, awareness campaigns, and tone from the top are crucial. Continuous improvement mechanisms, such as lessons learned from incidents and benchmarking against peers, demonstrate higher maturity. Technological advancement is central to ERM maturity. Malaysian banks are adopting regulatory technology, data analytics, machine learning, and artificial intelligence-driven risk models to enhance monitoring and predictive capabilities. These technological advancements enable more precise risk assessments, improved fraud detection, and a more adaptive regulatory compliance framework, ultimately strengthening the financial sector's resilience against complex and rapidly evolving threats.

Automation of risk reporting and digital dashboards further strengthens efficiency and accuracy. Maturity is demonstrated when technology is fully embedded in risk management processes rather than used as isolated tools. This integration transforms risk management from a reactive function into a proactive, strategic enabler, facilitating quicker and more informed decision-making across the enterprise.

The Five-level ERM maturity

Adapted from COSO and RIMS frameworks, this study adopts a five-level ERM maturity model. The model shows progressive ERM maturity stages, namely initial, developing, defined, managed, and optimized. The following Table 1 depicts the five-level ERM maturity.

Table 1: Five-level ERM maturity

Level	Description
Initial (Ad-hoc/ fragmented)	Risk management activities are unstructured and risks are handled reactively. There is limited awareness of enterprise-wide risk and inconsistent practices. Risk management is siloed by department and limited enterprise-wide perspective.
Developing (Compliance-Oriented)	While basic risk policies and procedures exist, risk activities are primarily driven by regulatory requirements (e.g., BNM compliance).
Defined (Structured/Process-Oriented)	Formalized ERM framework with assigned responsibilities. Governance and policies are in place. Risk appetite is defined but not fully integrated into decision-making.
Managed (Integrated into Business Processes)	ERM is integrated into strategic decision-making and performance management. Risk culture begins to influence business strategy. There exists a culture of proactive risk management.
Optimized (Value-Driven)	ERM is embedded across all levels of the organization. Advanced analytics, scenario planning, and strategic alignment drive value creation. ERM enhances innovation and sustainable growth. Continuous improvement and innovation in risk practices. Dynamic risk appetite and real-time monitoring.

ERM maturity scoring matrix

ERM scoring matrix An ERM scoring matrix provides a standardized framework for assessing the effectiveness and maturity of an organization's enterprise risk management program, typically evaluating various components such as risk identification, assessment, mitigation, and monitoring. This quantitative tool allows organizations to benchmark their current ERM capabilities against industry best practices and identify areas requiring further development or investment. Additionally, such a matrix aids in communicating the overall risk posture to stakeholders and facilitates strategic decision-making by providing clear insights into the organization's risk landscape (Rasid & Rahman, 2012). Moreover, it enables a consistent evaluation across different departments and business units, fostering a unified approach to risk management across the enterprise.

Table 2 depicts the proposed ERM maturity scoring matrix. The assessment of risk maturity is based on a structured assessment, the most commonly used methodology, namely Risk Control Self-Assessment (RCSA). Under the RCSA method, the bank will conduct workshops, surveys, or interviews with business units to evaluate how well risks are identified, assessed, and controlled. The evidence to support the assigned score may include risk registers, control effectiveness testing, audit findings, and compliance reports. The review and validation by internal audit, compliance teams, or an external consultant may reduce the subjectivity of the scores. Specific to banking, the scores may be benchmarked against BNM's regulatory requirements, COSO ERM, and also industry best practices. In addition, Key Risk Indicators (KRIs) and Key Performance Indicators (KPIs) may be considered to support the scoring. For example, low incident rates or strong regulatory compliance may justify higher scores.

Each of the ten keys is scored based on agreed-upon criteria, ranging from initial (score 1) to optimized (score 5). The total score of ERM maturity is calculated by summing the scores across all 10 dimensions. The lowest possible total score is 10 (if all dimensions score 1), and the highest possible total score is 50 (if all dimensions score 5). The ERM maturity index (EMI) is derived by converting the total score into a percentage. The EMI is derived by dividing the total score by the maximum possible score (50) and then multiplying the result by 100. This provides a standardized percentage value, making it easier to compare the ERM maturity levels of different banks. For example, suppose Bank A's ten-dimension scores are 4, 3, 5, 3, 4, 4, 2, 5, 3, 4. Total ERM score = 37 (out of 50). Thus, the EMI is 74%. Based on the following Table 3, Bank A's ERM maturity is assigned at level 4; managed (established). The ERM is integrated into strategic decision-making and performance management. Risk culture begins to influence business strategy and there exists a culture of proactive risk management.

Table 2: ERM Maturity Score

Dimension	Level 1: Initial	Level 2: Developing	Level 3: Defined	Level 4: Managed	Level 5: Optimized
1. Risk governance	No formal board oversight; Risk handled informally	The board reviews risk only for compliance	Risk committee established; periodic reporting	Active board oversight; risk integrated in strategy	The board fully embeds risk in decisions; strong independence and accountability
2. Three lines of defence	Roles unclear, overlaps exist	Basic separation of duties; gaps in execution	Clearly defined accountabilities; reporting lines exist	Effective challenge between lines; strong second line	Fully embedded model; proactive collaboration and assurance
3. Risk function competency	Limited expertise; reactive skills	Basic compliance knowledge	Professional risk staff with standard training	Specialized skills in multiple risk domains	Advanced expertise (cyber, ESG, fintech); strong incentives and career paths
4. Risk appetite and tolerance	No clear statement; reactive limits	Documented risk appetite, compliance-driven	Risk appetite linked to risk registers and limits	Risk appetite integrated with capital planning, business targets	Dynamic risk appetite embedded in decision-making, incentives, and innovation
5. Framework, policies, and procedures	Informal and fragmented	Formal but compliance-focused policies	Documented frameworks covering major risks	Policies are regularly updated, aligned with best practices	Fully integrated across functions, continuous improvement
6. Tools and methodologies	Basic checklists and controls	Risk registers are maintained inconsistently	Stress testing, KRIs, and scenario analysis are in place	Advanced forward-looking tools; dynamic stress testing	Predictive analytics, AI/ML risk models embedded in processes
7. Risk taxonomy and heatmap	Risks described inconsistently	Basic taxonomy, silo-based heatmaps	Standardized taxonomy across functions	Enterprise-wide taxonomy, updated heatmaps	Dynamic, real-time taxonomies and interactive heatmaps
8. Risk reports and dashboards	Irregular, backward-looking reports	Standard reports are submitted periodically	Regular dashboards with key indicators	Integrated reports across financial and non-financial risks	Real-time dashboards, predictive insights for decision-making
9. Risk culture and awareness	Weak culture; risk seen as a compliance burden	Awareness campaigns, but limited buy-in	Defined culture programs, tone from the top	Strong risk culture influences behavior and decision-making	Fully embedded culture, continuous learning, proactive improvement
10 . Technology adoption	Manual processes, spreadsheets	Basic risk systems, isolated tools	Automated systems for core risks	Advanced regulatory technology, integrated data systems	Artificial Intelligence, Machine Learning, predictive analytics, digital dashboards fully embedded

Table 3: The ERM Maturity Index

Level	EMI scores
1. Initial (Ad-hoc/ fragmented)	0 – 20%
2. Developing (Compliance-Oriented)	21 % - 40%
3. Defined (Structured/Process-Oriented)	41% - 60%
4. Managed (Integrated into Business Processes)	61% - 80%
5. Optimized (Value-Driven)	81% - 100%

4. Conclusion

ERM maturity in Malaysian banks is progressing, but may remain uneven across institutions. By evaluating governance, processes, culture, tools, and technology, this study aims to provide a holistic assessment that goes

beyond compliance, focusing on resilience, strategic alignment, and long-term value creation. While some financial institutions have made significant strides in adopting advanced risk management technologies and frameworks, others lag, often due to constraints in resources, expertise, or organizational culture. This disparity underscores the necessity for targeted interventions and collaborative efforts within the industry to elevate the overall standard of ERM practices. This uneven maturity highlights the importance of continued regulatory guidance and industry initiatives to foster widespread adoption of best practices, ensuring a more resilient and stable financial ecosystem

ERM emerges as a strategic necessity in Malaysia's banking industry, not merely a compliance requirement. By assessing ERM maturity through surveys, interviews, and content analysis, this study will offer insights into current practices, gaps, and opportunities for growth. The findings will guide banks toward embedding ERM into strategy and culture, thereby enhancing resilience and long-term competitiveness.

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Adoption of Self-Service Kiosk Technology in Quick Service Restaurants: An Application of the Unified Theory of Acceptance and Use of Technology (UTAUT)

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Abstract: The research seeks to examine the impacts affecting customers' adoption of Self-Service Kiosk (SSK) technology, emphasizing Social Influence (SI), Effort Expectancy (EE), Performance Expectancy (PE), as well as Facilitating Conditions (FC) within Quick-Service Restaurants (QSRs). Grounded in the Unified Theory of Acceptance and Use of Technology (UTAUT) framework, the research adopted a quantitative design utilizing a self-administered questionnaire for data collection. This cross-sectional study gathered data from 149 respondents. Findings indicate that PE as well as FC possess a relevant impact on customer adoption, while EE and SI show no significant effect. These results have valuable implications for fast food restaurants, particularly those integrating technology into their service models, especially in Kuantan, Pahang.

Keywords: *Self-service kiosk technology, Customer usage, Unified Theory of Acceptance and Use of Technology (UTAUT), Technology acceptance, Food Service Industry.*

1. Introduction

The Quick-Service Restaurant (QSR) industry plays a central role in discussions on environmentally friendly products (Mawardi et al., 2024). A QSR is a fast-food establishment that employs focused and efficient service methods to offer a concise menu at relatively affordable prices (Mendocilla et al., 2021). On the other hand, Self-Service Technology (SST) includes automated systems that enable clients to perform service tasks independently, without external assistance (Chan & Petrikat, 2022). As Yoon (2023) noted, SSTs are ubiquitous in the contactless era, though they are not new developments. Recent advances in technology have led to the development of sophisticated SST solutions that provide superior customer service in comparison to traditional in-person options, offering organizations a competitive advantage (Chan & Petrikat, 2022). Furthermore, Jeon et al. (2020) highlighted that Self-Ordering Kiosks (SOKs) in fast-food establishments represent an advanced technical tool and offer value to customers. SOKs are expected to become a norm and a ubiquitous customer service in the future (Jeon et al., 2020). Such kiosks provide clients with distinctive experiences of service and they increase employee productivity (Jeon et al., 2020).

This research is carried out under the research objectives as given below:
RO1: To assess the significant impact of Performance Expectancy on customers' usage of self-service kiosk technology at quick-service restaurants.
RO2: To evaluate the significant impact of Effort Expectancy on customers' usage of self-service kiosk technology at quick-service restaurants.
RO3: To investigate the significant impact of Social Influence on customers' usage of self-service kiosk technology at quick-service restaurants.
RO4: To examine the significant impact of Facilitating Conditions on customers' usage of self-service kiosk technology at quick-service restaurants.

2. Literature Review

Self-Service Technology (SST)

Such technologies as self-service are not novel, but they have become the norm of the contactless era (Yoon, 2023). As per Meuter et al. (2003), SST represents the technological interfaces that enable consumers to utilize services without the direct help of company employees. The implementation of SSTs in food service is also motivated by the assumption that technological advances may enhance the quality of service and establish new and enjoyable customer experiences (Yaacob et al., 2021). Quality assurance in food service has been transformed by the introduction of innovation and the popularity of automation of services (Talukder et al.,

2023). Furtado et al. (2020) observed that technology use could lead to customer satisfaction, thereby increasing revenue at QSRs in relation to Social Influence.

Self-Service Kiosk (SSK)

The Self-Service Kiosk (SSK) is an automatic payment system through which its users are authorized to browse, choose, and buy menu options (Na et al., 2021). Wu et al. (2020) emphasized that technology-based services have many advantages compared to conventional services. This technological development makes consumers more empowered in the financial services sector, and both banking and non-banking firms can expand their operations (Furtado et al., 2020). According to Ketimin et al. (2021), the application of SSK technology enables customers to customize their products, which results in a greater degree of control over the meal-making process.

Performance Expectancy (PE)

One of the most important variables in the prediction of customer behavior in the use of technology is identified as Performance Expectancy (PE) (Venkatesh et al., 2012). It pertains to a person's assessment of the extent to which using technology can enhance their effectiveness or efficiency in completing a specific task (Rumangkit et al., 2023). Other than that, it can be described as a personal judgment of the degree to which the usage of technology is going to make them better or more efficient in handling a particular task (Rumangkit et al., 2023). PE in the food service industry involves a variety of restaurant-related activities that allow customers to utilize SOKs effectively. It entails an evaluation of the activities of the QSRs in the eyes of the industry, especially in relation to the use of technology by consumers via SOKs (Baba, 2021). Park et al. (2021) noted that because SST is a change in the delivery of traditional human-based services to self-services, customers have become their own service providers.

Effort Expectancy (EE)

Effort Expectancy (EE), just like the perceived ease of use with regard to the Technology Acceptance Model (TAM), describes the convenience and ease of using an information system (Venkatesh et al., 2012). Baba et al. (2020) demonstrated that the SOK within a QSR must be easy to use and can be adjusted to the technical abilities of the customer. Consumers might not be willing to adopt the technology if they feel that the technology is challenging to use (Twum et al., 2021). According to Seo (2020), the kiosk may be better accepted if it is perceived as easy to use and convenient. In this way, Baba et al. (2020) assumed that consumer utilization is positively associated with a SOK and its ease of use, and they relate this notion to the utilization intention.

Social Influence (SI)

The Social Influence (SI) is the extent to which significant individuals in the life of a person feel that they should utilize a new information system (Venkatesh et al., 2012). It entails the perceptions of consumers on beliefs of others, such as family and friends, about the use of new technology (Singh et al., 2020; Galdolage, 2020). SI takes place when a person follows someone else's suggestion to use a particular technology (Rashid et al., 2024). Note that consumer behavior is marked by frequent changes in lifestyle, habits, trends, desires, and demands, making it challenging to predict (Šoštar & Ristanović, 2023).

Facilitating Conditions (FC)

Facilitating Conditions (FC) denote the perception that adequate technical and organizational resources are in place to enable and support the adoption of new technologies (Venkatesh et al., 2012). According to Venkatesh et al. (2003), FC did not directly influence individuals' behavioral intentions. In the SOKs' context, QSRs can significantly contribute to FC (Baba et al., 2020). Meanwhile, Jeon et al. (2020) stated that SOK technology includes supportive conditions like touch speed, system configuration, and screen movement, which enhance the kiosk's usability. However, without guidance, adequate knowledge, or timely support, individuals might be hesitant to embrace new technologies such as SST (Kamaghe et al., 2020).

Customer's Usage of Self-Service Kiosk Technology

Park and Lee (2020) described continuous use intention as the intention to continue using kiosk-based order and payment services, which is also the result of user reviews of the service. The SST in restaurants comes with both advantages and disadvantages to customers (Jeon et al., 2020). As per Furtado et al. (2020), the higher the

satisfaction of the customers with technology, the more reliable and secure the service the customers feel. Moreover, the more clients have trust in SST, the less they need human interaction (Furtado et al., 2020).

Technology Adoption Underpinning Theory for Unified Theory of Acceptance and Use of Technology (UTAUT)

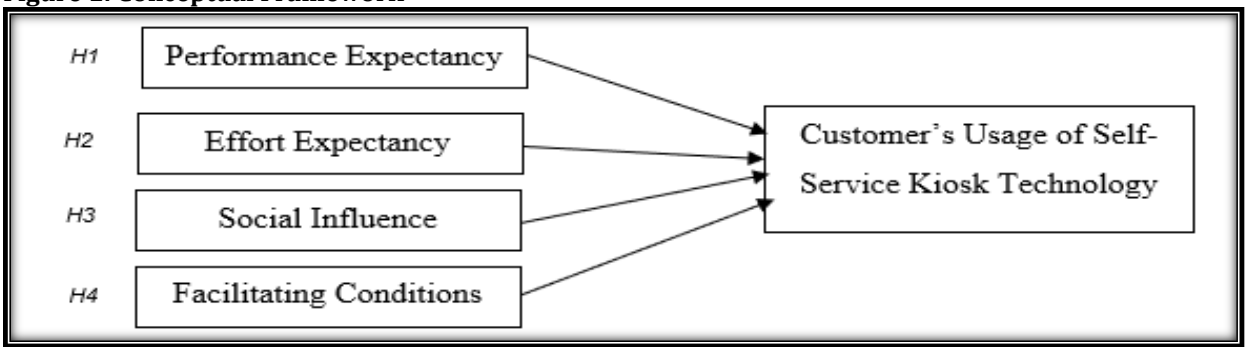
The theoretical framework that is used in this study is the Unified Theory of Acceptance and Use of Technology (UTAUT). In order to maximize the comprehension, as well as the prediction of technology adoption, Venkatesh et al. (2003) created the UTAUT, which is intended to incorporate the rival consumer acceptance theories. Venkatesh et al. (2003) defined PE as the extent to which one believes that the application of this system will enhance his/her performance at the workplace. Yang (2009) suggested that to distinguish their information systems among their competitors, organizations needed to do a thorough review of the variety of system qualities that proved beneficial to customers.

Consequently, the degree of ease linked to utilizing the system is the elucidation of EE (Venkatesh et al., 2003). Alsharif (2013) stated that the anticipation of effort becomes meaningful only if the individual has acquired adequate experience or training with the system. Here, the SI exerted by individuals surrounding will possess an indirect or direct impact on the individual's evaluation of the use of internet services. Venkatesh et al. (2003) defined SI as the degree to which a significant reference validates a specific behavior, which has the potential to impact an individual's information system.

Venkatesh et al. (2003) stated that FC expresses the extent of convenience in the technical infrastructure associated with consumer technology. Individuals who have first-hand experience with particular technologies are more likely to develop favorable opinions of those technologies (Taiwo & Downe, 2013). An additional support in the form of consumer-friendly interfaces will help reduce the barriers to adopting the new technology, which will, in turn, enhance the willingness to use the information system (Venkatesh et al., 2012).

The UTAUT model has been utilized in a number of recent studies on SSK technology. Jeon et al. (2020) indicated that the UTAUT model is used to understand how people adopt and utilize technology and pinpoint the variables that can affect the intentions of consumers to utilize SST in restaurants. On the same note, El-Said and Tall (2019) analyzed different variables that determine the behavioral intentions of customers to use SSKs. The results of their studies revealed that effort and PE are both significantly and positively related to the perceptions of the value of a product by customers, as well as PE bears a greater influence.

Figure 1: Conceptual Framework



Hypotheses Development

Performance Expectancy and customers' usage of self-service kiosk technology

The PE is an important element, and it influences the manner in which customers utilize technology, as per various research (Venkatesh et al., 2012). Note that performance expectation relates to the appraisal of actions related to the QSRs in the foodservice industry. Specifically, it dwells on consumer application of technology, including SOKs (Baba, 2021). Park et al. (2021) added that customers can act as the providers of services to themselves by moving away from the traditional human-oriented services to SST.

H1: Performance Expectancy positively affects customers' usage of self-service kiosk technology.

Effort Expectancy and customers' usage of self-service kiosk technology.
The EE strongly influences users' intentions to adopt a technology during its initial introduction phase, but this impact diminishes over time as users gain familiarity with the device (Jeon et al., 2020). Baba et al. (2020) argued that the adoption of modern technology will result in the integration of more complex and advanced functionalities. Hence, Baba (2021) suggested that the customer's willingness to utilize an SOK can be affected by highlighting the ease and user-friendliness of the kiosk system.
H2: Effort Expectancy positively affects customers' usage of SSK technology.

Social Influence and customers' usage of self-service kiosk technology.
Singh et al. (2020) defined SI as the consumer's assessment of the attitudes held by others, including their relatives and friends, towards the adoption of a new technology. The SI hypothesis explores how social institutions, interpersonal interactions, as well as the process of individual socialization affect people (Naeem, 2020). In addition to personal relationships, the physical restaurant itself can have a significant influence on consumers' first and continued inclination to visit (Baba et al., 2020). Conversely, consumers frequently make purchasing decisions based on the choices made by their peers (Brugarolas et al., 2020).
H3: Social Influence positively affects customers' usage of self-service kiosk technology.

Facilitating Conditions and customers' usage of self-service kiosk technology.
QSRs possess the ability to contribute to the various FC within the realm of SOKs (Baba et al., 2020). Consequently, Baba (2021) stated that customers who have a better set of FC are more inclined to adopt and utilize a particular technology. The study further notes that SOKs introduced in QSRs are expected to have limited customer adoption and usage, particularly in terms of their technical characteristics. Customers employ an organized method in assessing the quality of an application and its ability to perform seamlessly, irrespective of any temporary or technological challenges (Baba, 2021). Meanwhile, Jeon et al. (2020) defined SOK technology as a system that facilitates easy access to the kiosk's screen through various supporting variables, such as touch speed, system composition, and screen movement.
H4: Facilitating Conditions positively affect customers' usage of self-service kiosk technology.

3. Methodology

The researcher adopted a quantitative approach for the study's design, using convenience sampling to gather data from respondents in Kuantan, Pahang. The study utilized a cross-sectional research design to focus on a particular point in time. The analysis centered on individual respondents who had experience using SSKs at QSRs in Kuantan, Pahang. Data were gathered through a five-point Likert scale questionnaire. The surveys, available in both English and Malay, were confidential and for educational purposes only. To enhance reliability, a pilot study was conducted. The questionnaire was shared online through Google Forms, Facebook, and the researcher's personal WhatsApp. Additionally, offline surveys were self-distributed by the researcher. Using G-Power, the sample size was calculated to be 129 respondents, with an effect size f^2 of 0.15. The study used non-probability convenience sampling, and data analysis was performed utilizing SPSS version 28.0.

Demographics Profile
Of the 149 respondents, 75.2% (n = 112) were female, with fewer male participants. In terms of age, 18.1% (n = 27) were between 18 and 22 years old, 46.3% (n = 69) were aged 23 to 27, 16.8% (n = 25) were 28 to 32, and 18.8% (n = 28) were 33 years old or older. Most respondents had a bachelor's degree (47%, n = 70), while 27.5% (n = 41) held a diploma. Additionally, 18.1% (n = 27) had completed secondary school, while the lowest percentage (7.4%, n = 11) held a master's degree. In terms of employment status, 65.8% (n = 98) were employed, 7.4% (n = 11) were unemployed, and 26.2% (n = 39) were students. Only 0.7% (n = 1) of respondents were retired. Regarding usage of SSKs, 55% (n = 82) used them 1-3 times per month, 42.3% (n = 63) used them 4-6 times per month, and 2.7% (n = 4) used them 7-9 times per month. The most common location for kiosk usage was East Coast Mall (36.9%, n = 55), followed by Taman Tas (34.9%, n = 52) and Indera Mahkota (12.8%, n = 19). Other locations included Teluk Chempedak (10.1%, n = 15) and Jalan Pasar (5.4%, n = 8).

4. Results and Findings

Measurement model assessment

Table 1: Results of Correlation Test

Correlations						
		Performance Expectancy	**Effort Expectancy**	**Social Influence**	**Facilitating Condition**	**Customers Usage**
Performance Expectancy	Correlation	1	.538**	.513**	.451**	.468**
	Sig. (2-tailed)		<.001	<.001	<.001	<.001
	N	149	149	149	149	149
Effort Expectancy	Correlation	.538**	1	.712**	.774**	.608**
	Sig. (2-tailed)	<.001		<.001	<.001	<.001
	N	149	149	149	149	149
Social Influence	Correlation	.513**	.712**	1	.757**	.618**
	Sig. (2-tailed)	<.001	<.001		<.001	<.001
	N	149	149	149	149	149
Facilitating Condition	Correlation	.451**	.774**	.757**	1	.708**
	Sig. (2-tailed)	<.001	<.001	<.001		<.001
	N	149	149	149	149	149
Customers Usage	Correlation	.468**	.608**	.618**	.708**	1
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	
	N	149	149	149	149	149

**. Correlation is significant at the 0.01 level (2-tailed).

This study explored the relationships between several factors as well as customers' adoption of SSK technology. Firstly, hypothesis H1 proposed that PE possesses a positive effect on usage. The results showed a weak positive correlation (R = 0.468) with a statistically significant p-value (< .001). Second, hypothesis H2 suggested that EE positively affects usage. A moderate positive correlation was found (R = 0.608), also with a p-value of < .001. Third, hypothesis H3 stated that SI positively impacts usage. The results indicated a moderate positive relationship (R = 0.618) with a p-value of < .001. Fourth, hypothesis H4 posited that FC positively influences usage. The analysis showed a strong positive correlation (R = 0.708) with a highly significant p-value (< .001). The t-values and p-values showed that the PE (p = 0.029) and FC (p <.001) were found to be statistically significant, and EE (p = 0.680) and SI (p = 0.202) were not.

5. Conclusion

This paper employs the UTAUT to investigate the SSK usage by customers in Malaysian QSRs. The results have much value in terms of customer behavior, in which the elements of PE, SI, expectancy of effort, as well as FC, possess a high impact on the use of kiosks. With the help of the UTAUT framework, QSRs in Malaysia will have an opportunity to tweak their strategies to encourage the use of new technologies. By improving the user experience and eliminating possible obstacles, restaurants can be more responsive to the needs of customers, increase the efficiency of operations, and improve their role in the competitive market.

Theoretical Implications

This paper makes a valuable contribution to theoretical and academic knowledge, providing a great insight to scholars. It gives a more detailed insight that can guide scholars to find more informative data in the discipline, as well as improve the literature reviews. Through this, the researchers are able to delve into more advanced subjects, especially on topics like SSKs, QR codes, as well as robot services. By analyzing the application of technology within the context of food service organizations, the study of food service technology enables academics to refine models regarding technology acceptance, diffusion, and impact. Such results provide great guidance to future studies and practice. In the case of food service businesses, this research paper highlights

the role of enhancing organizational practices in technological advancement. It advises and trains food service organizations to embrace new technologies through raising awareness on how to improve PE, SI, EE, as well as FC. This also encourages academics to research more on technology in the food industry. Businesses that adopt technology will be in a better position to compete in the fast-changing environment as they are able to adapt to changing customer needs, industry variations, and innovations.

Practical Implications

The study provides insight into the food service sector, as it uses practical applications. The study identifies several benefits of technology in food service restaurants, where its adoption is increasingly common. Innovative strategies, for example, the usage of SSKs, are employed to encourage customer adoption of technology. These kiosks allow restaurant operators to reduce costs by automating and streamlining the order and payment process, minimizing the need for front-of-house staff (Baba et al., 2020). SSKs enhance the speed and accuracy of order processing compared to manual methods, reducing errors and incomplete orders. Restaurant managers anticipate that these kiosks will improve customer service and shorten peak-hour wait times (Leung et al., 2021). Governments also play a role in supporting the food service industry by raising performance standards and facilitating technological integration. Their provision of support can facilitate the adoption, usage, and enhancement of the technology-based solutions in providing efficiency, customer satisfaction, as well as growth of the industry. Moreover, governments must make sure that their respective technologies are easy to use and minimize the lag times but retain control of customer service and experience.

Limitations and Future Studies

This research paper points out the theoretical and practical implications, yet it also has limitations and suggestions. A significant threat that has been observed is the changing customer tastes. Emerging technologies and the change in the generation, as well as the change in the social norms, can rapidly affect the customer preferences, expectations, as well as behaviors toward SSKs. Additionally, the acceptance and use of SSKs can be influenced by regulatory changes, socioeconomic conditions, as well as industry development, with the differences depending on location and time. Rashid et al. (2021) suggested that future studies should embrace more Malaysian states and age groups. The sample can be extended to include people in different states to increase the diversity and representativeness of the results. This addition will enable the study to offer a more well-rounded analysis of the use of SSKs, quality of service received, and customer satisfaction among the varying demographics, thus helping to increase the reliability and validity of the theoretical implications of the study. The research in the future should also examine the attitude of restaurant owners on the readiness of customers to use SSKs. The readiness of the restaurant owners and managers to adopt SSKs can demonstrate the organizational aspects that can affect their adoption and use. It is important to know their perception of the strengths and weaknesses of SSKs and the resources they need to implement them. Moreover, analyzing the perception of the business owners on the consumer preparedness and using kiosks can shed some light on the discrepancy between customer expectations and organizational goals that would help in improving SSKs to satisfy the needs of the consumers. Moreover, further research ought to address how customers address their ethical concerns about SSKs, such as the problem of data privacy, the use of algorithms in decision-making, as well as the employment opportunities that kiosks represent to customers. The navigation by customers through ethical dilemmas related to the utilization of SSKs must be taken into consideration.

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Unveiling Barriers: A Qualitative Study on Halal Certification for SMFEs in Penang

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Abstract: Promoted by both Multi-National Companies (MNCs) and Small-Medium Enterprises (SMEs), Malaysia's Halal industry is flourishing, contributing billions of RM to the nation's economy and proving its potential for further growth. However, unlike MNCs, most Small-Medium Food Enterprises (SMFEs) face numerous challenges in obtaining Halal certification. As a result, this study aimed to investigate the difficulties experienced by SMFEs that have successfully acquired Halal certification. Using a qualitative approach, detailed face-to-face interviews were conducted with the aid of semi-structured questionnaires and audio recorders to achieve the study's objective of identifying the barriers to Halal certification faced by SMFEs. The research focused on Penang state, where the population of Halal-certified SMFEs was sourced from and screened by Jabatan Agama Islam Pulau Pinang (JAIPP), resulting in a vetted list of 25 potential respondents. Interviews were conducted with 12 respondents until data saturation was reached. The recorded audio data was transcribed, and the transcripts were analyzed using ATLAS. TI software. Demographic data underwent frequency analysis, while thematic analysis was applied to the transcribed data, generating nine codes, which were graphically represented by their relative themes and networks. The findings of this study, particularly the developed model, offer valuable insights into the issues at hand and could potentially assist SMFEs in achieving Halal certification successfully.

Keywords: *Halal food, halal certification, halal accreditation, barriers and challenges, small and medium enterprises.*

1. Introduction and Background

Certainly, the entire concept of Halal is fundamental to Islam. Interestingly, non-Muslim also began to accept and appreciate Halal foods, as well as embracing Halal standards as one of the most comprehensive and brilliant food quality standards available to date, which indirectly means promising global market potential of Halal foods. For instance, according to Pew Research Centre (2024)While the world's population is projected to grow to a staggering 9.3 billion in 2050, the number of Muslims is also expected to increase to 29.7% of the whole population, which is approximately 2,76 billion. Referring to Table 1, in 2010 alone, Muslims made up 23.2% of the global population (≈ 1.6 billion). These numbers signify the global market potential of Halal food products for Muslims, both inside and outside Islamic nations.

Table 1: Projected Global Muslim Population, 2010 – 2050 (PEW Research Center, 2024)

Projected Global Muslim Population, 2010 - 2050		
Decade	**Population Estimate**	**% of World's Population**
2010	1,599,700,000	23.2
2020	1,907,110,000	24.9
2030	2,209,270,000	26.5
2040	2,497,830,000	28.1
2050	2,761,480,000	29.7

To get a clearer picture of Malaysia's Halal prospects, Table 2 summarizes the accomplishments of Malaysia's Halal exports from the year 2022 to 2023. From the table, it can be seen that in 2022, Malaysia's total Halal export value reached a staggering amount of RM59.46 billion, which was a 3.83% contribution to Malaysia's

overall exports of RM1.552 trillion. In the following year, the amount of Halal exports' contribution of RM53.72 billion towards total exports of RM1.426 trillion had declined to 3.77%. In 2022, the biggest importers for our Halal exports were China, Singapore, Japan, the USA, and Indonesia. The following year, Singapore became the leading importer, followed by China, Indonesia, Japan, and Thailand. The rest of the major export destinations were mostly Middle Eastern and European countries, where the high demand for Halal foods is often unmatched by production shortages and low availability.

Table 2: Malaysia *Halal* Export 2022-2023 (HDC, 2024)

Year / Focus	2022			2023		
Total *Halal* Export Value	Malaysia's Total Exports: RM1.552 trillion Halal Exports: RM59.46 billion Halal Exports Contribution: 3.83%			Malaysia's Total Exports: RM1.426 trillion Halal Exports: RM53.72 billion Halal Exports Contribution: 3.77%		
Top 5 Export Destinations	**No.**	**Country**	**Value (RM)**	**No.**	**Country**	**Value (RM)**
	1	China	7.11 billion	1	Singapore	6.50 billion
	2	Singapore	6.24 billion	2	China	6.25 billion
	3	Japan	3.65 billion	3	Indonesia	2.91 billion
	4	USA	3.42 billion	4	Japan	2.62 billion
	5	Indonesia	3.06 billion	5	Thailand	2.50 billion

Conclusively, the table above verifies the massive potential for Halal products in countries like the USA, China, Thailand, and Japan, where Islam is not even a major religion and Muslims are among the minorities. Recent data also showed that there was a significant increment in Halal exports to our neighboring nations, Singapore and Indonesia. This notion proved that (i) there is a high level of product confidence among Muslim and non-Muslim consumers alike, even in non-Islamic countries, and (ii) there is a high level of trust in Halal-certified products.

Though the overall contribution of Halal exports towards Malaysia's total exports is not overly massive, the significance of the development and expansion of the Halal industry is of great prospective. The contributions of the food and beverage sector, as well as Halal ingredients, keep increasing each year, signifying constant support and demand for Halal food products and ingredients worldwide. All in all, the above reviews are evident proof that; (i) Halal foods offer a vast and lucrative business potential, (ii) Halal had been accepted internationally as an excellent standard for regulating the quality, cleanliness, wholesomeness, as well as the integrity of food products, and (iii) Halal foods are not only the preferred foods of Muslims, but also had incessantly grown into the likings of consumers at large as well.

2. Issues, Challenges, Trends and Barriers of Malaysia's Halal Industry

At present, the foodservice industry is defined in its broadest sense to mean "all establishments where foods are regularly served outside the home." (Payne-Palacio and Theis, 2012). As further explained by Kittler, Sucher, and Nelms (2011) The political, economic and social management of food at the local level is typically directed towards assuring a reliable and affordable source of nourishment. Moreover, advances in food production, storage, logistics and distribution are the closest examples, and the complexity of the food supply system has been examined by many disciplinary approaches. In light of the research scope, it is imperative to first define the target unit of analysis for this research, which is the Small and Medium Enterprises (SMEs), especially the ones that manufacture, produce, trade, sell, or handle any kind of food products and food ingredients (SMFEs). Small and Medium Enterprises (SMEs) are small companies that are defined by (i) sales turnover, and (ii) number of employees. In Malaysia, this definition covers all sectors comprised including services, manufacturing, agriculture, construction, mining and quarrying.

Indeed, rising demands for food products (especially Halal certified) are causing escalating numbers of SMFEs each year, and this sector's contribution to the GDP keeps growing, strengthening its significance. This signifies the imperative input of SMFEs towards the nation's economic gain, therefore indicating its worth to be

maintained, improved and expanded. However, in all fairness, the Halal endeavors of Malaysia's SMFEs are not without their barriers and challenges. Ismail et al. (2013) researched the export barriers to Halal SMFEs in Malaysia. These researchers distributed 600 questionnaires to SME owners in the SMIDEC directory and performed analysis on the 185 returned responses. It appears that, majority of SMFEs in Malaysia faced more or less the same export barriers: (i) internal export barriers, (ii) external export barriers, and (iii) procedural export barriers, with the last one being the most obstructive. Based on this evidence, it seems fair to suggest that many of the problems came from within. These kinds of obstacles could be overcome by enthusiastic and collective efforts by policymakers, public and private sector agencies, and the SME Halal food manufacturers.

Table 3: Definitions of SMEs based on Size of Operation (SME Corp., 2016)

Category	Manufacturing	Services and Other Sectors	Percentage
Micro	Sales turnover less than RM300,000 OR full-time employees of less than 5	Sales turnover less than RM300,000 OR full-time employees of less than 5	77%
Small	Sales turnover from RM300,000 to less than RM15 million OR full-time employees from 5 to less than 75	Sales turnover from RM300,000 to less than RM3 million OR full-time employees from 5 to less than 30	20%
Medium	Sales turnover from RM15 million to not exceeding RM50 million, OR full-time employees from 75 to not exceeding 200	Sales turnover from RM3 million to not exceeding RM20 million, OR full-time employees from 30 to not exceeding 75	3%

Md-Razak et al. (2015) Researched the importance and tendency of Halal products and services in Malaysia and the global market. Using a quantitative approach, the researcher distributed a 4-section questionnaire to 50 Muslim respondents in the Shah Alam area. It was found that the importance of Halal products and services is affected by three variables: (i) demand, (ii) awareness, and (iii) culture, with awareness being the most significant. The findings were in sync with the research done by Che-Omar (2013) On the challenges and marketing strategies of Halal products in Malaysia. The lack of awareness on the importance and advantages of Halal certification, as well as SME operators' lack of technical and general knowledge of Halal matters, hindered the strengthening of the Halal brand, recognition, confidence and assurance. Negative perception of the whole Halal certification process, procedural obstacles, and lack of effective enforcement by JAKIM worsen the circumstances. These internal issues and challenges must be dealt with firsthand to reinforce the foundation of Halal accreditation, towards all the efforts of going global.

Despite financial matters, Halal SMEs and their products need constant promotional and marketing support, not just from the government, but also from other agencies, trade associations, and stakeholders. One of the efforts was from Machfud, Khatib, Haji-Ahmed and Dahlan (2011) Who came up with the Halal Product Price Indicator Portal Model to promote Malaysia's Halal SMEs and their products? The portal would incorporate JAKIM, local Halal SMEs and potential customers into mutually combining roles, effort, knowledge and expertise. By having a portal, local SMEs would have a new marketplace and promotional medium where customers can browse, compare and contrast products and prices. JAKIM could play their roles of managing, monitoring and promoting themselves as the regulators and the authority of the Halal market. Nonetheless, the implementation of the portal is not without challenges, such as; (i) identifying local Muslim owned food manufacturers and suppliers, (ii) enforcement on the local Halal SMEs to update their products' prices and listings, and (iii) provisional laws and policies on the trade over the web.

When it comes to research on Halal, perhaps consumerism appears as the least intricate. Most researchers were found to center their focus on topics such as awareness, intentions, attitudes, perceptions, expectations, suggestions and recommendations. Yet, technical aspects of scientific research (such as sampling) proved that it is not as undemanding as it seems. Sampling, for instance, must be accurately determined from a vast pool of respondents to ensure generalization afterwards. Inaccurate representation would skew the result and render it useless. As a variation of this consumer research, Abdul, Ismail, Hashim, and Johari (2009) used the Audit Risk Model to determine factors involved in decision-making towards the purchase of Halal food products. Mixed method was employed; quantitative for the 1st stage, and qualitative for the 2nd stage. 1st stage involved distributing a questionnaire to 213 Muslim consumers who visited Malaysia Agriculture, Horticulture and Agrotourism (MAHA) 2008, while the 2nd stage comprises interviewing 6 Muslim lecturers in a public

university in Malaysia. It was found that there was a significant relationship between ethnic background, religion, and consumers' perception towards the Halal logo and ingredients. It was also found that there were doubts on the certification, enforcement and public understanding of Halal. As a result, it was agreed between respondents that the key features in the selection of Halal foods are simply and mainly: (i) trust, and (ii) confidence.

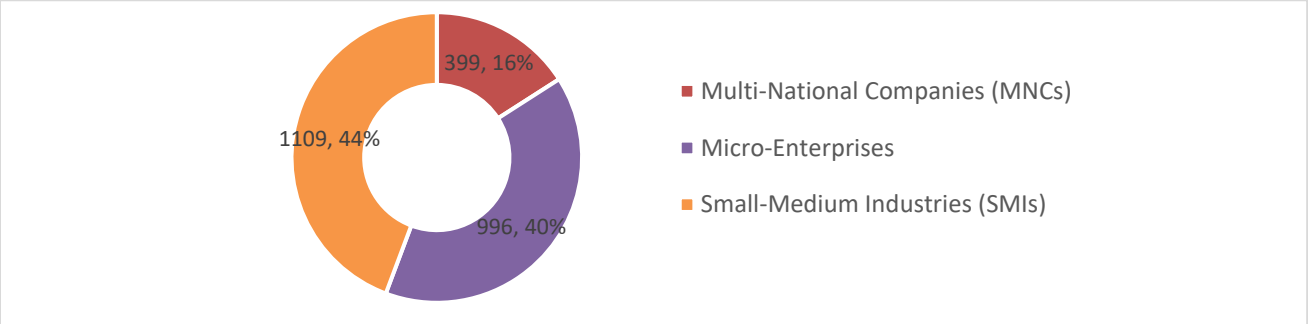
There were also concerns on the regulatory side. For instance, research done by Ambali and Bakar (2014) on people's awareness of Halal foods and products was essentially highlighting issues for policymakers. The main concern of the research is finding the determinants of Muslim consumers' awareness of Halal foods. By analysis of Al-Quran and Sunnah, as well as a survey method on a population in Shah Alam, it was found that there are several genuine predictors of Muslims' awareness. More importantly, the respondents, the absence of a universal Halal standard, the presence of unlawful ingredients and additives raised a few potential issues, and the lack of regulatory forces and law provision imposed on Halal certification offenders. These issues proved that the efficiency of regulation is one of the most important concerns when it comes to Halal foods.. Many of the challenges were in the form of compliance with the needs of (i) Halal standards and regulations, (ii) Department of Environment requirements, (iii) local authority licensing and permits, and (iv) Ministry of Health requirements. By examining qualitative responses, Akta Perihal Dagangan 1972, and the Environment Quality Act 1974, the researchers were able to outline potential future research, which is the identification of barriers to entry into the Halal business in Malaysia.

The difficulties of harmonization of Halal standards worldwide have resulted in a loss of billions of RM in potential international business trades. Halal certification bodies, the discretion of whether or not to accept products certified by these bodies was set to the consumers and the consuming countries. Some of the certifications were often rejected because these organizations were not recognized by the consumers or the consuming countries. (Abd-Latif, Mohamed, Sharifuddin, Abdullah, and Ismail, 2014). Although some countries claimed that their current Halal certification body are adequate, the exponential growth of demand for Halal products will outpace the existing supply in a few short years. As a result, increasing the output or export performance of SMEs is one of the Malaysian government's top priorities towards establishing the Halal hub. Since then, topics related to Halal hub have been the keen interest to many researchers, including in the field of Halal marketing, logistics, economy and finance. To begin with, Aidi-Zulkarnain and Say (2014) Produced an overview of Malaysia's efforts towards establishing an international Halal hub and its export performance. Focusing on the SMEs, the researchers found that Malaysian SMEs were facing stiff competition from neighboring countries in producing Halal food products, especially Thailand. Within the country, the outputs of SMEs were still trivial compared to the output of MNCs. Despite all the support given by the Malaysian government, many SMEs still encounter many challenges and barriers. Hence, future research could focus on exploring these obstacles and formulating possible remedies.

3. Methodology

For the in-depth interviews, the unit of analysis consists of SMFEs, represented by the owner, manager, or Halal executives, individuals who can address questions regarding Halal certification of their products, as well as their policies and perspectives on current certification practices. The selection of respondents was confirmed and verified by the Head of the Halal Division at Jabatan Agama Islam Pulau Pinang (JAIPP). SMFEs located in the vicinity of Pulau Pinang were chosen due to (i) the acclaimed reputation of Penang's Halal industry and ecosystem as one of the best in the country, and (ii) the supportive environment provided by the presence of JAIPP, PIHH, JAKIM, HDC, and regular Halal exhibitions and conferences that facilitate Halal research. The unit of analysis is represented by the owner or manager of SMFEs. The sampling frame for interviews comprised SMFEs that have successfully obtained Halal certification for their products. These selected SMFEs were taken from a pre-existing list titled 'Senarai Pemegang Sijil Halal Produk Makanan 2017,' provided by JAIPP and updated in April 2017. The list initially included approximately 413 firms, which then had to be screened based on specific inclusion criteria. 33 firms were shortlisted and referred to JAIPP, out of which only 25 were approved by JAIPP officials for undisclosed reasons.

Figure 1: Halal Certified Companies by Category of Industry (HDC, 2016)



Given that the unit of analysis for the in-depth interviews is the managers or owners of the SMFEs, the population consists of SMFEs that have successfully obtained Halal certification for their products. Figure 2 illustrates Halal-certified companies by industry category (HDC, 2016), last updated in February 2016. According to this figure, the total number of successful applications is 2,504, encompassing all three industry categories. Since this research focuses solely on small and medium industries, only product applications from SMI (1,109 firms, 44.29%) and Micro Enterprises (996 firms, 39.78%) are considered, totaling 2,105. Of these, approximately 413 firms are based in Penang, as confirmed by the list provided by JAIPP. This figure (413) was used as the total population number (N).

Additionally, the selected SMFEs must meet the following inclusion criteria: (i) they must be Small-Medium Food Industries (SMFEs), (ii) they must have successfully obtained Halal certification from JAKIM, and (iii) they must produce their food products, rather than being solely OEM (Original Equipment Manufacturer), ODM (Original Design Manufacturer), VAR (Value-Added Reseller), or simply an importer/distributor/wholesaler. The interviews were conducted using two instruments: (i) interview questions and (ii) interview protocols, both of which were validated for reliability and validity by subject matter experts. The interviews were audio-recorded at the respondents' chosen time and place. After the interviews, all recordings were transcribed, followed by data checking and cleaning, before being entered into ATLAS. Ti for thematic analysis. Subsequent coding and grouping led to findings supported by respondents' quotations.

4. Findings and Discussion

Respondents' Demographic Profile

In total, 12 respondents were interviewed, who are the owners/managers of their establishments. In terms of gender, male business owners (6 respondents) are proportional to female business owners (6 respondents). The age of respondents ranged between 38 to 60 years old. All the SMEs are specified in the food sector, with some variations in terms of core products, main customers, and nature of operations. These variations can be observed in Table 4. Some SMFEs might have slightly similar product lines, but the way they choose how to sell, market and impose visibility to their products depends heavily on the nature of the product, who their clients are, as well as their capacity in terms of production capability and marketing capital. Medium-sized enterprises that are much more capable financially can utilize their monetary resources to market their product line to hypermarkets inside and outside the country, while small enterprises will have to independently rely on their limited networks of marketing channels.

Table 4: Variations between SMFEs' Core Products and Operational Attributes

Respondent	Core Product	Direct Client	Nature of Operation
1	Homemade Ice Cream, assorted flavors.	Events, local retail stores, private functions, and exhibitions.	Direct retail, ice-cream booth, event catering.
2	Bottled sauce mix for noodles.	Local retail stores, local and regional hypermarkets, and exhibitions.	Direct retail, supplier to retailers (inside and outside Malaysia)

3	Sambal bilis garing. Crunchy garlic flakes.	No direct client.	Agent-based supplier.
4	Assortments of oven-baked healthy snacks.	No direct client.	Retail outlets inside and outside Malaysia.
5	Assortments of pastilles and herbal candy.	No direct client.	OEM (original equipment manufacturer) or VAR (value-added reseller).
6	Assortments of tepung goreng serbaguna.	Owns a fried chicken stall, local and regional retail stores.	Direct retail, supplier to retailers.
7	Kopi 'O'.	No direct client.	OEM (original equipment manufacturer) or VAR (value-added reseller).
8	Assorted curry pastes.	Local retail stores, local and regional hypermarkets, and exhibitions.	Direct retail, supplier to retailers (inside and outside Malaysia).
9	Assorted kuah rojak.	Direct retail, hotels, restaurants, and local retail stores.	Direct retail, supplier to retailer, contract supplier.
10	Cili giling. Pre-cooked curry pastes.	Direct retail, restaurants, and local retail stores.	Direct retail, supplier to retailers.
11	Belacan, assortments of sizes and forms.	No direct client.	Retail outlets inside and outside Malaysia, OEM (original equipment manufacturer) or VAR (value-added reseller).
12	Chocolate chip cookies, assorted flavors.	Own shop (outlet), direct retail, local retail, exhibitions.	Direct retail, supplier to retailers (inside and outside Malaysia), bookings and reservations.

Emerged Themes and Codes

Subsequently, the acquired theme was derived from thematic analysis of the transcripts. Overall, 5 codes were extracted to answer the main question, "What are the barriers of Halal certification experienced by the SMFEs?". Inclusively, 9 codes were able to be extracted from the responses to the question. The acquired theme and its relative codes are presented in Table 5 below:

Table 5: Barriers of Halal Certification Experienced by the SMFEs

Theme / Network	Codes	Grounded
Barriers to Halal Certification Experienced by SMFEs	Fraudulence	3
	Lack of Halal Awareness	3
	Inaccurate Information	5
	High Renovation Costs	5
	Lack of Capital	7
	Unstandardized Evaluation and Enforcement	5
	Meticulous Documentation	3
	Lack of Motivation	3
	Negative Attitude and Mindset	9

Code 1: Fraudulence

In the process of gaining Halal certification, there were always barriers or challenges faced by the entrepreneurs. The purpose of highlighting these obstacles was as a lesson to be learnt by other entrepreneurs wishing to file for Halal certification. Despite the hardships, all of the respondents managed to overcome them and successfully obtained their Halal certification. The barriers to Halal certification were not just meant as hindrances, but also featured some of the depraved elements in Halal certification. These elements could be

experienced directly by the respondents, or may be heard from someone else. For example, some of the respondents traced a few elements of fraudulence in Halal certification during their time, as revealed below:

R3: "One of the reasons many entrepreneurs are reluctant to expand abroad is that they often get cheated. Sometimes they are cheated by suppliers, sometimes by buyers, and sometimes even by fellow entrepreneurs. It's unfortunate for these entrepreneurs because SMEs like us have limited financial resources, especially when deceived. Therefore, many are cautious and choose to stay safe by marketing their products domestically."

R7: "I once visited a couple of non-Muslim premises that had Halal certification, but their cleanliness standards were disappointing. The workers' attire was improper, dogs were going in and out of the factory, the toilets were dirty, and so on... I was quite puzzled as to how they were granted Halal certification. Perhaps during inspections, they put on a 'show' and only displayed what was neat and clean to the JAKIM officers, whereas the reality was very different."

R7: "There are some small companies owned by non-Muslims that seem to exploit the Halal certification to market their products without ensuring compliance with the Halal requirements. Some hire consultants to obtain Halal certification; everything looks good and proper until they get the certificate, and then everything goes back to how it was (less clean and questionable)."

Code 2: High Renovation Costs

When asked whether the fees of obtaining Halal certification are expensive and burdensome, the entrepreneurs said that this is not the case. The fees for Halal certification are quite affordable, ranging from RM100 to RM700 annually, according to industry classification, whether the establishment is classified as (i) food industry/factory/product manufacturer, (ii) hotel and restaurant, or (iii) slaughterhouse. The fee structure is as explained below:
Micro industry -RM100.00 yearly
Small and Medium Industry-RM400.00 yearly
Multi-National Corporation-RM700.00 yearly

Despite the affordable fees, the real agony is the high renovation costs, as explained by the respondents:

R9: "The cost to obtain Halal certification is not expensive, only RM800 for 2 years. The expensive part is the renovation costs and so on…"

R12: "The expensive part is usually the renovation costs. Sometimes it can reach tens of thousands of RM. For the first application, JAIPP or JAKIM will visit our premises, inspect the condition, and suggest necessary improvements to meet Halal specifications. So, to meet these specifications, entrepreneurs spend a lot of money on renovations…"

Some respondents clarified that the high renovation costs were due to all the effort made to fulfill the tight specifications demanded by JAIN, JAKIM, or local authorities. These costs were mostly for premise renovations and upgrades, so it can adhere to the Halal standards. The testaments for this can be viewed below:

R7: "I was personally asked to install a fence for my factory, and eventually, the fencing cost amounted to RM4,000. To comply with the specified standards, I had to do it…"

R7: "For small entrepreneurs, some requirements can be quite complicated. For example, complying with the requirements to set up a ventilation system or adding barriers to separate different segments of the premises involves high costs for them."

R2: "It can indeed be problematic for SMEs operating from home or in places that do not meet the specifications, requiring upgrades. The renovation costs can be very high, and even after that, there's no guarantee they will get the Halal certification…"

In contrast, one of the respondents said that if entrepreneurs can split the renovation into several batches, the renovation costs wouldn't be so high. It's the accumulated amount that can cause a major setback to anyone

who wishes to apply for Halal certification, as quoted by the respondent:

R9: "If we are prepared, when JAKIM comes for an audit, it won't be too bad, maybe just a little 'touch-up'. If not prepared, when JAKIM comes for the first time, there will be many aspects that need improvement. Walls might have to be broken, drains made, exhaust fans installed, and so on. So, when a lot of money has to be spent on these improvements, that's when they say it's difficult, complicated, and so on."

Code 3: Inaccurate Information

The majority of the respondents agreed on this one avowal: don't trust negative people. Negative people are inclined to drag other people into negativity just by using their spoken words or apathetic behavior. Trusting the words of these types of people is what stalled potential applicants from really putting their effort into gaining Halal certification, as testified by these respondents:

R3: "Sometimes they only listen to hearsay... It's difficult, this is hard, there are many difficulties in getting Halal certification, so they lose interest in applying…"

R5: "Sometimes rumors say that getting Halal certification is difficult, expensive, and so on. Therefore, entrepreneurs should investigate first, ensure the truth, and be brave to try."

R6: "That's the weakness of many SME entrepreneurs; they listen to unverified stories. They should call or meet JAIPP directly instead of listening to unfounded tales…"

R8: "I urge entrepreneurs, if you have the intention to get Halal certification but lack information, don't just listen to stories that may not be true."

R11: "I think those who say that getting Halal certification is expensive and difficult have never actually tried to apply for it. They are just listening to others. Also, some consultants offer services to obtain Halal certification at high prices, so when they hear about these costs, they decide not to apply."

Code 4: Lack of Capital

Owing to the size of their organization and operation, many of the SMFEs didn't have large enough capital to invest in important areas required for expansion, such as marketing, attractive packaging, and logistics. Some of the respondents said it exactly:

R12: "There are many factors... Firstly, if their products are frozen, it will involve high costs, especially to provide suitable logistics. Delivery trucks, storage facilities, display spaces—all need to be frozen, so this will result in high costs for their products to be marketed widely."

R3: "To introduce our products widely is difficult because we are SMEs with small capital…"

R8: "…many SMEs are lacking in terms of 'packaging' and 'marketing', where usually we lack the capital to create packaging…"

R1: "When compared to big companies, it is indeed difficult for my small company to compete. In terms of products, I am confident of their competitiveness, but small business entrepreneurs often face capital shortages. For example, when people know my products are Muslim-made, high-quality, delicious, and have Halal certification, they become very interested, but if they are to be placed in shops, they need refrigerators. Providing these refrigerators is what we lack the capital for."

Some of the entrepreneurs have achieved reputable success by having their products penetrate hypermarkets across the country. However, other problems arose, as placing products in hypermarkets turned out to be a costly affair, as described below:

R12: "When SME products get Halal certification, many supermarkets and hypermarkets will be interested in their products, and most entrepreneurs will be excited by this offer. However, to enter large markets, we need significant

working capital because these offers are on a consignment basis. Money will only come in every 6 months, while the products must still be supplied…"

R12: "Additionally, we can't just leave our products on the shelves; we must regularly come to restock, do product sampling, arrange the products, remove unsold items that are damaged or expired, and so on. All of this costs a lot of money, time, and energy, and not many SMEs have enough resources for such tasks…"

On the other hand, one of the respondents indicated that many of the SMFE operators consisted of senior citizens residing in villages. When JAKIM or JAIN officers audited their establishments for eligibility, some of them just turned off by the officer's suggestions. To them, it's just not worth it if their products are marketed just within the village's vicinity. In the end, their desire to get Halal certification just came to a halt, as explained below:

R8: "…many SMEs, especially elderly entrepreneurs in villages, run their businesses with only small capital. Hence, applying for Halal certification has significant financial implications for them. If JAIPP officials come and see that they are only making products in their home kitchens, the officials will say, 'it's not allowed'; there must be a dedicated premise for processing the products. So, there they face another obstacle, which ultimately leads them to give up and only market their products in their local area…"

Code 5: Lack of Halal Awareness

The discussion on Halal awareness has made some of the entrepreneurs respond passionately, displaying their care for the faith and future of Muslim entrepreneurs. Noticeably, they were annoyed by the indifferent attitude displayed by some of the SMFE operators regarding Halal matters:

R3: "The unsatisfactory percentage of SMEs is, in my opinion, due to the entrepreneurs themselves. Awareness among them is still lacking. We encounter various excuses, such as 'it's difficult to apply for Halal certification', 'it involves high costs', 'feeling that Halal is unnecessary because the products are made by Malay Muslims', and so on. Sometimes they feel that their products will sell even without Halal certification, so there's no need to go through the trouble of applying…"

R6: "SME entrepreneurs need to think; we are producing food products for public consumption. If we do not maintain cleanliness, purity, and the quality of our food ingredients, what if someone gets sick after consuming our products? What if they accidentally eat something impure because of our negligence in maintaining cleanliness? What if it happens to our children and grandchildren? The government has provided enormous opportunities and given a lot of assistance. Entrepreneurs should no longer make excuses…"

R6: "…many SMEs also use consultants to obtain Halal certification, paying around RM1000-RM5000. Many do this either because they are too lazy to handle the documentation themselves or because many are not highly educated and do not understand record management and certification. This is sad. As entrepreneurs, they should always strive for self-improvement. If they do not know something, they should go and learn. Learn a bit of English, learn about record management, filing systems, and accounts to become dynamic entrepreneurs…"

Code 6: Lack of Motivation

Similarly, the lack of motivation among some of the SMFEs' operators had caused some of the respondents to express their agitation towards the topic. As the majority of the respondents have experienced many difficulties, especially in attaining Halal certification, they felt that some of the more laid-back SMFE operators had lost the desire to improve their organization. This can be seen in the following statements:

R5: "There are indeed some who are like that. Sometimes they participate in expos like MAHA, they make sales of RM15,000, and they are satisfied. What they don't realize is that sales at MAHA are just 'one-off'... what we want is continuity after that."

R10: "The problem is in remote areas, for example in Sik, Kodiang, Yan, Kuala Kedah... Many produce products for the domestic market only. Most of the entrepreneurs are old and no longer have aspirations to expand their businesses to the next level."

R8: "That's why many restaurants don't have Halal certification. These restaurant entrepreneurs are reluctant to list all the ingredients they use and the Halal certificates for each ingredient because there are too many involved. For example, there are approximately 22 ingredients in ayam masak merah, and they have to list the Halal certificates for each ingredient, even for black pepper. Imagine if they have 100 different dishes? It is indeed a difficult task, which is why they say it's hard…"

Code 7: Meticulous Documentation

One of the barriers to Halal certification was how meticulous the documentation would be to fulfill the requirements. The hard part was compiling evidence to ensure that every single ingredient used in the production is from Halal and reliable sources. In a small company where they do not have a dedicated staff reserved for documentation, most of the time, the manager or owner is burdened with compiling the necessary documents. During the interview, some respondents expressed their difficulties:

R6: "Previously, we had to deal with JAKIM in Kuala Lumpur. After streamlining, we now only need to go to JAIPP, and the fees are based on the size of the company. The difficult part is for entrepreneurs to trace the origin of every ingredient used and obtain the Halal certificate for each ingredient."

R4: "Sometimes, as producers, we are racing against time to deliver product orders abroad, but delays in obtaining Halal certification somewhat disrupt our operational schedule."

R10: "For older entrepreneurs, they feel that obtaining Halal certification is quite troublesome... there's a lot of paperwork and documentation to prepare, which is a weakness for them…"

Code 8: Negative Attitude and Mindset

Some respondents indicated that several SMFE owners are quite apathetic when it comes to Halal matters. Either these SMFE owners are too lazy to care about the future, or are too comfortable within their current environment, as uttered below:

R9: "Sometimes our people are not only lazy or shy to ask, but sometimes they don't even bother to find out who they should ask. So, all this is an attitude problem. We must change our negative attitude if we want to move forward…"

R3: "Yes, not many Malay entrepreneurs have Halal certification because of their attitude…"

R3: "…because not all SME entrepreneurs intend to apply for Halal certification. Only when there is awareness will it influence their attitudes and desires. This difference can be seen between urban and rural communities. In urban areas, the acceptance of Halal products is better because the awareness of Halal is high, whereas in rural areas, perhaps because the level of awareness is low, they don't care whether their daily products have Halal certification or not…"

Some of the SMFE owners are just inclined to make a lot of excuses, as quoted by some respondents. Too many excuses would close their mind to opportunities, and sometimes these opportunities are vital for survival. Among the predicaments often encountered in some of the excuses are:

R12: "JAIPP and JAKIM indeed conduct courses on how to apply, but many do not attend. Even if they attend, it is often the elderly. When asked to handle a computer to learn how to fill out the application online, many of them are not IT literate... they don't know, they don't understand, they give all sorts of excuses. That's what makes it difficult."

R3: "We encounter various excuses, such as 'it's difficult to apply for Halal certification', 'it involves high costs', 'feeling that Halal is unnecessary because the products are made by Malay Muslims', and so on. Sometimes they feel that their products will sell even without Halal certification, so there's no need to go through the trouble of applying."

Some of the SMFE owners also have the tendency to quickly jump to conclusions, especially after listening to

rumors without even bothering to check for the reliability and truthfulness of the news. Some of the respondents expressed their concern about the matter:

R3: "Many people lack awareness, and when they hear something negative about Halal, they immediately 'share' it on Facebook without verifying its truth first. This should not be done; people must realize that spreading false information can become slander, and that is a major sin."

R6: "Yes, it is indeed an attitude problem. An attitude of taking things lightly, waiting for help, listening to rumors instead of investigating for themselves, being easily satisfied, and so on. We must change this mentality if we want to establish a strong Halal industry…"

In addition, there were also a lot of SMFE owners who still had a subsidy mentality, where they were too dependent on others, especially on the government. These passive SMFE owners could not progress on their own until being pushed or given help (e.g., money, grant, subsidy) by the government. A few fretful respondents voiced their concern as below:

R5: "It is a bit regrettable that our entrepreneurs rely too much on grants or government assistance before they start taking steps to apply for Halal certification and so on."

R6: "This is the difficulty with our people. As I mentioned earlier, education and awareness are important. I also mentioned that if you want improvements, you must use capital (money). The government provides all sorts of assistance and grants, so why don't they apply? Surely the excuse isn't that they don't know how to fill out forms or are too lazy to deal with government agency bureaucracy? The government wants to help us, so what's wrong with us putting in the effort to learn, prepare everything needed, to complete the application? Money doesn't fall from the sky... Many don't like the trouble of filling out forms, preparing this document and that document, yet want us to help them. Some want Halal certification but refuse to invest in upgrading their premises. This is indeed a bad attitude, which makes it difficult to help many of our entrepreneurs."

Code 9: Unstandardized Evaluation and Enforcement

In the eyes of the respondents, the government agency should've been the party that would ease and facilitate the process of Halal certification. However, sometimes that is not always the case. There were several unfortunate circumstances where unstandardized evaluations and enforcement delayed the progress or even made it more difficult for these entrepreneurs. For example, one of the respondents complained lengthily:

R5: "I feel a bit disappointed because there are some unfair processes. For example, during the first application for Halal certification, someone else inspected, and the process was easy. But when applying for Halal certification a second time, a different person inspected, and the process became difficult. For instance, things that were allowed before are now not allowed. Some things are not allowed for us but are allowed for our competitors. Some things are not allowed for us but allowed for other companies, even though we use the same suppliers…"

R5: "There are several issues that undermine the benefits of Halal certification. For example, bureaucracy, discrimination, inequality in enforcement, media manipulation by large companies, and the need for more Halal laboratories across the country. These issues must be addressed to strengthen Malaysia's Halal industry, especially bureaucracy."

In some cases, it's the officer's attitude that bothers the entrepreneurs. The entrepreneurs felt like these officers were lack of empathy for their troubles, thus making it slightly more difficult for these entrepreneurs to deal with the authority. Some respondents shared their experience while dealing with government agencies:

R6: "Yes, it's easy enough. But sometimes, there are some new officers who complicate things... They strictly follow the rules, making the Halal application, renewal, and inspection processes cumbersome."

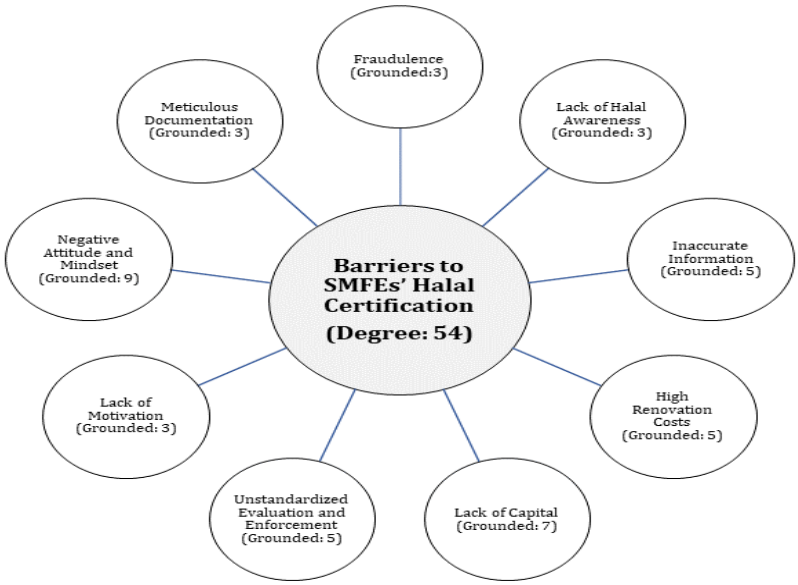
R6: "The Halal department also has some complexities... I have renewed my Halal certificate four times without any issues, but recently, the Halal department sent a new officer who seemed a bit egotistical, questioning many aspects that had no problems before. I also disagreed with his rather harsh approach. I had to go up to KOMTAR

to resolve this issue…"

R5: "Yes, usually I call the relevant parties directly. The responses I often receive are twofold; (i) the officer handling the application is not the one I'm talking to, so they are unaware, and (ii) for the first application, JAKIM facilitates it as an incentive, but for the second time, everything is tightened, and there is no compromise."

Emergent Network

Figure 2: Network of Barriers to SMFEs' Halal Certification



As a recapitulation, the analysis for Theme 3 was done to answer RQ3, which is "What are the barriers to Halal certification experienced by the SMFEs?". The extracted codes represent the challenges, barriers, and problems encountered by the respondents while applying for Halal certification. It was not really meant to demotivate or as a medium for complaints but served as examples for other entrepreneurs or whoever benefited from their experiences. These barriers to Halal certification were embodied by Figure 2: Network of Barriers to SMFEs' Halal Certification.

5. Summary and Conclusion

When conducting the research, there were some limitations hindering the full potential of the research. The lack of resources did get in the way of much better content analysis. The halal sector itself is quite young, blooming in correspondence with the globalization era and 4.0 industrialization. Since then. The halal sector was made known to the entire world, and people across the globe realized the quality, pureness, and cleanliness of Halal products. The demand soared high but was still not backed up adequately by proper research and development in key Halal areas. This resulted in a lack of literature, strong empirical research, resource persons, standards, and policies to be made as references. These resources are crucial to all efforts in elevating Halal into a rich, profitable, and respectable sector full of opportunities.

The same research template could also be replicated to be implemented in other states in Malaysia. In future research undertakings, the same research could be imitated to explore the phenomenon in other settings, which could present different challenges, opportunities and quandaries. For example, the circumstances for SMFEs in Sabah and Sarawak might be slightly different due to differences in local laws and regulations, as well as differences in demographic elements. These varieties can offer richness in data and results, which is more fitting to the multifarious background of Malaysian entrepreneurs.

Subsequently, this research was conducted as a check-and-balance measure to ensure that both the worlds of

academia and industry are in line, not just pleasing each other's goals and objectives. Especially in Malaysia, it is well-known that, unlike MNCs, many of the SMFEs didn't receive too much support and attention from the authorities, until only a few years ago. Interestingly, government statistics have shown that SMFEs are the actual backbone of Malaysia's Halal industry; they must be continuously nurtured and strategically sustained to elevate them to international standards. Hence, it is hoped that the HalCoM model could inspire and spark interests in future researchers to continue delving into this developing, vibrant and worthwhile research area.

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Exploring the Expectations of the Malay Generation X Towards Senior Living Accommodations in Malaysia

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Abstract: This study explores the expectations of Malay Generation X individuals regarding senior living accommodation. As Malaysia's ageing population continues to grow, with 15.3% of the population projected to be 60 and above by 2030, the demand for culturally appropriate eldercare facilities is rising. This qualitative study employed semi-structured interviews with 11 Malay informants through purposive sampling. Data were analysed using thematic analysis, resulting in four main themes and nine sub-themes. The findings reveal that informants are open to residing in senior living communities, provided these facilities align with their cultural and religious values. Key expectations include senior-friendly activities, such as leisure, socialising, and religious sessions; well-maintained facilities; qualified and hospitable caregivers; and comprehensive health and well-being services. Informants emphasised the importance of peaceful environments, privacy, and the integration of Islamic practices, such as halal-certified meals and prayer spaces. This study contributes to the literature on consumer behaviour in hospitality and ageing populations by highlighting the specific needs of Malay seniors. The findings offer valuable insights for policymakers and senior living operators to design facilities that cater to the cultural, emotional, and spiritual needs of Malay individuals. By addressing these expectations, Malaysia can ensure the provision of dignified and culturally sensitive senior living accommodations, fostering higher acceptance and satisfaction among the nation's elderly population.

Keywords: *Malay Elderly, Senior Living Accommodations, Ageing Population, Cultural Expectations, Elderly Care*

1. Introduction

Over the next decade, Malaysia is expected to experience a rapid increase in its ageing population. While developed nations like France, the United States, and the United Kingdom took decades to double their ageing population aged 65 and above, Malaysia is expected to achieve this milestone in just 23 years, increasing from 7% in 2020 to 14% by 2043 (Kinsella & Gist, 1995; Loraine et al., 2014; Tengku Abdul Hamid, 2015). Earlier, the World Health Organisation (2014) announced that the demographic shift is driven by declining fertility and mortality rates, as well as increased life expectancy. However, Malaysia's preparedness to address the needs of its ageing population, particularly within the Malay community, remains a critical issue.

In Malaysia, the Malay population, as the largest ethnic group, possesses unique cultural and religious values that influence their ageing experience and expectations. Urbanisation, modern lifestyles, and dual-income households have significantly impacted traditional family structures, which emphasise filial piety and elder care as religious obligations. These changes have created challenges for families, particularly in providing adequate care for ageing parents. Despite this, the stigma associated with sending elderly family members to senior care centres persists, often seen as a failure to uphold familial and religious duties (Suen, 2019).

Existing research on senior living accommodations in Malaysia has primarily focused on the general population with limited emphasis on specific communities such as the Malay. Studies suggest that Malays are gradually becoming open to institutionalised elder care, provided that facilities align with Islamic principles and cultural values, such as halal-certified meals, prayer spaces, and a sense of communal belonging (Che Anawa, 2015). However, the lack of facilities tailored to these requirements has caused many elderly Malays to show less interest in the current care options (Tabatabaei et al., 2016; Tan & Lee, 2017). Therefore, this study addresses the gap by exploring the expectations of the Malay ageing population - Generation X, regarding senior living accommodation/centres. This study demonstrates how senior living accommodations can be thoughtfully designed to honour the cultural and religious needs of Malays, enabling older adults to live with comfort and dignity, and in alignment with Islamic values. By appreciating what matters most to this community, senior living providers and policymakers can create more meaningful, personalised solutions that improve the lives

of elderly Malaysians while staying true to their traditions. This approach ensures satisfaction and helps bridge the gap between modern eldercare practices and cultural expectations.

Through this focused exploration, the study contributes to the development of culturally sensitive senior living accommodations that reflect the filial piety element integral to Malay and Asian values. Such advancements are essential as Malaysia prepares for the challenges and opportunities its ageing population poses.

2. Literature Review

As of the third quarter of 2024, Malaysia's population is estimated at 34.1 million, marking a 1.6% increase from the same period in 2023 (The Star, 2024). Alongside this growth, the country is experiencing a gradual demographic shift. In 2023, 7.4% of the population was aged 65 and above, a slight rise from 7.2% the year before (Siddharta, 2024). According to the Department of Statistics Malaysia (DOSM), by 2030, it's expected that 15.3% of Malaysians will be aged 60 and older—officially placing the nation in the category of an ageing population. This shift is largely due to lower fertility and mortality rates, along with Malaysians now living longer than ever before.

In response to these demographic changes, the Malaysian government has been actively encouraging investment in senior living projects and aged care services. The goal is to improve the quality of care and create facilities that better cater to the needs of an ageing population (Malay Mail, 2024). However, despite these efforts, negative perceptions of institutional eldercare remain widespread. Many still associate such facilities with a loss of independence and a decline in quality of life. To move forward, it's important to challenge these stigmas and design senior living environments that not only reflect Malaysia's cultural values but also offer older adults a safe, respectful, and dignified place to live.

Aged Care Industry in Malaysia

With increasing life expectancy, Malaysia, like many other countries, has begun prioritising the quality of life for its elderly population (Soriano et al., 2016). The healthcare needs of the elderly have become a pressing concern, necessitating a focus on institutionalised eldercare solutions. Since the establishment of the Care Centre Act in 1993, the Malaysian government and non-governmental organisations have worked to provide eldercare services, including nursing homes and residential facilities, for frail elderly individuals and those without family support.

Nursing homes typically provide 24-hour nursing care, support for daily living activities, and specialised medical services for elderly individuals with chronic diseases or disabilities. In contrast, residential homes offer accommodations with basic facilities, such as libraries, recreational areas, and meal provisions, for elderly individuals who do not require constant medical attention. While residential homes are a relatively new concept in Malaysia, they are gaining traction as the elderly population continues to grow (Tan & Lee, 2017).

As of 2019, Malaysia had 21 licensed nursing homes under the Ministry of Health and 350 private residential homes registered with the Department of Social Welfare (MIDA, 2021). Additionally, private institutions, such as the Columbia Asia Extended Care Centre, provide comprehensive nursing and rehabilitation services. The private sector has also shown a growing interest in developing independent and assisted living facilities to cater to the increasing demand among Malaysia's ageing population. The government has encouraged this trend by promoting investment in senior living projects to enhance the quality of eldercare in the region (MIDA, 2021).

Social Stigma of Senior Living Centre

Despite these advancements, a significant social stigma remains attached to institutional eldercare in Malaysia. Studies have shown that many associate institutional care with negative outcomes, including reduced autonomy, depression, and a lack of value for the elderly (Dixon et al., 2009; Sibuh, 2015). The lack of privacy in shared living spaces and instances of neglect or demeaning treatment by caregivers have further exacerbated these perceptions (Calkins & Casella, 2007; Choi et al., 2008; Westin & Danielson, 2007).

To overcome this stigma, there is a growing emphasis on transforming senior living centres into modern, comfortable accommodations that align with cultural values. Malaysia's recognition as one of the top five retirement destinations globally reflects a gradual shift in perception (Diane, 2015). As Generation X approaches retirement, this demographic, which currently dominates the workforce, is expected to have sufficient savings to invest in better facilities, paving the way for higher demand for well-designed senior living communities.

3. Methodology

Selection of Informants

This study employs a constructivist paradigm with a phenomenological approach to explore the expectations of Malay individuals regarding senior living communities, a relatively new concept in Asian countries. Data were collected through semi-structured interviews, enabling an in-depth exploration of the informants' perspectives. Informants were exclusively selected from the Malay ethnic group in Selangor, Malaysia. As of July 2024, Selangor's population was estimated at approximately 7.4 million, making it the most populous state in Malaysia (Siddharta, 2024).

This demographic significance makes Selangor a pertinent focus for understanding ageing trends within the Malay community. Eligibility criteria for informants included being between 38 to 58 years of age (Generation X) and enrolled in a government pension scheme. This cohort represents Malaysia's forthcoming ageing population, often referred to as the "silver generation." Their stable financial status, ensured by fixed monthly pension incomes upon retirement, positions them as a demographic likely to consider senior living communities offering comprehensive services and facilities.

In line with Creswell's (1998) recommendation of 5 to 25 informants for phenomenological studies, this research was conducted through in-depth interviews with 11 Malay informants. The sample was evenly divided between male and female informants, with nearly 90% reporting an annual income exceeding MYR60,000. This focused approach aims to provide culturally specific insights into the expectations and preferences of Malay individuals concerning senior living accommodations, highlighting their unique needs and values.

Instrumentation and Procedures

An interview protocol was meticulously developed and reviewed by experts in the hospitality and lodging industry, who were not directly associated with the study. This external review ensured the content validity of the protocol, enhancing its alignment with the study's objectives. While the protocol provided a structured framework for the interviews, the researchers retained the flexibility to ask follow-up questions. This approach allowed for deeper exploration of informants' insights and ensured comprehensive responses. The protocol included questions focusing on informants' expectations regarding facilities, services, and activities in senior living communities.

Data Collection

A snowball sampling technique was employed for participant recruitment. The initial participant was identified through the personal contact of one of the researchers. After confirming that the informants met the study's eligibility criteria, they were contacted via a messaging platform. Upon agreement to participate, the first informant provided referrals for additional informants. Face-to-face interviews were conducted at locations and times convenient for the informants, fostering a comfortable environment for open discussion. To ensure informants could express themselves fully, interviews were conducted interchangeably in Malay and English, depending on the informants' preferences. Interviews conducted in Malay were later translated into English for analysis.

All interviews were audio-recorded with the informants' consent to ensure accurate data capture. Additionally, the researchers maintained observation logs to document non-verbal cues and contextual insights during the interviews. Following the transcription process, the interview transcripts were shared with informants for member checking, allowing them to review and confirm the accuracy of the data. This practice enhanced the credibility and trustworthiness of the findings, adhering to Creswell's (2008) recommendations for rigorous qualitative research. This comprehensive and systematic approach ensured that the data collected were valid

and reliable, providing a robust foundation for analysing informants' expectations regarding senior living communities.

Data Analysis

Pseudonyms were used during data analysis to ensure the anonymity of informants. Each participant was assigned a unique code corresponding to their order in the study, such as M1, M2, and so on, representing the Malay respondents. This approach safeguarded participant confidentiality while enabling systematic data management.

The researchers carefully reviewed the transcribed interviews multiple times to gain an in-depth understanding of the data. Thematic analysis, as outlined by Braun and Clarke (2006), was employed to identify meaningful patterns and themes within the dataset. This method involved a structured process, starting with familiarisation with the data, generating initial codes, and then systematically searching for recurring themes. Emerging themes were reviewed, refined, and clearly defined before being organised into a comprehensive report. Throughout the analysis, researchers concurrently noted short phrases, ideas, and keywords that captured the essence of informants' responses. Frequently mentioned concepts were grouped and established as sub-themes and overarching themes. This meticulous and iterative process ensured that the analysis accurately reflected the expectations and perspectives of the Malay respondents regarding senior living communities.

4. Findings and Discussion

Informant Profile

Interviews were conducted with eleven Malay informants. Six out of the eleven informants were female, and 63% of the informants held high educational qualifications, including diplomas, Bachelor's degrees, and Master's Degrees. The majority (79%) of the informants were in the 45-year-old age group. Additionally, more than 65% of the informants belonged to the professional and management group, and 88% of the informants reported an annual income exceeding 60,000 Malaysian Ringgit.

Discussion of Themes

The uniqueness of this study lies in its ability to offer diverse views and voices of Malay Gen X, who have different expectations for the facilities, services, and activities that should be made available to ensure their quality of life during the golden years. Four main themes and nine sub-themes emerged from the analysis of the eleven interview transcripts.

Senior-Friendly Activities

This theme emphasises the importance of brain-stimulating and physical activities in keeping the elderly engaged and active. As supported by Great Senior Living (2012–2019), such activities enhance cognitive function, contributing to better mental and emotional well-being. Furthermore, these activities foster social connections, improve relationships, and enhance physical abilities and overall health.

Most informants (n=11) strongly preferred the Senior Living Centre to offer a range of activities categorised into four sub-themes: leisure activities, low-impact exercises, socialising opportunities, and religious or spiritual activities. A possible explanation for the significance of this theme is the informants' past experiences, as many had active professional lives and were accustomed to structured and meaningful use of their time. The following sections elaborate on each of the sub-themes of Senior-Friendly Activities.

Leisure Activities

This sub-theme received the highest emphasis from the informants. Nine of eleven informants highlighted various leisure activities, including arts and crafts, tours and sightseeing, gardening, reading, board games, singing, and dancing. Among female informants, the most preferred leisure activity was tours and sightseeing, as it was perceived to relieve stress, bring happiness, and reduce feelings of isolation at the centre. This is evident from statements such as:

"…. we *need to have an activity to take these older persons to go for a trip…Trips to certain places so that they'll also feel entertained, not feeling confined there."*

Informant 5

Reading and gardening were also frequently mentioned as leisure activities. These activities are believed to help the informants remain physically and mentally active.

Low Impact Exercise

Five informants highlighted this theme, emphasising the importance of low-impact activities such as aerobics, dancing, tai chi, and physical exercises led by qualified instructors. These activities were viewed as essential for helping senior residents maintain their physical health and overall well-being. Some informants expressed their thoughts as follows:

"There should be activities to keep us fit. Activities like exercises, which are led by the instructors."

Informant 3

Socializing

Ten informants agreed that they would stay at the Senior Living Community for socialising purposes. This is especially true for single informants who have no heirs. Socialising activities help keep their spirit growing and make them feel needed. Some of the socialising activities include chatting with friends of the same age, celebrating birthdays or festivals together, and sharing experiences. Among the statements provided by the informants are:

"I need to mix around with other people...communicate with people, or else your brain is going to age faster."

Informant 1

Religious and Spiritual Activities

Eight informants emphasised this sub-theme heavily, highlighting its importance in their expectations. Among the activities they anticipated were:

"…*they [senior living accommodation] should conduct religious classes weekly, invite someone [to] come and teach, we should always organise religious educational events so that the older persons will get the benefits..."*

Informant 5

The senior-friendly activities highlighted by the informants encompass leisure, physical, social, and religious activities. Leisure activities emerged as a prerequisite for the elderly to consider staying in a Senior Living Community. These activities were viewed not only as a means to pass the time but also as a way to foster happiness and contribute to improved health and well-being. This aligns with findings by Kim, Yamada, Heo, and Han (2014), who reported that leisure activities help seniors experience psychological benefits, strengthen social support networks, and enhance physical health, all contributing to successful ageing.

The informants particularly emphasised religious activities and facilities as essential components of a senior living centre. These include scheduled religious classes, prayer sessions, and spiritual gatherings providing solace and fulfilment. This finding aligns with similar insights from Chew et al. (2018), who noted that religious facilities and services, such as transportation to places of worship, are crucial for ensuring the emotional and spiritual well-being of elderly residents in senior homes.

Socialising activities were also highlighted as important to staying engaged and maintaining emotional health. Informants expressed a strong desire for opportunities to build meaningful relationships within the community, emphasising the importance of feeling included and supported. This sentiment echoes the findings by Chew et al. (2018), who noted that a sense of belonging and approval in a social circle is critical for the emotional well-being of elderly individuals.

Overall, the informants emphasised the importance of a holistic approach to senior living that incorporates leisure, physical, social, and spiritual activities, thereby ensuring their overall happiness, health, and spiritual fulfilment. Next, the second theme of Senior Living Centre expectations is presented.

Sufficient and Well-Maintained Facilities

This theme refers to adequate and well-maintained facilities that a Senior Living Community should provide to ensure residents' comfort and stability. The majority of informants (n = 11, with 6 being female) expressed their expectations regarding the facilities. Four sub-themes emerged: Fitness and Well-Being Facilities, Connectivity, Hotel-like Facilities, and Clean and Comfortable Facilities. It is reasonable to expect that elderly individuals need a living environment equipped with essential and well-maintained facilities to meet their needs.

Fitness and Well-Being Facilities

Technically, some of the fitness and wellbeing facilities required include a gym, swimming pool, medical assistance, running track or outdoor facilities, and physiotherapy.

Some of the informants stated:

"…swimming pool, gym... You can have like a running track...physiotherapy stuff like that"

Informant 8

Apart from that, religious facilities have been included in this sub-theme as they provide some peace of mind and could improve the informants' well-being. Only two out of eleven informants hoped that comfortable prayer places would be made available for them to perform their duties to God.

Connectivity

Interestingly, three informants emphasised that connectivity with the outside world is essential to any senior living community. They highlighted the importance of having reliable WIFI connections to maintain contact and communication with family members and friends. Additionally, some suggested that the management of the senior living community should provide regular updates on residents' health to their family members, ensuring transparency and fostering trust among them. One informant also expressed the need for a television as part of the facility. The significance of this sub-theme likely stems from the growing reliance on technological devices and internet connectivity in modern life, which enables better communication and access to information. The following statement reflects the informants' expectations:

"We live in multimedia…The IT world now. So, I think Wi-Fi is a must…."

Informant 8

Hotel-Like Facilities

Four informants strongly preferred the Senior Living Community to offer 'hotel-like facilities,' demonstrating their willingness to pay for such premium amenities. They underscored the importance of housekeeping, laundry, and room service, which they believed were crucial for ensuring comfort, convenience, and a stress-free lifestyle. These features were seen as essential in creating a living environment that meets practical needs and provides a sense of luxury and relaxation.

The informants emphasised that these services would allow them to focus on enjoying their daily lives without being burdened by routine chores. This preference reflects a growing demand for senior living accommodations that merge functionality with the sophistication and comfort of high-quality hospitality standards. By offering such amenities, senior living communities can cater to residents who value independence while appreciating the convenience and elegance of a well-maintained environment.

"*…Providing hospitality services like housekeeping, laundry, room service, things like that. Just like in a hotel, isn't it?*"

Informant 2, Informant 3

Clean and Comfort

This sub-theme highlights the importance of a tidy, well-maintained, and home-like environment with ample space, which the informants strongly value. Ten informants emphasised that a senior living centre should embrace a "feels like home" concept, fostering an atmosphere of warmth, familiarity, and comfort. Such an environment was crucial for promoting emotional well-being and facilitating a smooth transition to community living. The "feels like home" concept extends beyond cleanliness, focusing on thoughtful design elements tailored to the unique needs of elderly residents. These include spacious living areas, comfortable sleeping quarters, and accessible layouts that minimise hazards and promote safety. Essential features such as well-ventilated rooms, abundant natural lighting, and relaxing private areas were identified as critical for creating a welcoming space.

Informants also emphasised the importance of home-like amenities in enhancing their daily living experience. These include attached bathrooms for privacy, personal storage spaces for convenience, and dedicated areas for social interactions, such as communal lounges or living rooms. Informants envisioned a space that blends the functionality of modern living with the comfort and warmth of a traditional home, fostering a sense of belonging and security. By adopting these elements, senior living centres can effectively meet their residents' physical, emotional, and social needs, ensuring a high quality of life in a supportive and nurturing environment.

"...so, I prefer my room with a window or balcony, complete with a reading table and computers for my usage and definitely with an attached bathroom."

Informant 11

Security and Senior-Friendly Facilities

This sub-theme, though mentioned by a smaller group of informants (n=2), highlights an important expectation regarding on-site safety and security in senior living communities. Ensuring the safety and well-being of elderly residents is paramount, requiring facilities that minimise the risks of intentional or unintentional harm. Key suggestions included implementing senior-friendly features and robust security measures, such as surveillance systems.

Informants emphasised the need for comprehensive security systems to address concerns about safety in their environment. For example:

"*High security...of course, I need security as well...since you know the crime rate in Malaysia also now is very high...so security is the most important part of it..."*

Informant 7

"*They should have CCTV....to monitor us, just like a centre where we press a button. Someone will be there."*

Informant 10

These concerns align with findings in previous research. Tan and Lee (2017) emphasised that retirement homes should incorporate elder-friendly features, such as non-slip flooring, grab bars, and appropriately positioned electrical switches and windows, to enhance accessibility and reduce risks. Additionally, they recommended designs with barrier-free entryways, wider doors, and senior-friendly bathrooms to cater to the needs of residents. An emergency alarm system capable of providing around-the-clock assistance is crucial for security. Such measures not only ensure physical safety but also foster a sense of security and peace of mind for residents, which is vital for their overall well-being. Addressing these safety and security needs can significantly enhance the appeal of senior living communities and ensure that they meet the expectations of prospective residents.

Qualified and Hospitable Caregivers

One of the primary concerns expressed by the informants was the quality of care they would receive in their golden years if they chose to reside in a Senior Living Community (SLC). This concern stemmed from negative portrayals in the media regarding cases of elder abuse and neglect in care facilities. Consequently, seven informants highlighted the importance of having qualified and hospitable caregivers as a key expectation.

Chew et al. (2018) emphasise that as the health of elderly individuals deteriorates, they often require full-time caregiving services. Over time, residents tend to develop strong bonds with their regular caregivers, characterised by proximity, availability, and responsiveness to their needs. For this reason, informants emphasised that senior living centres must prioritise recruiting a professional caregiving team that is responsible, compassionate, and accommodating, ensuring both their physical and emotional well-being.

Their expectations were captured in the following statements:

"Staff must be friendly and courteous towards these old folk…The staff themselves must be creative and innovative. So that they can put some interest in the old folks"

Informant 9

Health and Well-Being Services

Health and well-being services encompass personalised support designed to meet the unique needs of elderly residents. These services include access to basic medical care such as regular health check-ups, on-site medical and healthcare facilities, and alternative treatment options. Additionally, counselling sessions and the provision of healthy, nutritious meals are considered essential for maintaining physical fitness and enhancing emotional well-being among the elderly.

Eight informants highlighted the importance of these services, expressing their expectations through statements such as:

"*Other services that I prefer to have are such as medical, health checks, nutrition, maybe like personal service personnel that will look after me from time to time. It will also be great if the management will send reports on my health"*

Informant 11

This feedback underscores the necessity of a comprehensive approach to health and well-being in senior living communities. By providing accessible healthcare, emotional support, and balanced nutrition, these services can significantly improve the quality of life for elderly residents, ensuring their comfort, security, and overall happiness in their golden years.

5. Conclusion

This study highlights the significant potential of senior living centres as an emerging market in Malaysia, particularly among the Malay population. The findings are grounded in the positive responses and insights gathered during the interviews, reflecting the informants' expectations for their future living arrangements. The study contributes to the literature on consumer behaviour in hospitality and ageing populations, specifically by exploring the unique expectations of the Malay community regarding senior living accommodations.

Theoretically, this research supports the arguments presented by Che Anawa (2015) about the evolving perspectives of Malays toward institutional eldercare, such as old folk homes. Practically, the findings provide valuable guidance for policymakers and service providers in developing policies and strategies for the operation and management of senior living facilities. Additionally, the expectations shared by informants provide senior living operators with actionable insights to enhance the design, facilities, and activities in these communities, making them more appealing and suitable for elderly residents.

However, this study is not without limitations. It focused solely on the expectations of a single demographic, which limits its comprehensiveness in capturing broader attributes relevant to senior living centres. Future research should explore a broader range of factors, including preferences, motivations, and satisfaction, and investigate how these elements collectively influence the development and success of senior living accommodations. Expanding the scope of future studies to include diverse methodologies and larger sample sizes could provide a more holistic understanding of this emerging market.

In conclusion, this study highlights the importance of developing culturally sensitive senior living solutions that cater to the unique expectations of specific communities, such as the Malay population. By addressing these needs, Malaysia can ensure a higher quality of life for its ageing population while preserving cultural values and traditions. Future efforts should aim to build on these findings to create inclusive and sustainable senior living models for the nation's diverse elderly demographic.

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Integrating Digital Leadership with Workforce Agility: A Conceptual Model for Malaysian Public Schools

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Abstract: The integration of digital leadership and workforce agility has become increasingly vital for managing digital transformation in educational systems. This conceptual paper explores how school leaders in Malaysian public schools can navigate technological change while cultivating a teaching workforce that is adaptive, self-regulating, and resilient. Grounded in transformational and distributed leadership theories, and informed by frameworks on learning agility and professional development, the study presents a context-sensitive conceptual model. Drawing on a synthesis of literature and practitioner experience, the paper articulates five key theoretical propositions linking digital leadership competencies such as emotional intelligence, strategic vision, and inclusive governance to workforce agility outcomes. It further examines organizational enablers including professional development, collaborative culture, and infrastructure support. The end product is a framework that provides a comprehensive picture of how the practices of educational leaders can contribute to institutional resilience, innovation, and inclusive capacity-building in the case of Malaysia's public schooling. This study adds to leadership theory and application by situating Western models within Southeast Asian environments and provides a basis for further empirical testing and policy development.

Keywords: *Digital Leadership, Workforce Agility, Educational Transformation, Malaysian Public Schools, Teacher Agency*

1. Introduction

The pace of change in the technological environment and the advancement of structures in organizational systems are reshaping educational systems and thus demand creative leadership and workforce preparedness. Amidst the Malaysian educational landscape, grounded on educational reform programs intertwined and geared with national development plans, the nexus between digital leadership and workforce agility is considered fundamentally as a fundamental subject of interest. This theoretical paper explores how school leaders in Malaysia can successfully navigate the intricate process of digital transformation while creating an agile workforce that can appropriately respond to the changing expectations of contemporary education.

The coupling of digital leadership and workforce agility is particularly pertinent for Malaysia as the country strives to converge an educational system with the aspirations proposed in the Malaysia Education Blueprint (MEB) 2013–2025. The challenges of the COVID-19 pandemic only strengthened the imperative for digital transformation and the need for innovative practices both in teaching and in administration. Despite considerable advances made, previous studies have identified a gap in the understanding of the link between leadership styles and workforce agility in the educational environment, especially in the context of Malaysian public schooling. This paper aims to bridge the gap by proposing a conceptual framework that explicates the linkage between digital leadership and workforce agility, in light of the specific exigencies facing the Malaysian context.

By tapping on a fusion of classic leadership models such as transformational, distributed and digital leadership and the more recent framework on workforce agility, this work presents a vision on how those domains relate to each other within education. Teacher workforce agility, conceptualized as the sum of the capacity teachers have to adjust, respond, and self-regulate in a context of changing conditions, is viewed through the dual cognitive lenses of teacher learning and teacher addictiveness. The objective of the drafting exercise is to provide a theoretical start to fill in the current gap, as well as some pragmatic aspects to policymakers and school institutional leaders in search of ways to reinforce teacher professionalism and institutional adaptability in an environment with rapidly changing conditions.

The operational mechanism of the method, this study obtained the majority of the literature from Scopus-indexed journals, concentrating on studies from the past decade that employed search terms such as "digital leadership," "workforce agility," and "educational transformation." To qualify for inclusion, studies needed to be either empirical or conceptual and relevant to educational institutions in Southeast Asia. Thematic coding facilitated a comparative analysis that identified correlations between leadership models and agility frameworks. This ensured that the findings were organized systematically. The analysis benefits from the author's extensive experience spanning over 25 years with the Ministry of Education Malaysia, providing insider perspectives that enrich the discussion of leadership and workforce agility in the local context.

Current research in Malaysia on digital leadership and workforce agility reflects both advancements and ongoing limitations. Although educational leadership has emerged as a growing area of interest, systematic reviews identify the field as "immature but emerging," and note the scarcity of studies that address the nuanced, context-specific realities of Malaysian public schools. Likewise, research on workforce agility has largely focused on private or organizational sectors, with less attention given to public education. This paper responds to these gaps by advancing a conceptual framework that is both theoretically informed and relevant to the Malaysian educational context.

The structure of this paper is organized to facilitate a comprehensive exploration of the topic. Following this introduction, the next chapter examines the digital leadership framework, addressing the required competencies and challenges faced by school leaders in integrating technology. The subsequent chapter explores workforce agility components, with a particular focus on teacher development and adaptive capabilities. Theoretical implications, combining digital leadership and workforce agility, as well as reflections on policy and future directions for research are also addressed. The paper ends with the synthesis of major findings and a summary of the practical implications of the new framework for Malaysian public schools. Table 1: Key Definitions Based on recent literature, in Table 1 we provide definitions and theoretical distinctions of digital leadership and workforce agility. This table illustrates a comparative summary of the main definitions and theoretical grounds of both Digital Leadership and Workforce Agility, which we identified in the main scholarly reference sources. It also juxtaposes different positions to emphasize the conceptual basis and nuanced reasoning behind current theories of school leadership and organizational flexibility in the digital age.

Table 1: Concept Definitions and Comparisons

Concept	Definition	Key Theoretical Roots	Distinctive Features
Digital Leadership (Northouse, 2019)	The process of influencing others through technology-mediated channels to achieve organizational goals.	Transformational and Servant Leadership; Technology Adoption Theory	Technology is used not just as a tool but as a medium of leadership influence.
Digital Leadership (Avolio et al., 2014)	Leadership that integrates digital competencies into traditional leadership approaches, enhancing communication and adaptability.	Full-Range Leadership Theory; Technological Acceptance Models	Blends traditional leadership traits with competencies required for digital-era leadership.
Workforce Agility (Sherehiy & Karwowski, 2014)	A workforce's ability to quickly adapt to changes in the environment, work processes, and technological innovations.	Organizational Agility Theory; Dynamic Capability Theory	Focuses on structural and process flexibility and fast reskilling of the workforce.
Workforce Agility (Muduli, 2017)	The behavioral and cognitive ability of employees to handle uncertainty and continuous change in digital settings.	Human Resource Agility Framework; Cognitive Flexibility Theory	Centers on employees' psychological readiness for digital disruption.

Workforce Agility (Nadeem, 2024)	Agility in education refers to teachers' capability to adjust learning practices dynamically in a volatile digital learning ecosystem.	Self-Determination Theory; Adaptive Teaching Models	Emphasizes self-directed learning, emotional resilience, and collaborative adjustment.
Digital Leadership (Mutil et al., 2024)	Leadership in schools that focuses on digital fluency, emotional intelligence, and rapid adaptation to technological change.	VUCA Leadership Models; Distributed Leadership Theory	Encourages shared governance and collective problem-solving through digital platforms.

The main research question that the current paper attempts to answer is: How do the school leaders deal with digital transformation and build an adaptive and resilient workforce in the turbulent environment of Malaysian public schools?

2. Digital Leadership Framework

In this section, the essential competencies, challenges and practices synonymous with effective digital leadership in Malaysian public schools are discussed. It focuses on the critical power of strategic vision, human-centered processes, and cultural fit in achieving a foundation for a successful digital transformation. Within the wider context of shaping education, this framework is the starting point for the way in which a view has been taken on the influence of leadership on workforce agility and technology integration.

Competencies and Challenges

In terms of the various digital leadership competencies in Malaysian public schools, the demands are complex and require technology savvy, creativity, vision, emotional quotient, and delegated distributed decision-making to implement effective digital transformation. “Technology fluency by itself is not enough for educational leaders; they must also communicate a clear and inspiring vision for the integration of technology and connect it to institutional needs to support school progress” (p. These leaders are also responsible for developing a shared vision of how digital tools can impact educational attainment and gaining the support of all of the school staff/ key stakeholders in the school (Phakamach and others 2023). Such a vision has to do more than just encourage the use of technology and system use, however, it focuses on the cultural changes that will be required for digital transformation to be effective. Emotional intelligence is a key factor, helping leaders to manage the spectrum of staff responses to the implementation of new technologies, from excitement to reluctance or fear. Knowledge of such reactions enables leaders to provide selective support, thus creating an inclusive and empowering climate for change (Fernandez & Rainey, 2006). The use of distributed decision-making to include teachers, support staff, and administrators in the decision-making process contributes to a sense of ownership and less resistance to change. The…empowerment" of stakeholders to participate in the implementation and integration of digital tools increases their involvement in the process of transformation and results in a better implementation of the process (Nadeem, 2024). A holistic approach that utilises technology in a balanced way with a more humane approach, e.g., the practice of empathetic communication and recognition of staff contributions, enhances school resilience and fosters a supportive school culture (Shamsudin, 2023). The integration of these competencies starts to address the multiple technical and personnel challenges when 703 Adams Digital leads in Malaysia's culturally diverse educational setting.

Obstacles confronting educational leaders in the public schools of Malaysia in relation to digital technology integration are still great and lie in the domains of ICT skill shortages, generational gaps, and poorly tailored professional development programmes. Senior teaching staff usually experience lower levels of digital skills, which slows down the pace as well as the success of technology incorporation (Rumeli & Rami, 2023). Given this restriction, differentiated models of professional development need to be adopted based on the spectrum of teachers’ skills, designed to provide both experienced and novice teachers with the training they need to develop their digital capabilities.” This gap between generations shows how important it is to have targeted, needs-based professional development that encourages peer-to-peer learning and mentoring across generations. This will make sure that digital strategies are used more consistently and fairly throughout the

school system (Rumeli & Rami, 2023). Professional development programs in Malaysian schools rarely cater to the practical, specific needs of the teachers, which further complicates the successful integration of technology. To overcome these obstacles, leadership should develop MN-wide projects, ranging from mentoring and peer-coaching to interactive workshops, to break down the generation divides and enhance the collective digital competency of teaching teams (Rumeli & Rami, 2023). These enduring issues suggest the human factor in the schools' digital transformation is as important as the tech one, warranting consistent leadership focus and system-wide support.

Trusted communication is one of the main factors that determine staff productivity and resilience, which are influenced in Malaysian government secondary schools by digital leadership that is based on relationship building, and this finding is consistent with prior research 9.. Trust-building behaviors, such as open and transparent decision-making, support of staff-led initiatives, are positively associated with staff well-being and engagement (Shamsudin, 2023). Trust as a leadership priority could facilitate an environment that feels safe for educators to take risks with new technologies and strategies. Open lines of communication, such as routine updates, feedback loops, and decision-making rooms to staff can raise concerns and provide suggestions and make people feel that they are part of the solution to create a shared sense of purpose necessary for digitization (Karakose et al., 2021). Acknowledgement by the institution for staff efforts in terms of informal commendations or formal institutional incentives must support positive involvement in technological innovations and encourage ongoing professional development (Shamsudin, 2023). This emphasis on relationship leadership is especially pertinent in the hierarchical and culturally oriented environment of Malaysian public schools where having dialogue and trust can be difficult but it is crucial in promoting collaborative innovation (Adams & Velarde, 2021). Furthermore, relational headship aids a school's adaptive power, which is its ability to respond to the constant pace of change and disruption that typically results from digital transformation.

Principals' digital leadership roles are understood by teachers in managerial, technological, and personal competencies that are key to facilitating whole school digital transformation. Additionally, principals are also considered as 'communication facilitators' through using digital options to make it easier for staff, students and parents to access information. This added transparency is conducive to trust building and the harmonizing of the views of stakeholders to a common goal (Karakose et al. Leaders and Principals at the management level must provide oversight of the infrastructure development, allocate resources to the acquisition of technology, and make digital policies that are in alignment with the mission of the school (Karakose et al., 2021). Equally important are interpersonal skills since principals are required to care for staff well-being, be supportive of experimenting with technology and provide constructive feedback when other staff raise issues about digital change! Principals also serve a vital function in the development of a digital learning culture through arranging staff development opportunities, establishing explicit digital literacy standards, and publicizing virtual accomplishments (Karakose et al., 2021). Transparent decision making transparency at the management level also contributes to staff buy-in by giving transparency over why decisions are made and policy set around D&T (and hence moving the digital leadership agenda forward) (Karakose et al, 2021).

Prospective digital transformation leaders in Malaysian public schools are required to demonstrate attributes of engaging and sustaining such relationships across culturally diverse teams which is a critical trait of a successful digital leader for a successful digital change. Change readiness and change management practice and constant dynamics should be given serious consideration. Cultural competence is the ability of leaders to respond to the diversity of expectations, values, and abilities of the different ethnic and language groups in the community (Adams & Velarde, 2021). They can take a more nuanced and locally contextual view when it comes to digital transformation by appreciating diversity, writes PAUL RUAN. The flexibility is just as important, however, because leaders will need to adapt their approaches to the varying levels of digital skills within the workforce and their attitudes to technology (Adams & Velarde, 2021). The school-level and local partnerships between schools and other stakeholders, including commercial technology suppliers and education authorities, enable leaders to capitalise on the resources, expertise and systemic support required to create the conditions for digital innovation (Phakamach et al., 2023). Planned change management with a focus on contingencies and open discussion on digital demand conditions can equip schools to tackle immediate as well as long-term challenges; especially in immediate crisis or transitional situations (Phakamach et al., 2023). Such relational and adaptive competencies are more and more crucial as Malaysian schools are challenged by swift

technological and societal shifts and need leaders who can bring diverse groups of people together on mutual grounds to achieve shared goals (Adams & Velarde, 2021).

Examples from the field underscore the critical need for gender-equitable and inclusive approaches in digital leadership development. Studies showing gender and age differences in being engaged in digital leadership roles reflect systemic inequalities that need to be actively addressed (Oktaysoy et al., 2022; Baroudi, 2022). Gender responsive leadership initiatives need to be put in place to ensure that educators, regardless of their gender identity,* have fair access to digital upskilling. Research also underlines the importance of intentional grouping in PLCs for both younger and older teachers to benefit from differentiated mentoring and support structures (Oktaysoy et al., 2022; Rumeli & Rami, 2023). Leadership development programs need to confront unintentional bias and social norms that stifle participation and contribute to the digital divide"(Baroudi, 2022). In doing so, different viewpoints inform decision-making, which in turn strengthens the relevance and sustainability of digital initiatives, and fosters a more inclusive school culture (Baroudi, 2022). Policies that focus on social equity by acknowledging the input and role of underrepresented groups, and recruiting leaders from diverse backgrounds, are key to the development of a digitally agile workforce that represents Malaysia's multicultural educational context (Oktaysoy et al., 2022).

Finally, distributed and transformational leadership models provide useful means for challenging digital denial and promoting ongoing school change. Distributed leadership highlights shared duties and collaborative decisions, utilizing the collective expertise and skills of teaching staff to create capacity for innovation and flexibility (Nadeem, 2024). Transformational leadership, however, uses inspirational motivation and individualized consideration to enhance teachers' ability to effectively engage with new technologies and create a culture where experimentation and learning through failure are supported (Baroudi, 2022). Creating a shared vision provides a long-term and medium-term goal that reflects the hopes and dreams of the school community, leading the digital agenda and school improvement (Nadeem, 2024). There is in addition a need for 'adaptive policy-making', meaning response to emerging needs and adaptive development of digital strategies for keeping schools responsive to changing technological and employment demands (Nadeem, 2024). Collectively, these models demonstrated the need to also move away from individualized to system-wide-based leadership initiatives that would build digital capacity and fluency at all levels of the educational system (Nadeem, 2024; Baroudi, 2022).

Technology Integration

This paper presents a multi-leveled technology embedding process in Malaysian public schools of which importance is attached not only to the technical dimension, but the human factor as well because this is key in the success of digital integration. One of the major aspects that leadership needs to address is the digital divide among teaching staff, in particular the digital proficiency gap between old teachers and new ones. Older teachers frequently self-report lower digital competence and present a barrier to the homogeneous use of technology in schools. This disconnect requires targeted interventions and specifically upskilling initiatives to cater to inclusivity across the range of ages. Yet, without these safeguards, the generation gap in technology use could lead to disparities in classroom practices that derail the school's shared mission of technology integration (Rumeli & Rami, 2023). School leaders are urged to take a more active role in creating personalized learning plans (Kereluik et al., 2013), as well as skill-based workshops specific to each educator. These interventions could not only help to fill the current voids but also help to develop a more connected and flexible workforce.

An essential component of the integration of technology in schools is the vision development by educational leaders. Vision is the unifying force that ensures that everyone, teachers, students, and parents are working synergistically toward common educational goals. But a lack of coherent digital strategy frequently leaves such initiatives in disarray, with adoption of tech deployed on an ad hoc basis remaining patchy at best. Leaders need to set objectives that go beyond the operational purposes of digital tools to the pedagogical value and equitable access that they facilitate (Rumeli & Rami, 2023; Msila, 2022). Throughout, this vision should be reinforced by strong communication to ensure that goals are clearly defined and that all key players are on board. Such misalignment can make for confusion and hurt the collective momentum that is necessary for maintaining momentum around efforts to integrate technology. By incorporating digital adoption within the wider context of school improvement plans, leaders can guarantee its relevance and alignment with the aims of the institution.

The human side of change management is another vital component of technology adoption that requires conscious leadership. Resistance to digital disruption is also common and many are stuck in old-fashioned ways of work, simply because they think that new technologies may pose a threat or a hassle. These are areas that require building trust at its highest and dialogue with leaders and employees. Clear, empathetic and active listening-based communication calms fears and builds a mutual understanding, and collaboration culture. Managers who express themselves in listening to the anxiety of the staff and who also express impressions of preparedness to adjust policies as per feedback are found to garner collective buy-in for digital initiatives (Shamsudin, 2023). Third, acknowledging teachers for their efforts whether through more formal forms of recognition or simply through positive reinforcement can motivate them to continue to engage with digital tools and approaches. Trust building of this kind is crucially important in culturally diverse school contexts where multiple meanings of these technologies need to be observed if inclusivity and harmony are to be preserved.

Professional development is a key element for successful technology integration; however, traditional methods, such as generic workshops, fail to address the specific needs of educators. Most teacher professional development programmes in Malaysian schools do not cater to differences in teachers' digital literacy, leading to disparate results and minimal continual engagement. Bespoke professional development programs based on both technical and pedagogical aspects of technology use are needed to enable teachers to successfully incorporate digital devices into their practice of teaching (Rumeli & Rami, 2023; Manaf, 2024). The same programs should be contextualized to subject-specific and other factors to make them relevant and applicable. Peer coaching, mentorship, and collaborative learning experiences can elevate the impact of professional development and contribute to a culture of continuous improvement. Through this they can forge a more flexible and resilient body of educators who are more able to meet the challenges posed by digital transformation, and who are less susceptible to wear and tear from their professional duties.

Setting up mechanisms for periodic assessment and feedback is another key and commonly ignored factor here. Digital executives need to make use of digital platforms and tools to track the evolution of technology adoption to make sure that their efforts are flexible and ongoing. To date, practitioners from many Malaysian schools, have not yet embraced this practice which could help in generating data-driven decisions (Manaf, 2024). Creating strong measurement frameworks, which utilize KPIs like student engagement, volume of technology use and teacher satisfaction, will give you hard data with which to gauge the success of digital efforts. These frameworks should also include real-time feedback mechanisms to allow leaders to quickly spot where they need to adjust and to adjust strategies accordingly. Schools can move to sustain the energy of their digital transformation efforts by making evaluation a baked-in part of the process of technology integration.

Key players: Principal/school leader. The principal/school leader is a key player in supporting a digital learning culture. Their participation in PD opportunities is transparent and they have open communication about money and PD usage, which sends a message to the entire school community about the school's attitude and stance on technology integration. Leaders who outwardly role model digital behaviors, also through the use of technology in their administrative tasks and in training side by side with staff, illustrate the willingness to that collective ownership of digital initiatives (Karakose et al., 2021; Sağbaş & Erdoğan, 2022). As much as possible, organizations should establish open lines of communication through digital tools, like messaging apps or virtual meetings, to promote collaboration and minimize misinformation. When leaders give clear and consistent updates, they create a sense of inclusion and unity needed to get through resistance and trust-building. In like manner, teacher-driven digital projects, cross-disciplinary collaborations and school-based initiatives provide staff with opportunities to take risks, experiment with technologies and push boundaries, and to incorporate technology as a natural part of the school culture and not an add-on (Sağbaş & Erdoğan, 2022). Not only does this joint working improve our staff morale, it also makes us more resilient in the future, better equipped to tackle whatever comes next.

Ultimately, the success of digital integration will be based on the capacity of school leaders to lead and manage this shift in a way that meets the specific needs of their schools. When there are goals that can be measured, such as student performance and teacher engagement, there is an accountability framework and a means to track progress (Ghamrawi & Tamim, 2023). Strategic differentiation – adapting digital tools to match local educational objectives and infrastructural realities – is equally critical. One-size-fits-all strategies for taking on

technology are less likely to work, which highlights the necessity for situational-specific solutions (Ghamrawi & Tamim, 2023). Leaders must also champion external partnerships to fill resource gaps and to provide equitable access to digital infrastructure, especially in resource-scarce areas. Interagency planning entities like the task forces may better inform decision-making through the inclusion of different perspectives, thereby improving the fit of digital efforts to a particular context (Ghamrawi & Tamim, 2023). This process of involvement will not only legitimize the implementation of a process but also create a common buy-in among all those involved in the process.

These measures complement the wider Malaysian Digital Education Policy that stresses systemic planning and capacity-building to bridge the infrastructural and skill-related gap. Key centres of excellence have been authorised to drive digital action within schools by the Ministry of Education in a policy that emphasizes the multi-level nature of sustainable digital change (Ramalingam et al., 2024). While these are encouraging developments, the scale of the task ahead relies upon adequate state support and the right allocation of resources. Additionally, successes from various digital transformation initiatives, indicated by the increased teacher satisfaction and student achievement as a result of targeted school leadership coaching, underscore the significance of leadership in bringing about constructive change in the public education domain (Ramalingam et al., 2024).

Notwithstanding the progress in the application of digital leadership in educational institutions, there are still notable theoretical voids, especially in its contextual implementation. Previous studies have predominantly concentrated on a functionalist view of leading and have not been concerned with the complexity of leading in differentiated educational systems such as Malaysia. Moreover, definitions and operationalisations of digital leadership – to an extent – often differ between studies, restricting their generalisability and transferability (Jameson et al., 2022). Addressing these shortcomings demands the creation of resilient, context-relevant frameworks that fuse digital leadership with workforce agility. Empirical research examining more local challenges and possibilities of public schooling can provide insights that aid the development of both theoretically and empirically informed research and practice. By taking a more critical and expansive lens in future research, this may help to provide a better understanding of how leadership practices intersect with digital transformation to develop more effective policies for educational advancement (Jameson et al., 2022).

Overall, the infusion of technology in Malaysian public schools is a complex task that needs a combined effort on technical aspects, strategic planning, and a human-oriented leadership style. Education leaders are tasked with helping guide their way through the challenges of collaboration and leading during digital transformation. By attending to the technological and human side of change, schools can build a workforce that is agile and flexible to meet the needs of an ever-changing education environment..

3. Workforce Agility Components

An agile and nimble workforce is key to success for the digital transformation of Malaysian public schools. In this section, we examine the critical elements that support teachers in being flexible and responsive to technological change, namely professional development and adaptive expertise. Understanding these components can aid educational leaders in cultivating a resilient teaching force that can prosper amid changing educational terrains. To further explicate these competencies, Table 2 presents the key domains and sub-constructs of digital leadership and workforce agility. Table 1 organizes some leading constructs of Digital Leadership and Workforce Agility by their component sub-constructs and conceptual dimensions from the latest academic frameworks. It offers multi-perspective insight into how these constructs are theorized and used in practice in the literature, contributing to the clarity of that and potential application for empirical research concentrations.

Table 2: Theoretical Dimensions and Constructs

Construct	Sub-Constructs	Dimensions
Digital Leadership (Avolio et al., 2014)	Digital Communication, Adaptive Thinking, Ethical Use of Technology, Visioning	Technological Proficiency, Innovation Culture, Change Leadership
Digital Leadership	Digital Fluency, Distributed Leadership,	Emotional Agility, Participative

(Mutil et al., 2024)	Emotional Intelligence, Crisis Responsiveness	Governance, Technology Integration
Workforce Agility (Muduli, 2017)	Cognitive Agility, Behavioral Agility, People Agility, Change Orientation	Adaptability, Role Flexibility, Learning Agility
Workforce Agility (Sherehiy & Karwowski, 2014)	Task Flexibility, Innovation Competence, Rapid Learning, Tech Integration	Operational Responsiveness, Employee Empowerment, Skill Flexibility
Workforce Agility (Nadeem, 2024)	Teacher Agency, Continuous Professional Development, Self-regulation, Collaboration	Pedagogical Flexibility, Digital Literacy, Institutional Support

Teacher Development

Pupils' demand-based school teachers' professional development for digital capabilities has become an urgent strategy for the Malaysian public school educators to be indeed ready with the competencies for the 21st-century instructional contexts. The research also reveals the inadequacy of the traditional one-size-fits-all training approach, which is unable to meet the heterogeneous level of competencies and practical needs of teachers causing uneven use of digital tools across the schools (Anis, 2024). Evidence Supporting Needs-Based Professional Development Researchers have documented the advantages of needs-based teacher learning that supports educators' drawn-from-professional-judgment desires in offering a safe and accommodating support system. For instance, professional development programs that emphasize sustained involvement and classroom practice have proved to be effective in increasing teacher confidence in using digital tools and their effective use in the fast-paced changes fostered by the pandemic (Damşa et al., 2021; Anis, 2024). The literature is clear that needs-based professional development that focuses on the individual needs of teachers, and delivers iterative and context-specific support, is effective. For instance, such professional development programmes which promote sustained interaction and classroom implementation have been found to enhance teachers' self-confidence and competence to integrate digital tools, especially in fast-paced changes such as during the pandemic (Damşa et al., 2021; Anis, 2024). These results provide evidence that the development of such focused and individual learning opportunities is necessary to close the digital skill gap in schools and to support more equitable processes of digital transformation. On the other hand, if such differentiated programs are desirable, the question may be raised as to whether all schools have equal access to the resources to implement them, especially in under-resourced areas, which from this perspective deserves further analysis. To address this issue, this study requires distinct professional development frameworks customized to each educator's competencies and the specific circumstances of their classrooms. This will bridge skill gaps and promote consistent technology use among all educators within the school.

Teacher agency– the ability to take the proactive steps needed to transition to digital and design effective learning environments – is key to the success of workforce agility in education. Studies have shown that teachers with developed agency are more likely to experience and search for support, exploit peer networks, and try out fresh pedagogical approaches in the face of obstacles (Damşa et al., 2021). However, there is not a homogeneous distribution of teachers' agency and school internal factors (including the quality of leadership, the access to digital resources, and the school culture of experimentation and risk-taking) strongly shape teachers' empowerment. For instance, with schools that provide autonomy, include teachers in decision-making processes and create a collaborative workplace culture, higher levels of teacher agency and therefore more developed classroom innovation are reported (Damşa et al., 2021). However, the opportunities for teacher-led innovation are often constrained by systemic pressures, especially in hierarchical or standardised educational environments. These structural barriers must be addressed to empower teachers to fully engage in and lead change for digital transformation. Further, research is required to investigate how schools can support the systematic implementation of motivational and contextual approaches to enhance teacher agency, beyond skill-focused PD.

Empowering teachers through transformational leadership and successful technology integration is at the heart of digital transformation in the schools. Transformational leadership by principals (e.g., vision, individualized support, and risk-taking) paves the way for environments in which teachers are more likely to feel highly motivated to use technology and to implement innovative pedagogical practices (Schmitz et al., 2023). For example, leadership strategies that focus on collaborative processes, trust development, and vision

sharing were associated with greater depth of classroom practices in technology (Schmitz et al., 2023). Such leadership initiatives not only increase the confidence that teachers have in using new digital tools, but also build pedagogical nimbleness, required to respond to changing educational needs. Yet these practices for sustainability may be contingent on a larger ecological alignment that could diverge across regions and schools (e.g., polices and resources). As a result, transformational leadership offers a useful pathway to empowering teachers, but the degree of its impact in practice is contingent on external variables that warrant further investigation.

Teacher learning agility is a dynamic form of potential consisting of change agility, mental agility, human relations agility, and results focus agility, which has recently been introduced as an antecedent of professional adaptability and commitment. Teachers with higher levels of change agility are more likely to adopt and participate in digital efforts while demonstrating a flexible and adaptive approach in reacting to new policies or technologies (Mahmutoğlu et al., 2024). In addition, mental dexterity allows teachers to respond critically to new information, implement new teaching methods, and remain problem-solvers when faced with uncomfortable and difficult situations (Mahmutoğlu et al., 2024). Human relations flexibility increases the collaborative capability of teaching staff, promotes the spread of digital expertise and encourages a cycle of innovation culture (Mahmutoğlu et al., 2024). Results focus on agility, in the meantime, ensure that the impact of digital transformation on measurable targets is emphasised and, hence, a results-based approach toward ongoing personal and professional growth is likely to be maintained during a transitioning period (Mahmutoğlu et al., 2024). Despite its promise, teacher learning agility is not maximized because the organizational context does not recognize and reward these characteristics. Further research is necessary to understand how particular models of professional development might develop and embed learning agility more systematically in school cultures in ways that are consistent with organisational aspirations and wider agendas of educational reform.

Studies have shown that teachers view digital leadership as being most effective when school leaders emphasize technology-oriented professional development and create a collaborative and inclusive school culture. Competent digital leaders craft a clear vision, set achievable objectives, apply transparent decision-making push trust and foster shared ownership in digital transformation initiatives (Karakose et al., 2021). Open communication channels allow for regular feedback, and the sharing of best practices, which are critical to minimizing resistance among employees and developing a feeling of collective ownership of the change (Karakose et al., 2021). What's more, executives who support regular professional development, mentorship and formalizing appreciation of digital success build rewarding spaces to engage and grapple with digital tools and behaviors over time. Yet the extent to which these efforts may be scaled back is constrained to the extent that resources are unjustly distributed including in schools that have not sufficiently been funded for technology and training. Further studies should look into the possibility of utilising these leadership practices in resource-limited contexts without losing the efficacy to promote a flexible workforce.

Performance coaching and creating collective learning capacity are powerful drivers of agility in teaching, enabling teachers to navigate the complexities of digital transformation more effectively. Performance coaching has proven to be effective in connecting individual growth goals with organizational priorities as teachers feel supported to master new digital tools (Lyons & Bandura, 2023). Coaching efforts that are built into the fabric of school culture – not as independent initiatives, but rather as an integral part of a teacher's total professional performance – and which exert a collective influence over teachers, raise their beliefs about, motivation to, self-regulation for, and efficacy toward ongoing skill development (Lyons & Bandura, 2023). Simultaneously, approaches to building collective learning capacity (e.g., diagnostic needs assessments and team-based professional learning) provide an opportunity for both individual and team learning needs to be met concurrently (Bailey, 2021). These processes promote the co-construction of digital practices and distribute leader- ship across teaching teams, allowing schools to maintain ongoing professional growth and build resilience in the face of uncertain or disruptive times (Bailey, 2021). Their applications are nonetheless not devoid of challenges, especially for promoting regular interventions, as well as for successfully embedding feedback systems in the teaching system. Further research into the best form of coaching and collective learning to enhance the kick-off, including transfer to the workplace across a variety of settings, is needed.

In sum, teacher development is a complex process, that requires customised strategies to accommodate the

dynamic needs of digital transformation in Malaysian public schools. Through an emphasis on needs-based professional development, the nurturing of teacher agency and the utilisation of leadership frameworks that encourage collaboration and flexibility, schools can unleash the potential for meaningful workforce agility. But this will not happen without continued aggressive effort to address systemic and logistical challenges to ensure all teachers have access to the tools, learning environment and support they need to succeed in an information-rich, digitally-enriched educational ecosystem.

Adaptive Capabilities

The adaptability of teachers is one of the most important factors in school effectiveness in responding to the dynamic needs of T and L, especially when rapid technological changes in the environment (during COVID-19) are taken into consideration. Teachers with high adaptability and communication approaches have been more successful in establishing effective digital learning environments even in the presence of profound constraints, as low digital competencies and a lack of sufficient institutional backing (Damşa et al., 2021). These results also indicate the importance of developing teacher agency as the basis of adaptability. Programs including formal peer networks and professional learning communities can offer opportunities for educators to exchange information, problem solve and create mutual support. Collaborative work with parents and schools has the potential to be effective, but robust institutional support and alignment with school goals are necessary to ensure that such efforts do not become symbolic and tokenistic. Future work could investigate whether these practices would be as successful in schools with fewer resources and less institutional support, such as low-income schools for which the practices are most needed, but in which they are least supported.

The enhancement of teachers' adaptive capacity is highly associated with their psychological well-being, self-determination theory, situating the satisfaction of psychological needs for competence, autonomy, and relatedness as crucial factors for fostering adaptability (Lim et al., 2022; Alviani et al., 2024). In Malaysia public school settings, digital competency and supportiveness of the environment seem to be the driving factors that will encourage workforce agility. Teachers with high digital competence, who are supported by their institutions, are more prone to successfully adapt to new challenges. By embedding these elements into established professional learning communities, one method for addressing differing levels of digital skill and cultivating a workplace learning culture rooted in collaboration and ongoing learning can be achieved. Yet, this view gives weight to empowerment and capacity and assumes the availability of a minimal level of resources, an assumption that cannot necessarily be made in all schools. As a result, policymakers and local school leaders should recognize the structural inequities that constrain digital competence-building opportunities, particularly in disadvantaged school communities, where adaptability is necessary, but frequently underfunded.

Agile leadership behaviours are essential in fostering adaptability amongst the teaching workforce. There is evidence to suggest that enabling teachers through participatory decision-making, motivation and job-specific training leads to the development of innovation and responsiveness (Al-Ganemi & Chalab, 2021; Özdemir, 2023). Such leadership approaches include building communal structures of accountability, and investing in coaching or mentorship targeted at fostering digital fluency. For example, training programs that deal with the different levels of the teachers' digital competence might increase the teachers' and the schools' flexibility, and as a result, be more responsive to curricular or policy changes (Al-Ganemi & Chalab, 2021). Although these examples show that the possibility of change created by DL's characteristics, that is, teamwork, at the same time, shows us that whether the DH system has brought about the desired changes to school practices will depend very much on the way it was able to overcome hierarchical features that characterize schools in the Malaysian context. Leaders would be wise to shift from transactional delegation to authentic participation and to develop a culture that truly honors the institutional knowledge of educators at the decision-making level. More research is needed on how these leadership behaviors can be scaled up at the school level under variance in administrative settings and resource distribution.

Agility within schools is also related to the individual agility of educators, and school climates that support empowerment, ongoing learning, and flexibility are important factors in enabling agility (Mozaffari et al., 2021). Research shows that positive school climates, with features like open communication, collaborative goal-setting, and a normalization of risk-taking, foster adaptability, along with greater job satisfaction and reduced staff turnover. Schools that encourage experimentation and feedback are more prepared to innovate and meet

growing new challenges. Yet this type of organizational flexibility demands mindful reorganization of schools to become inclusive and responsive which is especially difficult in top-down and impoverished education systems. Furthermore, although these approaches value culture, their use in the more rural/disadvantaged schools, which lack technological infrastructure, is still uncertain. Policy Implications Policymakers need to think about developing operational models that can allow these enabling climate features to be translated into concrete policies that can build capacity for adaptability in different school contexts.

In this way, teachers cannot only craft responses to what is happening within schools, but they can also adapt when there are environmental demands, such as a competitive or unstable educational climate. In Malaysia, changing policy movements such as the Malaysia Education Blueprint 2013-2025 and frequent curriculum changes necessitate constant responsiveness and adaptability from teachers (Wahjunianto, 2022). Schools that assist in creating workforce agility by providing flexible scheduling and resources, in offering ongoing professional development and in developing systematic forms of knowledge sharing allow teachers to prepare for and respond to the change. But, as practical solutions, these approaches are largely only as effective as the onset at which they are developed for consistent policies and equitable resource distribution in schools. Teachers in under-resourced schools may lack opportunities for professional development and infrastructure that support reform-driven expectations, prompting concerns about the longevity of agile strategies in these settings. Tackling these imbalances is indeed imperative if adaptability is to be a common, rather than the exceptional, trait of the Malaysian educational professional.

The incorporation of digital transformation leadership provides promising avenues for increasing school organizational agility. This leadership enables know-how transfer, innovation, and enables organizations to manage ambiguity and volatility (Ramadan et al., 2023). Tools such as structured collaborative platforms and focused knowledge-sharing practices enable schools to absorb rapid change while remaining innovative. In the context of Malaysia, where such digital discrepancies are widespread, the leaders who utilise these tactics, can plan to overcome the obstacle, by creating the knowledge and collaborative culture in the school. It is unclear, however, whether such mechanisms can scale. Schools, which are poor in infrastructure and finance, might lack the capacity to develop comprehensive knowledge-sharing systems, therefore requiring tailor-made strategies that suit resource-poor settings. Additional studies could examine ways to customize digital transformation leadership to meet the needs of various school settings while maintaining its efficacy and inclusiveness.

The understanding of teacher adaptability can be enhanced by incorporating notions from dynamic capability and information processing perspectives. Teachers who are highly effective at managing information and are in environments that have a culture of continuous improvement, are more adept at handling the ever-changing nature of demands and can be agile (Alviani et al., 2024). The agile educator is processing new information, assessing new technologies, and adjusting his pedagogical practices in real-time – rather than just relying on a static base of professional knowledge. This dynamic approach should be particularly appropriate in Malaysian state trunk roads due to the resource disparity occurring in Malaysian public schools, thus, requiring to have context-specific versatility and innovation. But such an understanding begs fundamental questions about the conditions that enable organizations to maintain this adaptiveness. Schools should concentrate on building a culture that values creativity and problem-solving and support staff with ongoing professional development. System-level approaches could be to co-create dynamic learning environments in which a state of continuous improvement and adaptability is embedded into everyday practices, and within the context of initiatives fostering economic and education reform, and the aim to enhance workforce agility.

In sum, the theme of ‘adaptive capacity’ draws attention to the complexity of how teachers are responsive to the digital turn in ways that are both influenced at the individual and organisational level. How well teachers can adapt will depend on cultivating teacher agency, on strategic professional development, and on leadership practices that create a sense of empowerment for teachers but also take down barriers to progress system-wide. Future interventions should work on the customization of frameworks accordingly to provide suitable to the different public schools’ needs in Malaysia, upholding inclusivity and sustainability over the long run.

4. Theoretical Implications

Examining and criticising the digital leadership theories indicates that the theories have a limited fit to the Malaysian school context, derived primarily from Western-based constructs. These well-established models tend to privilege individualistic leadership traits, such as politically visionary change or charismatic authority, which are less compatible with Malaysia's socioculturally rooted emphasis on collective agency, stakeholder engagement, and distributed governance. For example, a global phenomenon that has been hailed is transformational leadership, although it does not adequately capture the collaborative and participatory processes that are crucial in enabling sustainable transformation in Malaysian public schools (Nadeem, 2024). The bureaucratic climates and cultural specificity in Malaysian schools require adjustments or the construction of more contextually appropriate models. The idea of shared responsibilities and collective decision-making embodied in distributed leadership would, then, seem to correspond more closely to the realities of Malaysian practice. It includes levers such as shared PD initiatives and participatory governance, supporting an inclusive approach to digital transformation (Adams et al., 2021). Yet, challenges of introducing these practices, including change resistance, role confusion and creating trust within the leadership are faced. Solving these gaps by no means only enhances theoretical comprehension but also overcomes the theory-practice disjunction between leadership theories and Malaysian educational institutions. Table 3 provides a summary of empirical and theoretical studies, upon which this paper's theoretical assumptions are based. It consolidates salient contributions to the scholarly literature on digital leadership and workforce agility drawing from a variety of recently published empirical and conceptual studies. Every entry is accompanied by the research theme, methodological framework, and principal findings to guide the reader toward a full understanding of the background context and the research potential.

Table 3: Literature Synthesis

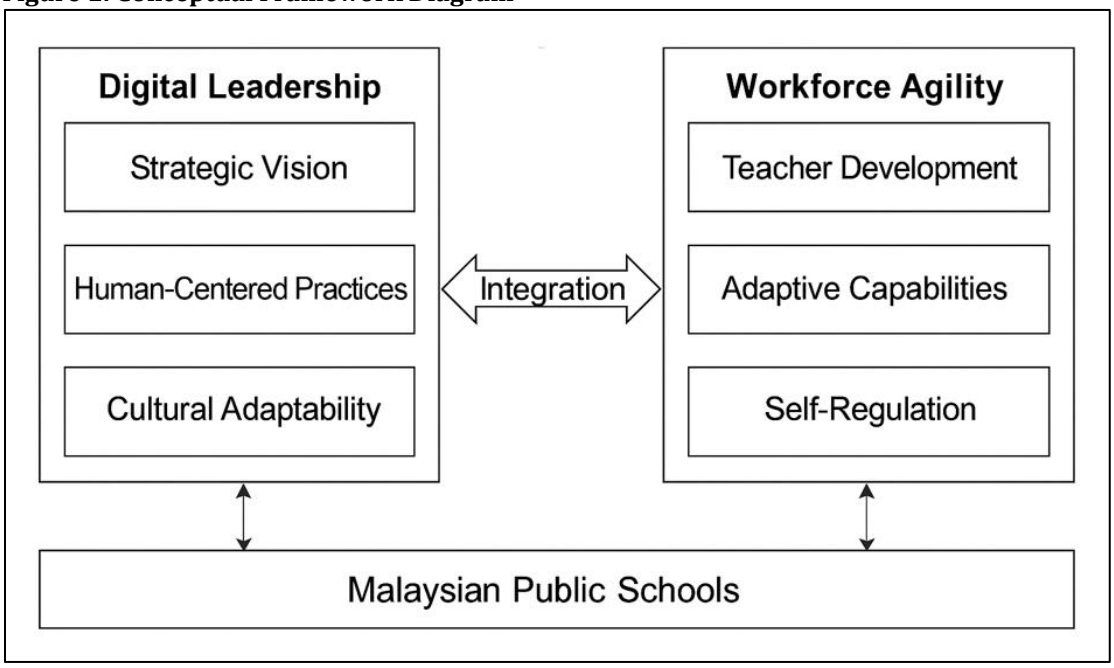
Author(s) & Year	Theme	Method	Key Findings
Mutil et al., 2024	Digital leadership readiness in Malaysian schools for VUCA environments	Systematic Review	Emotional agility, digital literacy, and visionary traits are crucial for leadership in volatile conditions.
Sherehiy & Karwowski, 2014	Defining dimensions of workforce agility	Conceptual Analysis	Agility involves adaptability, proactivity, resilience, and continuous learning.
Muduli, 2017	Agility competencies and HR practices	Quantitative Study	Agility is enhanced through leadership support, feedback, and agile HR practices.
Iskandar & Sobandi, 2024	Bibliometric trends in digital leadership research	Bibliometric Review	Key research themes include innovation, strategic orientation, and agility enablement.
Hatunoğlu, 2024	CPD for school leaders in the 4IR context	Systematic Review (PRISMA)	CPD must focus on digital leadership, agility, and resilience-building.
Nadeem, 2024	Workforce agility in educational reform	Qualitative Case Studies	Workforce agility depends on self-regulated learning and a collaborative culture.
Kamran, 2023	Digital leadership in public education post-COVID	Scoping Review	Leadership must balance structure with adaptive strategies for tech transitions.
Awodiji, 2025	African school leadership and digital innovation	Thematic Synthesis	Cultural and contextual adaptation is vital for digital school reform.
Miah et al., 2024	Digital transformation and organizational adaptability	Mixed-Methods	Strategic digital vision correlates with agility and school-wide change.
Elmatsani et al., 2024	Leadership evolution for digital governance	Bibliometric Mapping	Leadership in the digital age must integrate governance and innovation skills.

The merger between digital leadership and workforce agility explored of combining by Malaysian public

schools within Southeast Asian contexts is scant to such an extent. Although the importance of school principals in the creation of digital cultures is well-documented in the literature, empirical research on how digital leadership competencies facilitate workforce agility is still limited (Karakose et al., 2021; Adams et al., 2021). For instance, the Malaysian school principals are responsible not only to embrace and support digital transformation but also to respond to the professional development and the level of technological fluency among teachers. Such leadership activities have been shown to relate to higher teacher involvement and flexibility; however the processes that mediate these relationships need to be further explored. For example, to what extent leadership practices that emphasize technology training or collaboration indeed facilitate responsiveness to change, self-regulation, or adaptability among teachers, is still an open question. Therefore there is a critical need for research that integrates digital leadership, workforce agility and the variable outcomes of educational measures and on the particular practices, context and relationships between them. Addressing these knowledge gaps is particularly important given that the leadership of Malaysian schools may be strategically oriented to promoting agility, and in particular, in response to the specific challenges of their digital transformation initiatives.

A conceptual model that combines both digital leadership and workforce agility for Malaysian schools will have to address the critical organizational and individual factors that affect teacher adaptability. Workforce agility, which is characterized by adaptability, responsiveness, and self-regulation, is strongly contingent on organizational support for digital competence, enabling and collaborative knowledge sharing channels (Lim et al., 2022). In contrast to conventional frameworks for workforce agility, which predominantly concentrate on individual-level characteristics of workers, this model regards workforce agility as an outcome of organizational as well as individual factors. In this respect, teacher adaptation is not only a function of internal motivation but one that is heavily determined by the type of external support teachers receive, including access to resources, participative leadership, and formal professional development opportunities. For instance, schools that provide tailor-made differentiated training programmes for teachers have found themselves to be more engaged and capable of responding to digital change when ICT competencies differ (Lim et al., 2022). This emphasises the need to build institutional architectures that respond to concrete problems and at the same time create an atmosphere of cooperation. Nonetheless, this structure also needs to allow for differences in resource allocation in Malaysian schools, especially in deprived areas. The findings from this model have significant implications for policy making and institutional tactics, as they provide a richer comprehension of how to develop an adaptable workforce in a variety of academic contexts. Figure 1 shows the conceptual framework derived from the synthesis of digital leadership and workforce agility in Malaysian schools.

Figure 1: Conceptual Framework Diagram



With a foundation in these theoretical frameworks, the proposed model places a novel theoretical contribution by combining both distributed and transformational leadership theories, and workforce agility in digital transformation in educational contexts highlighting the complementarity to address digital transformation. The visionary leadership styles that are the hallmark of Transformational Leadership, are required in setting a clear vision and inspiring others to act jointly. At the same time, distributed leadership provides for the devolution of responsibilities that lead to increased collaborative innovation and accountability in schools (Phakamach et al, 2023; Nadeem, 2024). Combined, these two approaches have generally been used in isolation from one another by previous researchers. The marriage of these two bodies of literature provides a fuller and more comprehensive framework for the study of leadership in Malaysian public schools. For example, shared leadership can facilitate the assigning of such responsibilities as overseeing teacher-led digital initiatives or supporting and implementing adaptive instruction, thereby fostering collective problem-solving and organizational responsiveness (Nadeem, 2024). It also emphasizes agile policy-making and continuous feedback loops, which are essential to track the development of digital programs and respond appropriately to any difficulties. This integration goes beyond the conventional passing treatment of digital leadership and workforce agility as separate constructs and offers a framework that is more conducive to empirical testing and practical adoption in the Malaysian school setting.

Risk and system-wide adaptability. It might sound odd to discuss risk and system-wide adaptability here, but it is hard to dispute that the ability to manage risk and enable system-wide adaptability is key to leadership and agility in other sectors, such as logistics and food supply chains. Research in these areas has demonstrated how behavior-based management and traceability systems can lead to substantial improvement in organizational capabilities for addressing uncertainty (Fuad & Musa, 2021; Azmi et al., 2021). In the Malaysian setup, these principles may serve as a basis to formulate risk mitigation mechanisms to accommodate the disruptions due to technological, policy or social changes to Malaysian schools. For example, using traceability in digital initiatives (e.g., tracking real-time feedback of technology use in classrooms) may further assist leaders in recognizing bottlenecks and adapting strategies. Equally, systematic processes to receive regular feedback could enable schools to overcome resistance and hesitations in digital take-up, and build consensual responsiveness. Although such practices have proved successful in other industries, their translation for use in an educational setting presents a particular challenge in terms of how to make the activities accessible and effective across under-resourced schools. Investigating these similarities and their relevance to education is a fruitful way of broadening both theoretical and practical responses to agility and leadership in schools.

The implications that these findings have in theory suggest a range of opportunities for contributing to the body of knowledge and practice at the nexus of digital leadership and workforce agility. Through synthesising current leadership concepts and practices and responding to gaps in the literature regarding context, the limitations of dominant models are exposed and repurposed for meaningful practical contribution to the flood of schools to digital transformation in Malaysia on tested empirical constructs in the future. Table 4 lists theoretical statements that arise from the model, which can serve as a guide for future empirical testing. Each of the propositions is rooted in recent empirical or conceptual work and has the intention to guide future research and theory development in the area of digital transformation of education.

Table 4: Propositions Summary Table

Proposition No.	Proposition
P1	Digital leadership that integrates technological fluency and vision positively influences teacher agility and innovation (Avolio et al., 2014; Mutil et al., 2024).
P2	Distributed and participative leadership practices enhance teacher agency and adaptive capacity in dynamic digital settings (Northouse, 2019; Nadeem, 2024).
P3	Continuous professional development focused on digital competencies improves workforce agility and resilience (Muduli, 2017; Awodiji, 2025).
P4	Emotional intelligence in leaders moderates the effects of digital stress, enabling smoother organizational transitions (Soliman et al., 2023).
P5	Organizational supportive mechanisms such as IT infrastructure and peer working networks moderate the relationship between digital leadership and staff responsiveness (Kamran, 2023; Sherehiy & Karwowski, 2014).

5. Conclusion and Recommendations

The study aimed at finding out how digital leadership and innovative workforce agility could satisfy the challenges inherent in the digital transformation, at Malaysian public schools. Integral to this goal was exploring ways in which educational leaders can support their institutions to navigate technological change and develop a teaching workforce that is agile, responsive, and has the capacity for ongoing innovation. The inquiry was guided by the research question: What are how school leaders in Malaysia drive digital transformation and develop an agile workforce? The paper has attained its aim by covering the multi-dimensional domains of competencies, strategies, and organisational conditions that drive digital leadership and workforce agility to intersect, particularly in the case of Malaysia, via a relatively exhaustive conceptual summary.

The body of the paper provides a manifold of related results. Firstly, successful digital leadership in Malaysian public schools is a mix of being technology fluent, emotional intelligence and the ability to articulate a compelling strategic vision for digital change. But good leadership isn't only about technical proficiency; it's also relational and depends on skills like trust-building, open communication and cultural competence. The analysis reveals that the distributed and transformational leadership models are particularly suitable for the Malaysian context where these leadership approaches support an inclusive decision-making process, adaptability, and collaboration in the school climate, which are essential for successful digital adoption.. Technology integration emerges as both a technical and human challenge, requiring not only infrastructural improvements but also differentiated professional development and ongoing support to bridge generational and skill-based divides among educators. Needs-based professional development, targeted coaching, and mechanisms for peer learning are vital for cultivating teacher agency and closing gaps in digital competency. The development of workforce agility, framed as a dynamic blend of adaptability, self-regulation, and collaborative learning capacity, is shown to depend on institutional frameworks that empower teachers, promote psychological satisfaction, and normalize experimentation and risk-taking. Empirical trends identified in the literature underscore the importance of equitable access to resources, inclusive policy implementation, and the alignment of digital leadership practices with the broader goals of educational reform in Malaysia.

When situated within the wider research context, this work makes a significant contribution by expanding the theoretical discourse on digital leadership and workforce agility beyond Western-centric frameworks. The integration of distributed and transformational leadership models, contextualized for the cultural and organizational realities of Malaysian public schools, provides a nuanced understanding of how leadership practices can drive systemic digital transformation. The paper addresses critical gaps in the literature regarding the mechanisms that connect digital leadership competencies to workforce agility, offering a conceptual model that is both practically grounded and theoretically robust. Additionally, the parallels drawn from research in other fields, such as risk management and system-wide adaptability, open new avenues for applying established management principles to educational contexts. By integrating these perspectives, the work not only deepens the theoretical dialogue but also offers insights that are actionable at the policy and institutional levels.

Reflecting critically on the findings, certain limitations become evident. As a conceptual paper, the analysis is primarily based on the synthesis of secondary sources, making the results dependent on the quality and scope of existing literature. There is an inherent risk of cultural bias, as many digital leadership models originate from Western educational systems, and their direct transferability to Malaysian schools may be limited without further adaptation. The proposed conceptual model, while grounded in current empirical and theoretical insights, has yet to be validated in real-world school environments. Moreover, resource disparities and systemic inequalities themes recognized throughout the analysis present challenges for the practical implementation of recommended strategies, particularly in underprivileged or rural schools. These limitations underscore the need for caution in generalizing findings and highlight the importance of context-sensitive research design in future inquiry.

Looking ahead, several directions for future research are evident. Empirical studies are needed to test and refine the conceptual model proposed here, particularly through case studies or mixed-methods designs in diverse Malaysian school settings. Further investigation into system-level risk management, the scalability of

distributed leadership practices, and the mechanisms for fostering equity in digital competence development would enrich both theory and practice. Policy-oriented research that addresses infrastructural disparities and explores strategies for sustainable resource allocation is crucial for ensuring that digital transformation initiatives benefit all schools equitably. Furthermore, studies investigating the measurement and training of workforce agility across various cultures and organizational settings will make these findings more relevant and generalizable to environments in the Southeast Asia region and beyond.

At a personal level, this intellectual odyssey has enhanced my appreciation of the complex interplay between leadership, digital transformation and workforce agility in the specific setting of Malaysian public education. It has highlighted the need to anchor academic analysis in practitioner experience and create models and strategies that reflect the reality of the local context, rather than falling back on imported frameworks. The impetus and orientation for this work (to contribute to cultivating more resilient, innovative and inclusive educational systems) is as relevant as ever, in a field that is ever having to evolve. Synthesizing research and critical reflection offered in this article in the hope of stimulating additional discussions and action among the learning sciences scholars, policy makers, and educational leaders.

To conclude, the theoretical synthesis between digital leadership and agile workforce seems to be a potential pathway to improve teacher professionalism, institutional resilience and sustainable educational development in Malaysia. By dealing with both technical and human dimensions, and framing institutional change within a larger plane of equity and flexibility, this paper paves the way for further progress and substantial reform in Malaysia's public schools.

These strategies translate overarching concepts into tangible actions applicable in both leadership and policymaking. Tailored professional development, organized mentoring, and continuous feedback systems can enhance teacher adaptability for school administrators. Policymakers can ensure that digital transformation benefits all schools, regardless of their location, by guaranteeing equitable resource distribution, targeted infrastructure funding, and the implementation of comprehensive equity policies. Incorporating these practices into the distributed-transformational leadership model enhances its relevance and feasibility for Malaysian public schools

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Nature's Value: Unveiling How Perceived Value Drives Tourist Satisfaction and Social Media Recommendations

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Abstract: Nature-based tourism has gained significant popularity, prompting the tourism industry and local authorities to transform natural areas into major attractions. This type of tourism encompasses eco-tourism, conservation efforts, adventure activities, and island tourism, which aim to balance environmental, social, and economic development. Social media plays a vital role in promoting these destinations, as tourist often share their experiences and generate electronic word-of-mouth (eWOM) through posts, comments, blogs, and travel journals. Despite its importance, there is limited research on how the perceived value of nature-based tourism impacts tourist satisfaction and their intention to recommend via eWOM through social media, particularly in Pangkor Island. This study employs a quantitative approach, analyzing 160 survey responses using Structural Equation Modeling (SEM) with SmartPLS software. Results reveal that emotional and social value significantly influence both tourist satisfaction and the intention to recommend Pangkor Island through social media. Furthermore, tourist satisfaction mediates this relationship. However, perceived quality and price do not play a notable role in determining satisfaction or intention to recommend through social media. These findings provide useful insights for the tourism industry, aiding destination management in developing strategies to enhance and preserve Pangkor Island's appeal as a tourist destination.

Keywords: *Nature-based, Perceived Value, Tourist Satisfaction, Intention to Recommend, Social Media.*

1. Introduction and Background

Natural resources are one of the main tourism products. In the past few years, tourism activity that involves natural resources has been increasing rapidly (Carvache-Franco et. al., 2019). As you can see, nature-based tourism products have become more popular nowadays and it has become one of the factors why tourists travel to that particular place. Visiting nature-based places can improve individual health and welfare, connect people with the culture and nature, enhance social connections and also contribute to local economies. All these benefits can be an experience for a person and society and also sustained social development (Winter et al., 2019). Because nature-based tourism is growing fast, the tourism sector, local government, and other agencies have taken action to boost tourism within the related area to change natural sites into popular destinations.

Island tourism appears to be promoted for the conservation of the environment and social development while fulfilling the economic agenda. Malaysia is home to several beautiful islands across the world, as well as a diverse range of fish species, coral reefs, and other marine life (Zainuddin et. al., 2018). Redang, Langkawi, Tioman, Kapas, Perhentian, Sipadan, and Pangkor are among the most popular tourist destinations in Malaysia. To promote this product, social media plays an important role in making a destination well-known (Dedeoğlu et. al., 2020). Interaction in the dissemination of information involves those who have no interest in only one destination, but help to disseminate the information together to create viral marketing and create an impact on the brand image of the destination. Electronic word-of-mouth (eWOM) is often recognized to be one of the behavioral intents of tourists. On holiday, tourists create eWOM using words that are in the form of comments, posts, travel journals, notes, and blogs (Litvin et al., 2018).

The perceived value of the nature-based tourism may affect the willingness of a person to recommend some details to other people significantly (Caber et. al., 2020). Nature-based tourism is more likely to be promoted by tourists when they think that it has something special and should be experienced. The perceived value of nature-based tourism may depend on such items as the quality of the natural environment, the intensity of

service delivered by tour operator services and accommodation, and the whole experience experienced by the guest (Ban et. al., 2021). Several studies have investigated this relationship and found that tourist satisfaction plays a mediation role. Nature-based tourism plays a significant role in offering pleasure to tourists making them likely to be content with their stay (Huang et. al., 2020). In its turn, said satisfaction may increase the likelihood of referring others to the place (Marques et. al., 2021). This is referred to as the mediation effect where the subjective value of nature-based tourism interferes with intention to recommend based on tourist satisfaction (Ahn et al., 2020).

Nevertheless, little investigation indicates the intention to recommend the utilization of eWOM using social media in the context of nature-based tourism. Consequently, the study will discuss the interdependence between experienced value, tourist satisfaction and recommendation intention in the social media within the nature-based tourism context which prompts a number of research purposes. It has the following objectives: 1) to find out the effect of the perceived value of nature-based tourism on tourist satisfaction and desire to recommend the use of social media; 2) to establish whether satisfaction is a mediator between the tourist perceived value of nature-based tourism and desire to recommend the use of social media. This would be relevant because it would show what triggers amongst tourists the desire to recommend nature-based tourism to other people. In addition, knowing which among the perceived value attributes contribute most in determining intention to recommend can also serve as guidance in helping the policy makers and the tourism managers to adopt the best strategies of ensuring that the tourists' experience can be maximized and the numbers of tourists recommending nature-based tourism are maximized. Furthermore, the investigations into the mediating capacity of satisfaction in this study may be practically important with respect to the impact of satisfaction on the association between perceived value and intention to recommend with the help of social media. Through the identification of the processes through which satisfaction affects the relationship between perceived value and intention to recommend through social media, this study can potentially contribute to improving measures of tourism management that can enhance tourist satisfaction and elicit more positive recommendations. Overall, the findings of this study can have significant contributions to the promotion and development of nature-based tourism as a sustainable and attractive tourist destination.

2. Literature Review

Overview of Nature-based Tourism

Metin (2019) defined nature-based tourism as a form of tourism that engages various forms of activities which include swimming, diving, hiking, camping, picnicking, taking photographs, learning, and even spending time with those whom people love, in the realms of the natural locations that they feel to be different and intact. Sustainability and profitability are two key concepts whose role is critical in determining the success of nature-based tourism. The mission or task of the natural areas is to offer tourism activities opportunities and also identify appropriate tourist destinations. Tourism supporting factors determine the quality and quantity of the tourist attraction spots in natural environments and will depend on the tourists' visiting expectations (Metin, 2019).

Overview of Island Tourism

One of the well-known tourist attractions is Island tourism which is gaining popularity. Tourism of the island is regarded as one of the most significant tourist products of most countries, and it has served to ensure that the locals prosper economically (Hanafiah et. al., 2016). It is also grounded in the tourism product that is available on an island such as activities that can be undertaken on the island. One of the examples of any service or product that can be resold (so-called visited) and marketed to others is Island tourism (Sangpikul, 2018). Island tourism is a significant business sector in most regions around the globe including Malaysia. Not to mention that island tourism can have a significant impact on the environment and the culture of a location, emotionally providing people with a working workplace and economic benefits to the community (Alisa & Ridho, 2020).

Perceived Value

As Kadir and Shamsudin (2019) note, the image based on the perceived value of the product or service is presented as the difference between the difference between customer-predicted benefits and the perceived cost is attributed to the customer. It implies that it depends on the way the result value might determine

whether the overall consumer experience was substantial considering the money they paid or highly below the expectations. Products or services can make customers happy as long as they can meet their needs within a reasonable price limit that can be bought by the consumer (Shamsudin et al., 2018). In the meantime, Karjaluoto et. al. (2019), stated that the concept of customer perceived value refers to the attitude of the customer concerning whether the goods or services fulfilled his or her expectations. The principle of perceived value also presents ecotourism marketing packages with real-life implications on ecotourism marketing oriented at visitors (Kim and Park, 2017). Indeed, when perceived value becomes a one-dimensional number, when an objective methodology is applied to describe and quantify it, a contract center, be it as it may, is bound to become focused over the issues associated with value of cost of a protest or its utilitarian usefulness; this contract center, nevertheless, does not take long to be that which can be termed as the tourists discerning utilitarian value as it is associated with price, host- provider, benefit, and the core and social prestige of relations with staff, residents, and fellow tourists (Huang et al., 2019).

One of the oldest Multidimensional value models is the so-called PER VAL model, having four dimensions that exhibit the quality, emotional, price and social value (Sweeney and Soutar, 2001). Bihamta et al. (2017) define perceived quality as the cumulative quality or experiences rendered to the customers depending on the customers. It might not correspond to the actual performance but be influenced by the brand image and relative experiences of the same service by the patient with the services of the competitors (Keshavarz and Jamshidi, 2018). Tung et al. (2017) recognize the significance of emotional components in memory in addition to the fluidity of memory as far as tourist experiences are concerned. Pre-trip desire has been reported to be associated with the emotions reminisced in post-experience stories, which tourists usually share with others about this story (Tung et. al., 2018). The desired engagement is often the experience that is most forcibly remembered a bit later (Servidio and Ruffulo 2016), indicating that we have ordered what we are visiting to remember it even prior to the journey. Since the point of focus in this case is on the memories of emotional experiences, one must also address the offering of post-trip experience sharing discussions on social media. Some of the incumbent researchers have addressed the effects of sharing on the sharer and the receiver (Gannon et al., 2019).

The perception of prices is a highly significant and positively significant factor in making purchases. Pricing refers to exchanging value by consumers in the advantage of possessing or utilizing an exchange service product (Satriawan and Setiawan, 2020). There are three elements of product pricing namely fair prices, fixed prices as well and relative prices. Price is seen to be of significant impact on the perception of the consumer, and Satriawan and Setiawan (2020) assert that an intention will be formed in case the price corresponds to expectations. When the intentions of the consumers are stronger, they cannot avoid purchasing. The social value is relatable to the client's picture which is something that the buyer seeks to have altered. Since the tourism industry has a nature of high interaction between sightseers, neighborliness is advantageous to both suppliers and the community, social value is viewed as an essential element of seen esteem in the context of a tourism industry (Rasoolimanesh et. al., 2020). Indicatively, Kim et al. (2019) established that social value has no impact on shaping the loyalty of grocerant customers and it has very little effect on the behaviors and feelings of individuals.

Tourist Satisfaction

Valduga et al. (2019) argued that perception and satisfaction of tourists in a tourist destination were based on assessing different destination characteristics including but not limited to: lodgings and food, attractions, climate and image, products, availability, culture, communities, and price. Using the anticipations of the tourists in relation to the visitation of a tourist destination, Xu et al. (2019) examined the role played by positive and negative emotions in evaluating tourist satisfaction. Tourists who had a positive experience are more inclined to suggest and visit the same area again (Souza et. al., 2019). Tourists who have a positive travel experience are more inclined to return to the same location (Widjaja et. al., 2020).

Social Media

Social media is an internet-based application that brings content normally created by relevant experience and exchanged online with other users, such as text, photos, and videos (Seraji et. al., 2023). Social media marketing covers the following elements, which are online communities, interactions, content sharing, comfort, and reputation (Lacarcel & Huete, 2023). The main feature of social acceptance by advertisers and consumer media

as a means of communication is the role of 'virality' or amplification of one's views to get a bigger audience by exchanging text and visual media (Pourkarim et al., 2022). Patra et. al. (2022) stated that social media has changed the situation dramatically. In terms of customer perspective, it has allowed the end-user to search, schedule, and customize their holiday packages in a way that has not been possible via conventional information methods (Kumar et. al., 2022). While on the service provider side, it has helped cater to a globalized market by creating, managing, and distributing worldwide offerings (Kopalle et. al., 2022).

Intention to Recommend

Intention to recommend is a type of behavioral intention. Hashemi et. al. (2023) identified intention to recommend as the greatest predictor of good behavioral outcomes from pleasant visitor encounters. The informal communication about the seller and its products or services that is targeted towards other consumers is described as the intention to suggest or give word of mouth (Putri, 2022). In comparison to the others, word of mouth is considered a highly trustworthy information service that involves offering recommendations, promoting purchases, and passing along good feedback (Chopra et. al., 2022). Customers are especially driven to spread eWOM because they believe it will have a favorable impact on how they are viewed by the user community, in addition to the benefits they will get (Luc, 2023). Helping others, expressing happiness, expressing successful experiences, warning others, safeguarding others, and sharing successful experiences are the most significant motivations for visitors to contribute information via eWOM (Albattat & Shareeza, 2023).

Electronic Word of Mouth (e-WOM)

The Internet enables consumers worldwide to anonymously share their experiences with products and services through social media platforms (Pandey & Sahu, 2020). Electronic word-of-mouth, or eWOM, has helped brands gain prominence in social media advertisements. The eWOM communication is essential to social media in such a way that the power of a speech lies with the generator of content passing on to the members of their community, which in turn is passed on to other members, giving the communication a sense of virality (Kakirala & Singh, 2020).

Hypotheses Development

Perceive Value and Intention to Recommend Through Social Media

Carlson et al. (2019) found that brand social media values influence consumer involvement positively. Perceived value enhances positive eWOM, according to previous studies in the e-commerce environment (Shaikh et al., 2018). Customers in social commerce utilize a variety of techniques to spread eWOM, including recommendations, referrals, ratings, reviews, and forums. Customers are especially driven to spread eWOM in this setting because, in addition to the benefits, they believe it will improve how they are viewed by the user community (Lee et al., 2012). Therefore, the following hypotheses are proposed:

H1a: There is a significant relationship between the perceived quality and intention to recommend through social media.

H1b: There is a significant relationship between perceived emotional and the intention to recommend through social media.

H1c: There is a significant relationship between perceived price and intention to recommend through social media.

H1d: There is a significant relationship between perceived social and intention to recommend through social media.

Perceived Value and Tourist Satisfaction

Satisfaction occurs when one's expectations are satisfied by the experience's consequences (Chan et. al., 2021). Service, value-added extras, price savings, convenience, and emotional outcomes are among the factors that customers consider while making purchases or exchanging items (Miao et al., 2021). In the tourist business, perceived value has a positive influence on satisfaction (Paulose & Shakeel, 2021). As a result, the following hypotheses are proposed:

H2a: There is a significant relationship between perceived quality and tourist satisfaction.

H2b: There is a significant relationship between perceived emotional and tourist satisfaction.

H2c: There is a significant relationship between perceived price and tourist satisfaction.

H2d: There is a significant relationship between perceived social and tourist satisfaction.

Tourist Satisfaction and Intention to Recommend Through Social Media

Previous studies looked into the impact of satisfaction on loyalty and intention to recommend. Abuamoud et. al. (2018) looked at the link between tourist satisfaction and loyalty. Valle et. al. (2006) looked at how tourist satisfaction impacts their loyalty and intention to recommend. The results show that tourist satisfaction and loyalty are favorably and strongly connected, and this relationship leads to the intention to recommend. In contrast, Prayag et. al. (2017) discovered that the level of satisfaction influenced the intention to recommend. When tourists are happy, they are more likely to suggest a location. Therefore, the following hypothesis is proposed:

H3: There is a significant relationship between tourist satisfaction and intention to recommend through social media.

The Mediating Effect of Tourist Satisfaction

Mediation is a key methodological concept in the social sciences. The objective of a mediating effect study, according to Baron & Kenny (1986) and Yuan & MacKinnon (2009), is to identify whether the relationship between the independent and dependent variables is largely attributable to the mediating variable. The accuracy of the mediating effect analysis is essential for understanding the link and mechanism between the independent and dependent variables. Tourist satisfaction has been proven to be a useful mediating variable in a lot of previous tourism research. (Wang & Hsu, 2010). Therefore, the following hypotheses are proposed:

H4a: There is a significant mediating role of tourist satisfaction in the effect of perceived quality on the intention to recommend through social media.

H4 b: There is a significant mediating role of tourist satisfaction in the effect of perceived emotion on the intention to recommend through social media.

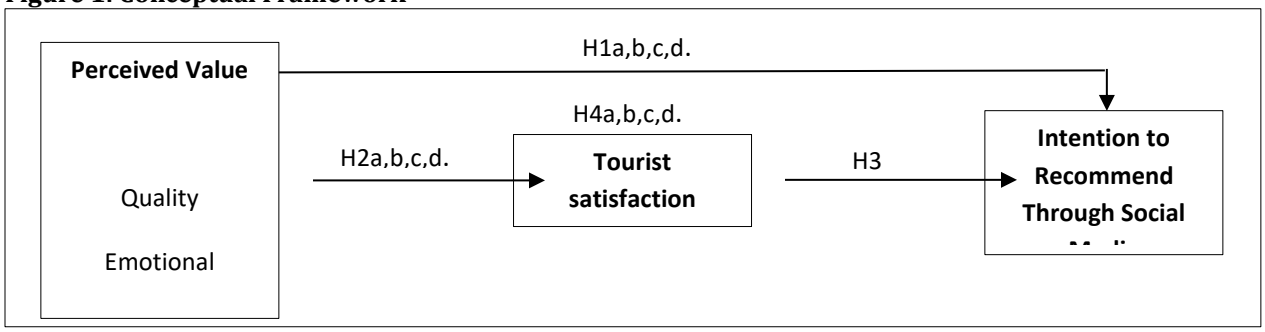
H4c: There is a significant mediating role of tourist satisfaction in the effect of perceived price on intention to recommend through social media.

H4d: There is a significant mediating role of tourist satisfaction in the effect of perceived social on intention to recommend through social media.

Conceptual Framework

The study framework of this study contains three variables, which are the perceived value of nature-based tourism (independent variables), tourist satisfaction (mediating variable), and intention to recommend (dependent variable). The conceptual framework of the study is presented in Figure 1.

Figure 1: Conceptual Framework



3. Research Methodology

This study employed a quantitative method to determine the cause-and-effect relationship between two or more variables (Creswell, 2003). The research was conducted in a natural, non-contributory setting, which meant that the activities occurred regularly and without interference (Ariffin & Zahari, 2013). The study focused on travelers aged 18 and older who had visited Pangkor Island within the previous five years. This age group was chosen because people above the age of 18 are seen to be capable of making informed decisions that result in accurate and trustworthy responses (Cacioppo and Petty, 1979). Power analysis was utilized to calculate the sample size, as has been recommended in recent research (Hair et al., 2019). The G*Power 3.1.9.7 program, which is frequently used by business and social science researchers (Faul et al., 2009), predicted that a mediation model would require at least 146 participants. The study received 160 responses, reaching the

minimum threshold. The study was primarily analyzed with SPSS and PLS-SEM via SmartPLS software. Data was collected via self-administered and online questionnaires with four sections: (1) Demographic profile, (2) perceived value, (3) tourist satisfaction, and (4) intention to recommend through social media. It was developed and altered based on the variables in the research framework received from the literature review. Items in each dimension were derived from prior literature and certain adjustments were made to meet study aims.

4. Results

Respondent Profile

Table 1 shows a total of 160 people responded, with males (n=77) and females (n=83) being the most common genders. Males account for 48.1 percent of the study's participants, while females account for 51.9 percent. The total number of respondents in this research (n=160) reflected the tourist population in the research area. In this study, 55.6 percent (n=79) of respondents were between the ages of 21 and 30, 31.3 percent (n=50) were between the ages of 31 and 40, 8.8 percent (n=14) respondents were between the ages of 41 and 50, 6.3 percent (n=10) respondents were between the ages of 18 and 20, 4.4 percent (n=7) respondents were between the ages of 51 and 60, and there are no respondents were between the ages 61 and above. The biggest percentage of 61.9 percent (n=99) of respondents were from Malaysia. The second largest is from Chinese respondents, which is 18.8 percent (n=30). Then followed by Indian respondents, which is 13.1 percent (n=21). The lowest respondent is others with only 6.3 percent (n=10).

Table 1: Demographic Profile

Variable	Frequency	Percentage (%)
Gender		
Male	77	48.1
Female	83	51.9
Age		
18 – 20	10	6.3
21 – 30	79	55.6
31 – 40	50	31.3
41 – 50	14	8.8
51 – 60	7	4.4
61 and above	0	0
Race		
Malay	99	61.9
Chinese	30	18.8
Indian	21	13.1
Others	10	6.3

Reliability and Validity Analysis

Model measurements were undertaken to ensure instrument reliability and validity. Table 2 shows that all constructs have good Cronbach's alpha scores of 0.70 or higher. Furthermore, the structures' composite reliability was outstanding. Hair et al. (2017) found that the constructs had a composite reliability score of greater than 0.70, indicating strong reliability. The average variance extracted (AVE) for all constructs exceeded 0.50. Thus, convergent validity is established (Hair et al., 2017)

.

Table 2: Reliability Analysis

Constructs	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Quality	0.770	0.852	0.591
Emotional	0.908	0.929	0.685
Price	0.789	0.876	0.702
Social	0.873	0.903	0.610
Satisfaction	0.928	0.942	0.698
Intention to Recommend Through Social Media	0.828	0.897	0.744

Hypotheses Testing

Figure 2 illustrates the study's direct path hypothesis testing using 5000 bootstrap subsamples and a 95% confidence interval. Hair et al. (2017) found a statistically significant relationship based on indicators such as p-value (below 0.05) and t-value (greater than 1.96). The analysis in Table 3 revealed that only three emotional hypotheses (β = 0.341, t = 2.633, p = 0.009), social (β = 0.205, t = 2.662, p = 0.008), and satisfaction (β = 0.779, t = 0.049, p = 0.000) were significantly associated with intention to recommend through social media, while another two hypotheses which are quality (β = 0.067, t = 0.801, p = 0.423 and price (β = 0.114, t = 1.095, p = 0.273) were found to be statistically insignificant. Besides that, the analysis also shows that only two emotional hypotheses (β = 0.437, t = 2.872, p = 0.004 and social (β = 0.263, t = 2.741, p = 0.006) were significantly associated with tourist satisfaction while another two hypotheses which are quality (β = 0.086, t = 0.785, p = 0.433) and price (β = 0.146, t = 1.067, p = 0.286) were insignificant. Furthermore, this study also shows that only two emotional hypotheses (β = 0.341, t = 2.633, p = 0.009 and social (β = 0.205, t = 2.662, p = 0.008) have a significant mediating role of tourist satisfaction in the effect of perceived quality on intention to recommend through social media while another two hypotheses which are quality (β = 0.067, t = 0.801, p = 0.423) and price (β = 0.114, t = 1.095, p =0.273) were found to be insignificant, (p-value > 0.05 and t-value < 1.96).

Figure 2: The Structural Equation Modelling Analysis

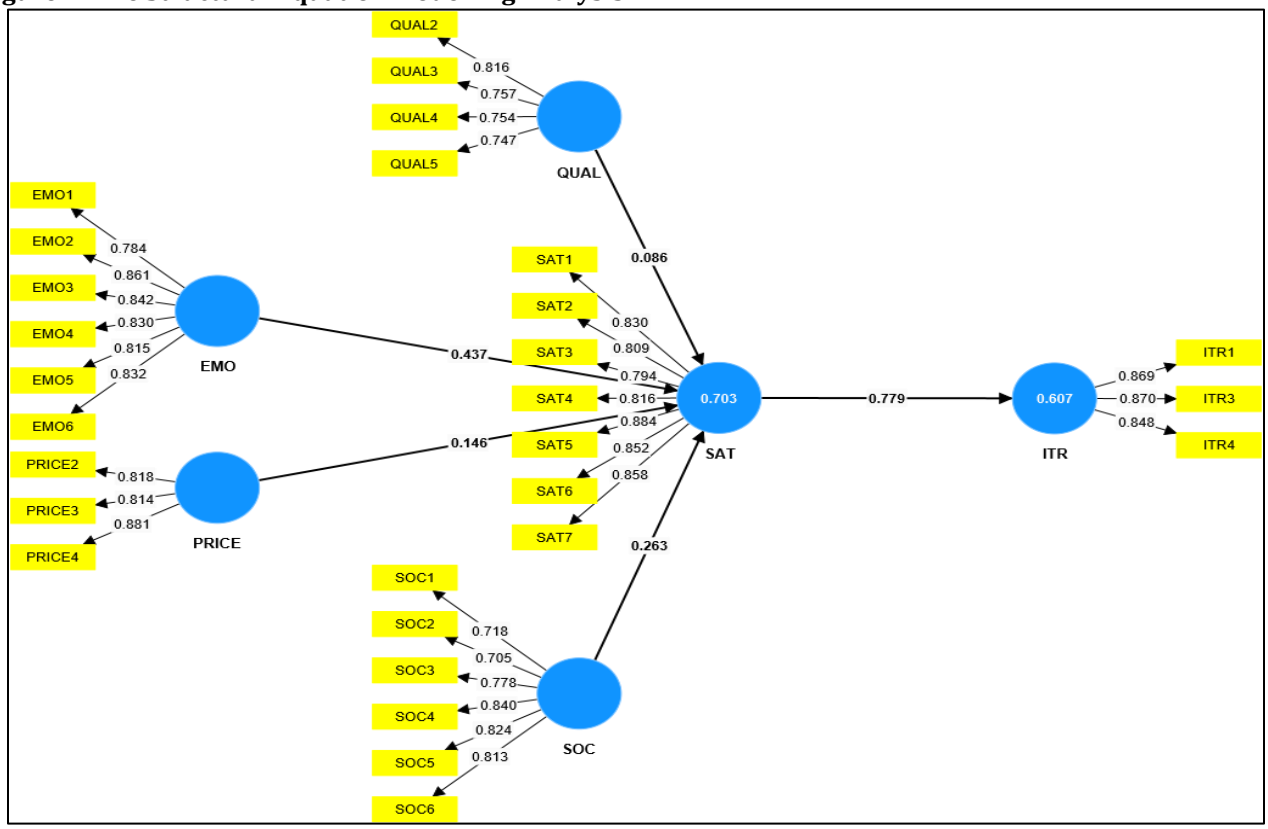


Table 3: Results of Hypothesis Testing

Hypotheses	Path Coefficient	STDEV	t-value	p-value	R^2	Decision
H1a	0.067	0.084	0.801	0.423	0.605	**Insignificant**
H1b	0.341	0.129	2.633	0.009		**Significant**
H1c	0.114	0.104	1.095	0.273		**Insignificant**
H1d	0.205	0.077	2.662	0.008		**Significant**
H2a	0.086	0.109	0.785	0.433	0.694	**Insignificant**
H2b	0.437	0.152	2.872	0.004		**Significant**
H2c	0.146	0.137	1.067	0.286		**Insignificant**

H2d	0.263	0.096	2.741	0.006	**Significant**
H3	0.779	0.049	16.020	0.000	**Significant**
H4a	0.067	0.084	0.801	0.423	**Insignificant**
H4b	0.341	0.129	2.633	0.009	**Significant**
H4c	0.114	0.104	1.095	0.273	**Insignificant**
H4d	0.205	0.077	2.662	0.008	**Significant**

Discussion

The emotional impact of a visit to Pangkor Island considerably increases tourist satisfaction and willingness to promote the place via social media. The positive path coefficient indicates a strong and statistically significant association, implying that pleasant emotions felt during the visit increase both satisfaction and the chance of recommending the island on social media. When it comes to tourist experiences, Tung et al. (2017) highlight the relevance of emotions in remembering, as well as memory's malleability. Positive holiday memory sharing has a greater influence on individuals who "know" the sharer and are similar to them. Similarly, perceived social interactions and experiences have a considerable impact on satisfaction and the intention to recommend, emphasizing the relevance of social components in the overall tourist experience. Rasoolimanesh et al. (2020) also observe that social value is considered to play a crucial role as a factor of perceived esteem in the tourist industry. In addition, the satisfaction of tourists significantly and strongly affects the intention to recommend. It is justified by the studies conducted by Prayag et al. (2017), where it was found that the degree of satisfaction was the determinant of intention to recommend. The p-value is an unusually low number and this implies that there is a lot of confidence regarding the association of delighted tourists advising other tourists of Pangkor Island at all times.

Nonetheless, the findings of the study reveal that perceptions of quality and price are not relevant predictors of tourist satisfaction and intention to recommend Pangkor Island via social media. There exists a stereotyping of tourists regarding the degree of services and facilities in major tourist destinations. In most cases where these expectations are elicited, there might not be a positive influence on satisfaction and recommendation intention. This follows up on the findings of Chen and Chen (2010) who found that beyond some quality the extra quality improvement did not significantly enhance the satisfaction of the tourists and intention to recommend. Moreover, tourists, to a particular extent those visiting captivating or novel places like Pangkor Island may not be that sensitive to price as much as they reckon that the overall experience is worth having. This is affirmed by the findings of Alegre and Garau (2010) which established that to a number of tourists, the values of experiences as a subset of unique experiences surpass pricing issues.

In addition to that, the study concluded that tourist satisfaction has a significant influence on the relation between perceived emotional, perceived social, and intent to recommend Pangkor Island using the so-called social media. This implies that the agreeable emotional and social experiences during one trip would enhance the level of satisfaction of the tourist, leading to higher chances of the potential recommendation of the location. Tourist contentment as a form of bridging allows the happiness of emotions and social experience to relate to the social media intention to recommend. Happy customers tend to refer a vacation spot because they will convert their pleasant experience and relations into part of their total experience of the journey. Ryu et al. (2012) have supported this mediating role by finding that satisfaction is the mediator between pleasant experiences and target recommendations. Further, Positive emotions that come as part of the visit also significantly boost tourist pleasure. This feeling of happiness, excitement, or rest results in a greater appreciation of the whole environment when there is a tourist experiences these emotions. As Hosany and Gilbert (2009) found out, good emotional reactions are closely connected with elevated levels of tourist satisfaction leading to behavioral intentions kind of intentions as intention to recommend. All these activities are significant during the interaction with the residents and other tourists and the events held in the community, as they add to the pleasure of tourists. Pull social interactions create a feeling of a place of belonging and pleasure, therefore contributing to a feeling of greater satisfaction. Lee et al. (2013) state that social interactions significantly affect tourist satisfaction which subsequently affects their tendency to recommend the location.

Nevertheless, the research finds that the perceived price, perceived quality, and intention to recommend Pangkor Island have no mediating roles with priority to social media through tourist satisfaction. Surprisingly,

many modern tourists have listened to unique experiences that are easily recalled rather than using conventional and linear quality standards. According to Mahdzar et al. (2020), the overall experience, rather than the perceived quality of particular services or facilities has a higher impact on the satisfaction and behavioral intention shaping of the experience economy. Also, tourists tend to plan their tours and are psychologically ready for the cost attached to the same. Lee et al. (2011) explain that perceived price does not affect the level of satisfaction and recommendation among a considerable number of travelers since the spending is anticipated and planned. The fact that the mediating effect of visitor satisfaction as shown by perceived quality, perceived price, and intention to recommend Pangkor Island using social media is not significant indicates that perceived quality, perceived price, and intention to recommend Pangkor Island using social media may not be defining factors of the tourist behavior in this setting. The tendency of tourists to choose emotional and social experiences, rather than old-fashioned quality and prices, means that only a small contribution to satisfying and referral intentions might be made. This observation can be justified based on previous studies which show that current tourists desire special experiences more than quality and price. Destination managers must then focus more on enhancing the experiential attributes to be able to maximize the happiness of the tourists and influence a favorable word of mouth.

5. Managerial Implications and Recommendations

The research findings present significant implications for the tourist sector and management of tourism destinations particularly those involving nature-based tourism destination management like the Pangkor Island. The fact that emotional and social experiences are huge contributors to visitor satisfaction and recommendation intention in terms of social media underlines the fact that destination managers should work towards the development of emotionally sensitive and socially interactive tourist experiences. Strategies to attain pleasant emotion arousal and worthy social bonds should be oriented toward the achievement of activities. These might comprise joint environmentally friendly tourism interaction, community welfare, and giving the tourists a chance to relate with the local community and their civilization. With the priority given to the above areas, the tourism managers may enhance the satisfaction of tourists in general, create positive eWOM, and make the destination more attractive and more sustainable.

Although there is good knowledge gained during this study, it further presents chances for additional research. The future study can investigate specific areas of emotional and social experiences that most impact on tourist satisfaction and recommendation intentions. Moreover, the research could examine the perception of the value of nature-based tourism by the various groups in society and how these influence their satisfaction and eWOM activities. Longitudinal research might also be conducted to identify the way in which the attitude and behavior of tourists evolve with time in regard to the fluctuation of the tourism offers and the destination management methods. More so, this will help to spread the study to other nature-based tourism locales to help support the results and offer a more detailed insight into the factors affecting satisfaction and recommendations in the sphere that is emerging as the model tourism industry.

Conclusion

The central research question of this work is to study the impact of the perceived value of nature-based tourism on the intention to recommend, mediated through tourist satisfaction, via social media. Significantly to mention, the research was able to achieve its objectives following the stringent research methodology as it was able to address the research questions and support the hypotheses. The conclusions drawn are that the emotional and the social value in the perceived value plays a great role in the satisfaction of the tourists and any future recommendation they will have with the recommendation of Pangkor Island as an ideal destination using social media. These findings highlight the fact that the emotional and social experience of tourists is critical in terms of the overall satisfaction influencing the positive wording on social media. They further point out the necessity of such priorities as to increase the value of loyalty to destinations to raise positive marketing by word-of-mouth in response to nature-based tourism.

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Who are Xenocentric Consumers? A Review of the Demographics and Socio-Psychological Attributes

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Abstract: In sociology, xenocentrism represents the preference for out-group cultures, norms, and values over the in-group. In marketing, consumer xenocentrism refers to consumers' favoritism for foreign-made products. The findings of previous studies have shown that various factors influence consumer xenocentrism, including the perceived quality of foreign products, the desire for social status, and cultural stereotypes. This paper focuses on the profiles of xenocentric consumers that distinguish them from in-group consumers. Besides demographic differences, socio-psychologically, xenocentric consumers are more open to other cultures and belong to marginalized groups. Understanding the profiles of xenocentric consumers may help marketers of both local and foreign brands segment and approach their target markets innovatively.

Keywords: *Consumer Xenocentrism, Out-Group Favoritism, Profile*

1. Introduction and Background

From a sociological perspective, xenocentrism refers to "the view of things in which a group other than one's group is the centre of everything, and all others, including one's group, are scaled and rated with reference to it" (Kent & Burnight, 1951). Xenocentrism can lead to feelings of estrangement from one's own culture or community and may even result in a loss of cultural identity (Mueller et al., 2016).

Consumer xenocentrism refers to the tendency of consumers to prefer foreign goods over domestic ones, even when domestic products are of equal or superior quality. It is also defined as "the admiration or preference for a specific cultural out-group or out-groups over the cultural in-group to which one belongs" (Cleveland & Balakrishnan, 2019, p. 417).

The growing availability of foreign products in developing and emerging markets, driven by globalization, has made the study of xenocentrism increasingly important (Lawrence, 2012; Balabanis & Diamantopoulos, 2016; Camacho et al., 2020). Notably, consumer xenocentrism represents one of the significant topics in marketing literature (Nguyen & Pham, 2021; Camacho et al., 2020; Rettanai Kannan, 2020; Rojas-Méndez & Chapa, 2020; Balabanis & Diamantopoulos, 2016). The primary focus of most existing studies on consumer xenocentrism is on examining its antecedents, outcomes, moderators, and mediators. These contributed to the development of the consumer xenocentrism model and the application of relevant theories.

Despite the importance of understanding and analyzing the antecedents and outcomes of consumer xenocentrism, it is equally crucial to understand the profile of xenocentric consumers to assist local and international marketers in effectively segmenting their target consumers. According to Keillor et al. (2001), "..companies should prioritize their international segmentation approaches to consumer characteristics rather than country characteristics because a successful strategy lies in effectively matching product attributes to consumer attitudes, values, and lifestyles".

Hence, this paper aims to review and integrate the findings of existing studies on consumer xenocentrism to build profiles of xenocentric consumers. The review focuses on demographics and socio-psychographic variables, which are amongst the most extensive grounds for market segmentation (Hooley et al., 2020). It also focuses on developing country contexts, as consumer xenocentrism is more prevalent among consumers in developing nations (Rojas-Méndez & Chapa, 2020). According to Nguyen and Pham (2021, p. 9), "...consumers who constitute out-group reference like xenocentric ones will show favorable evaluation toward purchasing non-local products, and this proclivity is observed more intensely in developing or emerging markets". On the other hand, consumer xenocentrism is less common in Western countries, and its effect would be minimal and often unnoticed (Mueller & Broderick, 2010).

Many consumers in North Africa, Latin America, and parts of Asia tend to have a more favorable view of the images presented by Western, more developed countries, and often reject their own local cultures (Mueller & Broderick, 2010; Batra et al., 2000; Nguyen & Pham,2021). Even though local products are often of higher quality and cheaper, consumers in developing economies prefer foreign goods (Mueller & Broderick, 2010; Mueller et al., 2016). Generally, the products originating from the USA, Western European countries, Japan, and South Korea are perceived as having greater value. The purchases of those products are likely associated with status, growth, and modernity (Mueller et al., 2016).

Practically, understanding xenocentric consumers and their profiles is significant to both local and foreign brands' producers in dealing with the evolution of the business environment and the complexity of consumer behavior. As highlighted in Diamantopoulos et al.'s (2025) work, xenocentric consumers could represent an attractive segment for domestic firms willing to adopt foreign branding strategies.

2. Literature Review

Defining Consumer Xenocentrism: Stier (2010) defined xenocentrism as an unreflective and disproportionate focus on "the other," with a strong preference for imported materials or goods. Xenocentrism is classified as deviant behavior in psychology because it deviates from societal norms. It is unusual for a person to value another country's goods, services, styles, ideas, and other cultural elements. However, in the age of globalization, xenocentrism is challenging to avoid, and it is not an unusual phenomenon, even among people who love their country and support the government's policy. It is due to people's extensive exposure to other cultures and products, which may influence their behavior.

Xenocentrism is also observed in several controversial topics, such as religion, politics, and social organizations, where individuals frequently in contact with foreign countries tend to embrace and promote foreign culture (Balabanis & Diamantopoulos, 2016).

The opposite construct of xenocentrism is ethnocentrism (Kent & Burnight, 1951; Sumner, 1906). Ethnocentrism refers to the tendency for individuals to view their own culture, beliefs, and values as superior to those of others and to judge other cultures by their own standards (Sumner, 1906). Consumer ethnocentrism refers to consumers' preference for local products due to sentiments that purchasing foreign products is considered un-national and could negatively impact local economies (Shimp & Sharma, 1987; Sharma et al., 1994; Gurhan-Calli, 2018).

While consumer ethnocentrism is often driven by feelings of patriotism and loyalty to one's own country (Sharma et al., 1994; Shankarmahesh, 2006), consumer xenocentrism tends to be driven by a desire to be seen as sophisticated or cosmopolitan (Wang et al., 2020; Mueller et al., 2016).

Consumer xenocentrism is evident across various product categories, including food, clothing, electronics, and luxury goods. For instance, generally, consumers from developing countries prefer to purchase designer clothing produced in Italy or France or high-end electronics made in Japan or South Korea over similar products produced domestically. In a study involving Thai consumers, Thoumrungroje et al. (2024) found that xenocentric consumers commonly could not recognize the superiority of domestic products and, even if they do, they still prefer (inferior) foreign products. The study concludes that the country of origin (COO) will likely override other cues for xenocentric consumers, which often result in sub-optimal product choices.

For measuring consumer xenocentrism in developing countries, X-Scale was created and validated through a study conducted by Rojas-Méndez and Chapa (2020). The development of the scale has further facilitated research in this area.

The Profile of Xenocentric Consumers: This section discusses the groups of consumers classified as xenocentric based on the findings of previous studies. It focuses on the demographic and socio-psychological variables. Gender - Rojas-Méndez and Kolotylo's (2022) work found that men are more xenocentric than women. Men were more likely to be influenced by the perceived status and prestige associated with foreign products. On the other hand, women were more likely to be influenced by the functional and utilitarian aspects

of the products. This difference in motivation may also contribute to the gender difference in xenocentrism. Nam's (1998) study highlighted that women living in male-oriented societies tend to display foreign product bias.

Level of income - The definition of "high income" varies depending on the context and location, but generally, it refers to those who earn significantly more than the median income in their area. Marketers of luxury goods and services, such as high-end cars, designer clothing, and exclusive travel packages, often target high-income consumers. Past studies have shown that consumers from higher-income groups in developing countries tend to be more xenocentric (Seta & Sutarso, 2023; Nguyen & Pham, 2021).

Younger consumers - Generally, younger consumers refer to those belonging to the millennial generation (born between 1981 and 1996) and Generation Z (born after 1996). In most countries, young consumers are a key demographic group for many businesses and marketers, representing a large and growing population segment with substantial purchasing power. They are more likely to be early adopters of new technologies and products and tend to have different preferences and behaviors than older generations. They prefer experiences over material possessions, such as travel, dining out, and attending events. Younger consumers are also more open to diversity and inclusiveness and choose brands that reflect their values and beliefs.

Previous studies have shown that younger consumers tend to be more xenocentric than older consumers (Mueller et al., 2016; Nguyen & Pham, 2021). This attribute is similar to what is highlighted in sociology (Kent & Burnight, 1951), where younger people are more xenocentric because they view preferences for out-groups as expressing their freedom.

For instance, a study conducted in China indicated that younger consumers tend to purchase foreign products as a form of rebellion or defiance against authority (Mueller et al., 2016). Nguyen and Pham's (2021) work demonstrated that consumer xenocentrism has a positive influence on the intention of young Vietnamese consumers to purchase foreign products. The study involved respondents aged 18 to 30 years.

Occupation and education - A "white-collar employee" refers to an individual who performs professional, managerial, or administrative work in an office or other formal setting across various industries, including business, finance, law, medicine, education, and technology. Their knowledge-based work and professional attire often characterize them.

White-collar occupations are a significant and growing part of most countries' workforces, reflecting the countries' increasing focus on knowledge-based industries and services. Employees in the white-collar sector and those with a higher education level were found to be more xenocentric (Mueller et al., 2016; Seta & Sutarso, 2023; Nguyen & Pham, 2021). This contrasts with ethnocentric consumers, who are primarily blue-collar workers with lower levels of education (Shankarmahesh, 2006).

Social status - The relationship between xenocentrism and social status is one of the most recurring themes in xenocentrism literature. For example, in China, the consumption of foreign goods was linked to the symbolic significance of rank and prestige (Mueller et al., 2016). This preference is evident even though foreign goods are expensive in China due to prevailing currency exchange rates (Sun et al., 2014). According to Tang et al. (2022), Chinese consumers favored foreign goods for better quality, which helped them display their status or indicate that their status had improved.

A previous study also indicated that consumers from lower-status groups tend to have a strong desire to purchase high-status products from foreign countries to enhance their social status (Wang et al., 2020; Tang et al., 2022). Thus, it can be concluded that signaling one's status not only comes from wealthy consumers but is also found in the lower-status group for hedonic reasons. Previous studies showed that the perceived hedonic value and reputation are among the determinants of consumers' purchase decisions of foreign brands (Sun et al., 2014; Wang et al., 2020).

Disagreement with national government - From a socio-psychological perspective, individuals who rebel against their home country's politics or economic policies are often referred to as xenocentric (Kent &

Burnight, 1951; Lawrence, 2012). Those dissatisfied with their country's policies tend to 'visualize' themselves as 'migrating' to other countries (Lawrence, 2012).

As highlighted in Mueller and Broderick's (2010, p.7) study, consumers' oppositional purchasing reflects civic disloyalty or disagreement. One of the examples quoted in their study was Belk's work (1982) that "the American purchase of Swiss-made Volvo during the 1970s was a symbol of opposition against US Vietnam War policy and support for Sweden's policy criticizing the same".

Exposure to other cultures - Consumers exposed to other cultures tend to be more receptive to culturally relevant products and services and may place a greater emphasis on authenticity, sustainability, and social responsibility. They may have unique needs and preferences shaped by their diverse experiences and knowledge (De Mooij, 2021). They are more likely to be xenocentric than those who are not, and they are typically younger (Lawrence, 2012).

Research has shown that individuals who have received their education overseas, work for a multinational corporation, or have international relations are more likely to be xenocentric and, therefore, prefer to purchase products from other countries (Mueller et al., 2016; Seta & Sutarso, 2023).

Consumer in former colonies - The term "consumer in former colonies" refers to individuals residing in countries that were formerly colonized by other nations, primarily in Africa, Asia, and Latin America. These consumers may have distinct cultural and historical backgrounds shaped by their countries' colonial past, influencing their purchasing behaviors and attitudes toward foreign goods and services (Appadurai, 1996).

According to Wallach (2002) and Mueller and Broderick (2010), consumers of former colonial countries tend to be highly xenocentric. The colonial influence can be linked to feelings of inferiority toward one's culture and superiority toward the colonizers' ways of life. In other words, colonization has led to a negative self-image and an overvaluation of Western culture (Mueller & Broderick, 2010). It also resulted in consumers' preferences for international products over locally made ones (Balabanis & Diamantopoulos, 2016; Batra et al., 2000).

Marginalized people - Marginalized people are individuals or groups who are excluded, disadvantaged, or discriminated against in society due to various factors such as race, ethnicity, gender, disability, or economic status. The United Nations (2016) defines marginalization as pushing a group or individual to the fringes or margins of society, where they have limited access to resources and opportunities and may experience social exclusion, discrimination, and poverty.

Some examples of marginalized groups include indigenous people, ethnic and racial minorities, people with disabilities, refugees and migrants, low-income and homeless individuals, and children and youth. Marginalized consumers may also be underrepresented or misrepresented in advertising and media, making it challenging for them to find products that cater to their needs and preferences. Culturally, they are more xenocentric. They believe they do not belong to the national group or, in extreme cases, that their national group rejects them. To revolt, they identify with an out-group (foreign countries) and are thus xenocentric (Prince et al., 2016; Kent & Burnight, 1951; Mueller & Broderick, 2010).

3. Managerial Implications and Recommendations

Xenocentric individuals develop their perceptions of foreign cultures by exploring their personal needs for social status or lifestyle, thereby reflecting their current status quo (Rettanai Kannan, 2020; Balabanis & Diamantopoulos, 2016).

The profiles of xenocentric consumers may provide input to foreign and local brand producers in innovatively segmenting and approaching their target markets. For instance, according to Diamantopoulos et al. (2025), regional firms may strategize their brands to 'look' foreign through product design, merchandising, labelling, and advertising in targeting xenocentric consumers. The aim is to create associations of "foreignness" in the consumer's mind. Adopting foreign brand strategies may help reduce the rejection of local brands among xenocentric consumers in their domestic market (Rojas-Méndez & Kolotylo, 2022). At the same time, local firms

could leverage the brands' "foreignness" positioning to target consumers in other countries (Diamantopoulos et al., 2025).

A limitation of this paper is its scope, which primarily focuses on consumers in developing countries. Different or similar profiles of xenocentric consumers could result in reviewing consumer xenocentrism studies across nations, regardless of the nation's economic status. Nonetheless, as addressed beforehand, xenocentrism is more prevalent in the context of developing or less developed countries. Conceptually grounded in sociology, people from these countries are more likely to admire the out-group's (i.e., other countries') cultures, norms, and values.

Future research may consider studying consumer xenocentrism across product or service categories to form more detailed profiles of xenocentric consumers. A comparative study and review between developed and developing countries may broaden the understanding of the xenocentric profiles of those markets. Additionally, although most previous research has found a positive relationship between xenocentrism and socio-economic factors, such as income and education, it is essential to note that this relationship may be complex and dependent on various factors.

4. Conclusion

The objective of this paper was to develop profiles of xenocentric consumers through a review of past studies involving respondents primarily from developing countries. Xenocentrism tendencies began with fascination, admiration, and love for foreign cultures. The review showed that xenocentric consumers are predominantly men, young, high-income earners, and those in white-collar occupations (Mueller et al., 2016; Seta & Sutarso, 2023; Nguyen & Pham, 2021). They tend to have a high level of education and exposure to other cultures, and they often associate the purchase of foreign brands with prestigious social status (Wang et al., 2020; Tang et al., 2022; Mueller et al., 2016; Seta & Sutarso, 2023). Most consumers in former colonial countries tend to be xenocentric (Balabanis & Diamantopoulos, 2016; Mueller & Broderick, 2010). Xenocentric consumers also seem to purchase foreign products as a symbol of disagreement with national government or policies, and some of them are from marginalized groups (Lawrence, 2012; Prince et al., 2016; Mueller & Broderick, 2010). Consumer xenocentrism is the opposite concept of consumer ethnocentrism (Diamantopoulos et al., 2025). The differences in demographics and socio-psychological profiles of those consumers may have a different impact on business strategies.

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Organizational Determinants of Environmental Management Accounting Adoption: Evidence from Malaysian Local Councils

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Abstract: Despite the numerous benefits that environmental management accounting (EMA) offers, its adoption by the public sector in developing countries seems to be progressing slowly. Therefore, the purpose of this paper is to examine the organizational determinants influencing the adoption of EMA by Malaysian local councils. A self-administered questionnaire survey was conducted among accountants at local councils in Peninsular Malaysia using a consensus approach. The questionnaire items are based on prior studies on EMA adoption. The results suggest that an internal environmental committee plays a significant role in encouraging local councils to adopt EMA. This committee is responsible for planning, monitoring, measuring, and reporting environmental performance, for which EMA is needed to provide pertinent information. The research provides an impetus for other local councils to set up their in-house environmental committee to promote EMA adoption and subsequently improve the generation of information for more accurate measurement of environmental performance. Since research on EMA adoption in the public sector is relatively scarce, it contributes to a limited understanding of the internal and external factors that influence its adoption. Therefore, the paper offers useful insights to relevant authorities, such as federal and state governments, on policy changes that could enhance EMA adoption within public sector organisations.

Keywords: *Environmental Management Accounting, Environmental Accounting, Environmental Reporting, Local Council, Local Government*

1. Introduction

Rapid economic development has transformed the social fabric and altered ecosystems in Malaysia, leading to the emergence of various environmental problems. One such problem is the increasing generation and variety of solid waste (Che Ku Kassim, Ahmad, Mohd Nasir, Mod Arifin, & Wan Mohd Nori, 2019; Mohd Shakil, Mohamad Azhar, & Othman, 2023). Statistics show that an estimated 49,670 tonnes of waste are generated daily (Abdul Ghani, 2021), with municipal waste accounting for 64% of the total solid waste generated (Mohd Shakil et al., 2023). However, only 70% is collected, while the remaining 30% often ends up in illegal dumping sites or is diverted for recycling purposes at the source or during collection (Hassan, Awang, & Jaafar, 2006).

The responsibility for managing waste and public cleansing falls on the shoulders of public authorities, specifically local councils (Ibrahim and Md Salleh, 2006). The increasing volume of waste and limited resources, such as landfill space, have led to various environmental problems and challenges, including effective waste control management and sustainable development (Qian, Burritt, & Monroe, 2011). The complexity and rising costs of waste management highlighted the need for a more holistic approach to identify environmental information and make environmentally amicable decisions (Qian et al., 2011).

Jasch (2003) has highlighted the lack of appropriate accounting techniques, especially in the management accounting discipline, for addressing environmental matters. Although a host of techniques have been developed, they have mostly originated from other disciplines rather than accounting itself (Jasch, 2003). The failure to capture environmental information may distort the success of environmental initiatives developed and promoted by an organization, as accountants fail to provide the necessary support for environmental decision-making (Gibson and Martin, 2004). Traditionally, many environment-related costs are grouped into overhead accounts, leading to obscured cost information. This practice means that environmental costs are treated as hidden costs that are not properly acknowledged or reported (Gale, 2006).

The shortcomings of conventional accounting practices suggest the necessity of embracing a more contemporary approach to overcome these flaws. This is where EMA comes into play (Che Ku Kassim, Mohd Ariffin, & Muhmad, 2024). The core idea of EMA is often associated with internal costs, as external costs, such as those impacting society or the environment in which an organization operates, are often viewed as beyond

the organization's legal obligations (Gibson and Martin, 2004; Jasch, 2006). EMA is constantly being adopted to improve an organization's environmental performance significantly, as it helps in improving the identification, measurement, and reporting of environmental information. This, in turn, provides a more accurate basis for assessing environmental performance (Jasch, 2006).

Although EMA adoption has been dominated by the private sector, there is evidence suggesting that the public sector is beginning to show some commitment to EMA (Qian et al., 2011; Che Ku Kassim, Adnan, & Ali, 2022). However, particularly in developing countries such as Malaysia, EMA adoption is only at a moderate level (Che Ku Kassim et al., 2022). This raises the question of what factors are likely to influence the adoption of EMA. The literature indicates that various internal and external factors influence EMA adoption; however, this paper, being explanatory, focuses only on the organizational determinants.

The paper is structured as follows: The next section reviews prior studies related to organizational determinants and develops relevant hypotheses. Following that, the research methods adopted are elaborated upon. Then, the results are presented and discussed. Finally, the paper ends with a conclusion.

2. Literature Review

EMA is introduced to resolve the shortcomings of conventional management accounting (MA) practices, particularly concerning environmental costs and impacts (Burritt, Schaltegger, & Christ, 2023; Che Ku Kassim et al., 2024). In the past, environmental costs were often treated as part of overhead expenses, leading to obscured cost information (Gibson and Martin, 2004). This inaccurate practice of MA presents significant challenges for EMA, such as the necessity to disclose hidden environmental costs accurately through revising cost identification, measurement, and reporting methods. Proper scrutiny of environmental costs allows an organization to accurately calculate and manage these costs, leading to improved environmental performance information (Gibson and Martin, 2004). This demonstrates the important role of EMA as a valuable tool to assist organizations in managing costs and reducing the environmental impact of their operations.

Generally, EMA is classified into two main categories: physical and financial information. Physical information includes records on the use, flows, and final disposal of energy, water, and materials (including corresponding waste), as many environmental impacts are related to these physical substances. Monetary information includes environmental costs, earnings, and savings (Che Ku Kassim et al., 2022). Private and public sector organizations are under pressure to integrate environmental issues into their policies, strategies, and decisions (Che Ku Kassim et al., 2024). Moreover, bowing to the heightened environmental awareness, stakeholders are demanding that sufficient environmental information be included in corporate reports and other communication channels such as organizational websites and social media (Che Ku Kassim, Ahmad, Mohd Nasir, Mod Arifin, & Wan Mohd Nori, 2020; Giacomini, Rocca, Zola, & Mazzoleni, 2021). To support the environmental reporting process, EMA is crucial as it can help organizations accurately identify, measure, and report information related to numerous environmental aspects of production and transactions (Che Ku Kassim et al., 2022).

Since EMA is an internal practice, its adoption is likely to be influenced by various factors. There is a wealth of evidence suggesting that environmental practices are systematically determined by a set of observable organizational determinants (Frost and Seamer, 2002; Christ and Burritt, 2013; Mokhtar, Jusoh, & Zulkifli, 2016). Whilst the association between EMA and organizational determinants has been a consistent area of interest over the years (Mokhtar et al., 2016), limited analysis of such an association is available for public sector organizations, especially local councils (Che Ku Kassim et al., 2022). Therefore, this paper attempts to examine the extent of influence that organizational determinants have on EMA in local councils in Malaysia. Several organizational determinants examined in this paper are reviewed below.

Age of Organization

According to Kobeissi and Damanpour (2009), age is one of the organizational attributes that contribute to the development of internal environmental practices. Mature organizations are often associated with high expectations from stakeholders regarding the organization’s involvement in social and environmental activities. The authors further argue that an organization goes through different growth phases in its life cycle before

reaching a point of stability. Newer and less mature organizations tend to prioritize achieving their economic goals, while more established organizations shift their focus towards addressing pertinent social issues that can set them apart from their peers (Kobeissi and Damanpour, 2009). On the other hand, Welbeck, Owusu, Bekoe, and Kusi (2017) argue that when an organization matures, its involvement in social responsibility activities becomes ingrained, with social and environmental activities becoming integral to organizational strategy.

Past research rarely examines the age of an organization as a variable influencing environmental practices. Although one may argue that an organization's age symbolizes political visibility similar to organizational size, there appears to be a lack of empirical studies to substantiate the claim. Arguably, mature organizations, particularly those in the public sector, may be more susceptible to public pressures due to their visibility to relevant publics. This heightened visibility may attract a disproportionate amount of scrutiny, necessitating a greater organizational response to ensure its legitimacy. (Frost and Seamer, 2002). In the context of EMA, it can be speculated that mature organizations are more driven to embrace EMA to help in identifying, quantifying, and disclosing environmental costs and/or benefits with a certain degree of accuracy. Therefore, the following hypothesis is formulated:

H_1 = *There is a positive relationship between the age of the local council and EMA adoption.*

Organizational Size

Organizational size has been widely examined in environmental accounting and reporting research in the public sector (Frost and Seamer, 2002; Ribeiro and Aizar-Guzman, 2010). The consistent results show that size positively influences organizations to adopt environmental accounting practices. An identical finding is also found in empirical research conducted within the Malaysian context (see, for example, Mokhtar et al., 2016). Larger organizations often feel that they are under intense scrutiny from regulators and the public. To avoid unwanted scrutiny, they tend to be more proactive in responding to their social responsibilities compared to smaller organizations (Mandigma and Omier, 2024). Moreover, due to the extensive nature of their operations, larger organizations need EMA to support the measurement and reporting of their environmentally-related commitments. This aligns with the Legitimacy Theory, which suggests that larger organizations face significant pressure to disclose environmental information because of their numerous stakeholders and societal expectations (Mandigma and Omier, 2024).

In general, larger organizations have greater financial resources to implement projects or activities aimed at reducing environmental impacts and subsequently report on their efforts compared to smaller organizations (Ribeiro and Aizar-Guzman, 2010; Mokhtar et al., 2016). As EMA is a comprehensive MA practice, it requires a data management and technology infrastructure to support new processes for gathering and handling environmental data (Zatini, Porta, & Za, 2025). Arguably, only larger organizations with extensive financial resources can afford to invest in acquiring new data infrastructure and the related information systems. Moreover, implementing EMA also requires organizations to provide sufficient training and skills support for staff to handle new forms of data, which necessitates a budget allocation that smaller organizations may struggle to fulfil. Therefore, consistent with the above contentions, the following hypothesis is developed:

H_2 = *There is a positive relationship between the size of a local council and EMA adoption.*

Presence of an Environmental Committee

According to Gale (2006), an EMA and reporting system requires a comprehensive set of environmental performance information that can only be obtained through the establishment of an internal environmental committee within an organization. Ideally, this environmental committee serves as a support system that provides relevant environmental information, which is crucial input for EMA and reporting (Jasch, 2003). In research conducted by Velte and Stawinoga (2020), it was discovered that the presence of an internal environmental committee responsible for social and environmental involvement is significantly associated with the extent of the organization's engagement in social and environmental-related activities. To acknowledge their efforts, organizations make appropriate disclosures to highlight their environmental commitment and responsibility. Moreover, an internal environmental committee plays a significant role in shaping an organization's environmental strategies, which in turn influence the organization's strategic policies to meet stakeholder needs (Dixon-Fowler, Ellstrand, & Johnson, 2017).

The extant studies consistently show evidence of a positive relationship between the development of an internal environmental committee and environmental accounting practices and performance (Dixon-Fowler et al., 2017; Velte and Stawinoga, 2020). This suggests that having an environmental committee could propel the involvement of an organization in social and environmental initiatives. Similar results have been observed in the context of local councils. Ribeiro and Aibar-Guzman (2010), for example, conducted a study on the determinants of environmental accounting practices in local entities in Portugal. They found that these practices are significantly influenced by the adoption and implementation of internal environmental management practices. This indicates that local councils prioritize environmental-related activities, contributing to improvements in their social and environmental performance. Therefore, consistent with the foregoing arguments, the following hypothesis is developed:

H_3 = *There is a positive relationship between the existence of an environmental committee in a local council and EMA adoption.*

Status of Local Council

There is existing evidence suggesting variations in the adoption of environmental accounting practices among different tiers of local councils. Marcuccio and Steccolini (2009), for example, found differences in voluntary extended performance reporting, which consists of social, environmental, and economic elements among Italian local governments. Their study reveals that municipalities that are closer to citizens prioritize reporting on social impacts compared to provinces. Provinces, on the other hand, adopt a more balanced approach in their reports. Additionally, since provinces are more related to economic activities, they place greater emphasis on disclosing financial information, which may result in lower levels of environmental and social disclosure compared to municipalities. Joseph and Taplin (2011) also suggest that differences are likely to exist among different tiers of local councils, as each has different types of constituents and faces varying levels of pressure when it comes to engaging in environmental-related accounting practices.

Similarly, Qian and Burritt (2007) also found that the localization of local councils is an important criterion in the adoption of environmental accounting practices. They discovered that urban councils are more likely to identify and use EMA information compared to rural councils for waste management, although the difference is not significant between large and small councils. However, evidence from Che Ku Kassim, Mohd Nasir, Ahmad, Wan Mohd Nori, and Mod Arifin (2021) suggests otherwise. They discovered that high-level local councils tend to provide a lower level of environmental disclosures compared to their low-level counterparts. In explaining the differences in the adoption of environmental accounting and reporting practices by urban and rural local councils, Williams, Wilmshurst, and Cliff (2011) suggest that insufficient resources and a lack of mandatory requirements are the main reasons. Therefore, consistent with the above contentions, the following hypothesis is developed:

H_4 = *There is a positive relationship between the status of a local government and EMA adoption.*

3. Methodology

A mail survey was conducted to examine the organizational determinants influencing EMA adoption in local councils in Malaysia, which are geographically scattered across the country. The selection of local councils was based on their participation in Local Agenda 21, which emphasizes their role in achieving sustainable development (Joseph and Taplin, 2011). This marks the pivotal role that local councils should play in the implementation of sustainable development at the local level. In supporting local councils, EMA can serve as a valuable tool that supplies pertinent information to help them address numerous environmental challenges (Qian et al., 2011). Moreover, the infusion of the New Public Management (NPM) concept into local councils has led to considerable administrative reforms aimed at improving the operations and performance of the public sector. This includes the application of private sector practices such as EMA in the public sector (Joseph et al., 2014). These evidences suggest that local councils may have adopted EMA in fulfilling their roles and responsibilities.

Survey Population

The population of the survey consisted of local councils in Peninsular Malaysia, as local councils in East Malaysia are governed by different legislation (Che Ku Kassim et al., 2020). There are a total of 103 local councils in Peninsular Malaysia, consisting of eight city councils, 34 municipal councils, 57 district councils, and

four modified local councils (Che Ku Kassim et al., 2019). Modified local councils are agencies with the authority to operate similarly to a local council (Che Ku Kassim et al., 2020). Due to the small number of local councils, a census approach was used instead of a sampling method.

Survey Instrument

A questionnaire was used as the survey instrument, which was divided into two parts. Section A consisted of seven items used to secure demographic information, while Section B consisted of ten items used to measure the extent of EMA usage within the local councils. The constructs were measured as follows:

Organizational size: The size of an organization has been measured using various proxies, as there is no theoretical explanation that justifies why a particular indicator should be selected over another indicator. When selecting the appropriate proxy for organizational size within the public sector domain, caution should be taken. According to Frost and Seamer (2002), the private and public sectors differ in a number of ways, and certain proxies may be inappropriate for public sector organizations. As an example, a proxy of entity size based on sales revenues or profit may be deemed to be unsuitable for government departments, as they do not generate revenue and are funded mainly by the government. This paper adopted total employees as a proxy for size, a similar approach to that used by Marcuccio and Steccolini (2009).

Organizational age: Organizational age is rarely examined in EMA research. Age has a significant influence on promoting the adoption of environmental-related accounting, as mature and stable organizations are often anticipated by stakeholders to be more involved in environmental and social activities. Consistent with Che Ku Kassim et al. (2019), the age of the organization was calculated based on the difference between the current operating year and the year of establishment.

Presence of environmental committee: The impact of the environmental committee, as a component of the internal management system, on social and environmentally related activities is clearly demonstrated in Velte and Stawinoga (2020). Having an environmental committee helps organizations engage in various social and environmental activities. To take credit for their efforts, an EMA is arguably crucial for providing relevant social and environmental data to inform organizational strategies and decisions. The presence of the environmental committee was measured using a dummy variable.

Status of local council: According to Joseph and Taplin (2011), different levels of local government experience varying degrees of pressure to adopt environmental accounting practices. The upper levels (city and municipal councils) often confront more pressure to adopt these practices compared to district councils. These differences in status can be measured using categorical data, as demonstrated by Che Ku Kassim et al. (2021).

EMA: The theoretical concept of EMA encompasses both monetary and physical aspects. Therefore, any measure intended to serve as an appropriate proxy for EMA should incorporate both elements. However, research on EMA in the public sector receives relatively little attention, resulting in a limited availability of measures developed to represent EMA. This paper adopts a measure of EMA developed by Ferreira, Moulang, and Hendro (2010), as the construct has been tested in various organizations, including the service sector.

Operationalization of the Survey

Before the actual survey, a pilot test was conducted with three accountants from municipal councils and two from district councils. The accountants were contacted personally through emails and telephone calls. Once they agreed to participate, the questionnaire was sent by mail. Stamped and self-addressed envelopes were provided to them to encourage a prompt reply. No major changes were required. However, there was a suggestion from the pilot test that the questionnaire should be made bilingual, in English and Bahasa Melayu (the national language of Malaysia), to improve comprehension. The revamped questionnaires were mailed to 98 accountants from all local councils in Peninsular Malaysia. Accountants were selected as they are the key individuals involved in preparing various types of organizational environmental and sustainability accounting information (Ferreira et al., 2010; Schaltegger and Zvezdov, 2015). The contact information and addresses of the accountants were obtained from the local councils' organizational portals. Two follow-ups were conducted, and the completed questionnaires were codified into a menu-driven software program for analysis.

4. Findings and Results

A total of 69 replies were received, yielding a response rate of 70.4%. However, three questionnaires were excluded from the analysis due to having more than 10% missing items (Hair, Black, Babin, Anderson, & Tatham, 2006). A non-response bias analysis was also performed by comparing the responses from early ten and late ten respondents, as the latter is often used as a proxy for non-respondents. The comparison of the two groups was conducted using the independent sample t-test. The two-tailed significance test indicates that $p>0.05$ (not significant), suggesting that the difference between the responses of the "early" and "late" respondents in the questionnaire was not significant. This, therefore, suggests that there is no significant difference between the two groups, and non-response bias is unlikely to be a problem.

Demographic Profile of the Local Councils

Table 1 summarizes the demographic profile of the local councils that responded to the survey. Out of the 66 local councils, district councils were the majority of the survey participants, with 38 respondents, accounting for approximately 57.6% of the total respondents. This is so as district councils comprise more than half (55.3%) of the total local councils in Peninsular Malaysia. The majority of the local councils (57.6%) have been in their current status for more than 20 years. In terms of age, the oldest local council is 79 years old, and 50% of the councils are considered newer, with an age of below 10 years. The number of employees is found to be correlated with the status of the local council. The higher the status, the greater the number of employees. For example, city councils have over 1,000 employees, while district councils in rural areas have fewer than 50 employees. Approximately 46 (69.7%) local councils have established an internal environmental committee within their organizations. Meanwhile, only four (6.1%) local councils have revealed that their organizations have a budget allocation for research and development (R&D) in environmental matters. These four are all municipal councils. None of the city councils has set aside a budget allocation for R&D in environmental matters. However, only one of the four local councils provided an estimate of their budget for R&D in environmental matters, which amounts to approximately 0.2% of the total organizational budget. Moreover, out of these four local councils, only three have established an Environmental Management System (EMS) and are certified under ISO 14001. Due to the limited number of local councils involved in R&D and having established an internal EMS, further analysis was not conducted.

Table 1: Demographic Profile of Local Councils

Description	Range	Frequency	Percentage
Status	City council	4	6.1
	Municipal council	20	30.3
	District council	38	57.6
	Modified local council	4	6.1
Number of years in the current status	< 1 year	1	1.5
	1 – 5 years	4	6.1
	6 – 10 years	10	15.2
	11 – 20 years	10	15.2
	> 20 years	38	57.6
	No information	3	4.5
Organisational age	< 10 years	4	6.1
	11 – 20 years	6	9.1
	21 – 30 years	7	10.6
	31 – 40 years	46	69.7
	41 – 50 years	2	3.0
	> 50 years	1	1.5
Total employees	< 50	4	6.1
	51 – 150	21	31.8
	151 – 300	17	25.8
	301 – 1,000	17	25.8
	> 1,000	7	10.6
Presence of an environmental committee	Yes	46	69.7

	No	20	30.3
R&D on environmental matters	Yes	4	6.1
	No	62	93.9
EMS certification	Yes	3	4.5
	No	62	93.9
	No information	1	1.5

In terms of the extent of EMA application within the organization, the mean score was 3.022, indicating a moderate level of EMA usage. Cronbach's Alpha was also computed for a variable related to the EMA application to measure the degree to which the ten items in the variable were positively correlated with one another (Coakes, Steed, & Dzidic, 2006). The alpha coefficient yielded a value of 0.954, indicating a high level of reliability, which is considered fairly strong (Sekaran and Bougie, 2016). The normality test was also conducted by measuring the values of skewness and kurtosis, as it is a fundamental assumption for regression analysis (Field, 2009). According to Kline (1998), data with a skewness value of less than three and a kurtosis value below ten can be generally classified as normally distributed. The tests indicate that all variables with continuous data (size, age, and EMA usage) have skewness and kurtosis values within the acceptable range for normality.

Organizational Determinants for EMA Adoption

The main objective of the study was to examine the organizational determinants that may influence the adoption of EMA. Stepwise regression was conducted for this purpose. Besides being the most popular method, stepwise regression allows the independent variable that contributes the most to explaining the dependent variable to be added first (Cooper and Schindler, 2008). Subsequent variables are then included based on their incremental contribution over the former variable. In addition, variables may be excluded if they meet the removal criterion. Before conducting multiple regressions, various assessments, including normality, the ratio of cases to independent variables, linearity, homoscedasticity, and independence of residuals (Coakes et al., 2006), were run. It is noteworthy to mention that these assumptions are not completely met. However, according to Fields (2009), violations of the assumptions do not necessarily mean that the regression model is incorrect; rather, they only alert that the findings may not be applicable beyond the sample used in the research. Table 2 below presents the results of the stepwise regression analysis.

Table 2: Regression Results

Independent Variable	t	Sig.	Tolerance	VIF	Hypothesis
Organizational size	0.470	0.640	0.967	1.039	Rejected
Organizational age	-1.061	0.293	0.995	1.005	Rejected
Environmental committee	2.202	0.031**	1.000	1.000	Accepted
Status of local government	-0.690	0.493	0.967	1.034	Rejected

**$p < 0.05$

The Mahalanobis distance values indicate that there are no multivariate outliers among the independent variables, as all values are less than the critical chi-square value of 13.8 at an alpha level of 0.000 (Coakes et al., 2006). Multicollinearity is another concern, as it can have damaging effects on multiple regressions (Cooper and Schindler, 2008). In assessing multicollinearity, the variable inflation factor (VIF) index and tolerance statistics are useful. Large VIF values exceeding 10 (Cooper and Schindler, 2008) and tolerance statistics below 0.1 (Fields, 2009) suggest a serious issue of multicollinearity. The results presented in Table 2 suggest that multicollinearity is unlikely to be an issue.

Contrary to earlier studies by Frost and Seamer (2002) and Ribeiro and Aizar-Guzman (2010), the organizational size of Malaysian local councils does not appear to be a significant determinant of EMA adoption. City and municipal councils, being larger in size than district councils, are expected to be involved in various environmental activities and programs. This involvement may lead them to adopt EMA in order to generate environmental information for better reporting (Mokhtar et al., 2016). However, such an expectation is not apparent. The results appear to be consistent with those of Ferriera et al. (2010) as they discovered a similar pattern and argued that EMA is not driven by organizational size but rather by the environmental sensitivity

of the organization. A study by Lynch (2010) indicates that the nature of public sector departments influences their environmental reporting. The level of reported environmental disclosures is found to be higher in departments with substantial environmental portfolios compared to their counterparts. This suggests that the more environmentally conscious an organization is, the more likely it is to provide environmentally-related disclosures and adopt EMA to help measure and report such information. Moreover, small and medium organizations in Malaysia are increasingly using EMA to gain a competitive advantage and match the information needs of stakeholders, despite having limited resources (Muhammad Jamil, Mohamed, & Muhammad, 2015).

Table 2 also exhibits evidence that organizational age is not a significant determinant for EMA adoption. While Welbeck et al. (2017) suggest that mature organizations prioritize social and environmental practices, the findings of the study suggest otherwise. EMA is an internal management practice that necessitates investment in data infrastructure and human skills (Muhammad Jamil et al., 2015). Therefore, a relatively young organization with strong financial resources may adopt EMA earlier as compared to mature organizations with limited resources. As shown in Table 1, only four local councils in Malaysia have allocated a budget for R&D in environmental matters. This indicates that EMA adoption is not a managerial priority for local councils. Perhaps, the focus of the local councils is more towards fulfilling their responsibilities in public service delivery to mitigate any unwanted criticisms from the public, such as long delays, unprofessional attitudes, and ineffective policy enforcement (Che Ku Kassim et al., 2022). Moreover, as Lynch (2010) points out, a lack of external pressures from stakeholders is also a factor that hinders the adoption of environmental accounting and reporting in the public sector. Qian et al. (2011) have shown that the rising demand for environmental improvements from the local community has influenced local councils in Australia to embark on EMA to facilitate the waste management practices. Unfortunately, in Malaysia, the power of the local community appears to be too weak to exert any significant influence on driving the adoption of EMA (Che Ku Kassim et al., 2022).

Consistent with Dixon-Fowler et al. (2017), an interesting finding related to the establishment of an internal environmental committee is observed. One of the advantages of having this committee is that it helps the organization streamline its environmental initiatives, ensuring that environmental costs and performance are properly tracked and accurately measured. This, in turn, will have a favorable impact on managerial decisions (Dixon-Fowler et al., 2017). In addition, an internal environmental committee signals the commitment of top managerial leaders to environmental matters, which can boost the organization's reputation and build strong credentials. As evidenced by Hasan, Waghule, and Hasan (2024), proper top management support encourages an organization to adopt EMA, and its adoption can help the organization improve its overall environmental performance. This is possible because EMA can provide relevant environmental and financial data that are crucial inputs for more effective decision-making. The internal environmental committee is responsible for advising local councils on operations that are properly aligned with organizational environmental goals, and EMA supports the measurement and reporting of environmental costs and benefits. Hence, local councils are provided with comprehensive information that will be beneficial in strategic planning and environmental strategies aimed at improving the overall performance of local councils.

The status of the local council also appears to be a non-significant determinant for EMA adoption. Although earlier studies indicate differences between environmental accounting and reporting practices among different levels of local councils (see, for example, Qian and Burritt, 2007; Marcuccio and Steccolini, 2009), such findings are not evident in the current study. One possible justification is that EMA is a relatively new concept in Malaysian local councils, and its nature and benefits are not well understood (Che Ku Kassim et al., 2022). In a survey conducted by Che Ku Kassim et al. (2019), one of the reasons for the low level of environmental information provided by Malaysian local councils is the lack of skilled staff to handle environmental-related matters. Therefore, to promote the adoption of EMA, especially within the public sector, the roles of education and professional bodies need to be strengthened. In addition, as highlighted in Che Ku Kassim et al. (2022), coercive pressure in the form of state government regulations can impact EMA adoption within local councils. However, regulating EMA as a compulsory practice may not be suitable at present due to the absence of a standardized framework. One possible approach to encourage the adoption of EMA in the Malaysian public sector is by making environmental reporting mandatory, mirroring the private sector. This would then lead to EMA adoption to facilitate reporting practices.

5. Conclusion

EMA is a comprehensive MA practice that helps organizations to accurately track information related to environmental costs and benefits. This information is crucial for organizations to measure their environmental performance and make informed decisions for long-term strategic planning. EMA adoption has been promoted in the private sector at both international and national levels. Of late, there has been a trend towards the adoption of EMA in the public sector as well, indicating a growing interest in environmental commitments. However, in the public sector, particularly at the local council level, EMA is only used at a moderate level, especially in developing countries such as Malaysia. An array of internal and external factors is found to influence EMA adoption. This paper examines four internal factors related to the organizational determinants, including organizational size, age, presence of an environmental committee, and the status of local councils. The results suggest that having an in-house environmental committee is a significant predictor that influences EMA adoption by local councils. This committee provides a systematic structure responsible for effective and efficient planning, monitoring, measuring, and reporting of the local councils' environmental performance. To help the committee fulfil its goals, EMA is considered vital as it can supply the required information for better environmental sustainability, governance, and accountability.

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Breaking Barriers: Empowering Special Needs Accountants in Malaysia through Artificial Intelligence and Assistive Technology

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Abstract: Accountants with disabilities face persistent barriers in the profession, such as limited educational access, inadequate workplace accommodations, inaccessible technologies, and prevailing social and institutional biases. These limitations restrict their participation and deprive the profession of diverse talents and perspectives. Thus, this study explores how artificial intelligence (AI) and assistive technologies can empower accountants with disabilities in Malaysia by reducing obstacles, fostering inclusivity, and promoting workforce diversity. Using content analysis of existing literature, the study identifies the challenges encountered by workers with disabilities, examines current technological applications, and reviews international practices to highlight lessons that may be adapted to the Malaysian and regional context. The findings indicate that AI-driven solutions and assistive tools such as screen readers, real-time captioning, smart prosthetics, and cognitive support systems can improve accessibility, communication, productivity, and independence for these professionals. Consequently, such empowerment fosters greater workforce inclusion, enhanced productivity, strengthened equity and independence, and expanded opportunities for lifelong learning. Although specific evidence in Malaysia is limited, increasing institutional support and local innovations demonstrate strong potential for integration. The study contributes to the literature on diversity and inclusion in accounting. Practically, it calls for firms, educators, and stakeholders to adopt inclusive technologies, and from a policy perspective, it highlights the importance of government support in promoting equal opportunities. The study addresses this issue in Malaysia, offering fresh insights for a more inclusive accounting profession. It addresses the research gap in inclusivity and highlights how technology can foster a more equitable professional environment.

Keywords: *Orang Kurang Upaya (OKU), Malaysia, Accountants, Artificial Intelligence, Assistive Technologies*

1. Introduction

The accounting profession has historically been defined by its emphasis on accuracy, analytical precision, and adherence to professional standards. Nevertheless, people with special needs have frequently encountered systemic barriers to participation in the field. It includes challenges in retrieving educational, workplace accommodations, and the use of traditional technologies that do not adequately address their needs (Faiella et al, 2023; Shahbudin & Jamil, 2024). These barriers not only limit career opportunities for these individuals but also prevent the profession from fully benefiting from diverse perspectives and talents.

In today's digital era, technology and innovation are transforming every industry, and the accounting field is no exception. As technology unlocks efficiency and growth in our profession, it also creates a tremendous opportunity, such as the ability to create a more inclusive profession. The intersection of AI and assistive technology can be life-changing for OKU (Orang Kurang Upaya) here in Malaysia. Recent innovations in AI and assistive technologies provide a great opportunity to tackle these problems. AI-assisted technologies such as speech recognition software, automatic data analysis, intelligent screen reading, or predictive text can now give benefits to accountants with visual, auditory, physical impairments, or cognitive disabilities (Hussin et al., 2024; Naayini et al., 2025). These technologies have the potential to transform the work of the special needs accountant into a functional accountant.

In addressing the challenges faced by persons with disabilities in the accounting field, this study investigates the role of AI and assistive technologies in enhancing their empowerment, with particular attention to the

Malaysian context. It underscores the potential of these technologies to break down barriers, improve accessibility, and foster a more diverse and inclusive workforce. This discussion adds to the growing research on diversity and inclusion in the accounting profession by emphasizing the transformative role of technology in fostering more equitable and inclusive professional environments.

2. Literature Review

Contextualizing Disability in Malaysia

In Malaysia, the label OKU is used to describe persons with persistent physical, sensory, intellectual, or mental impairment. These factors, together with environmental or social barriers, do not allow people to realize their full potential in their daily lives. This is consistent with the understanding of disability as an interaction between an individual's ability and their environment, rather than a mere medical condition as enshrined in the Persons with Disabilities Act 2008. This act defines disability as an inhibition that is not the result of a mere medical diagnosis but is based on the interaction among the person's physical, including sensory, functioning with targets in the environment.

Malaysia has implemented several policies to support persons with disabilities, notably in employment, over the past decade. However, there is little available research on the representation of these groups in individual professions, such as accountancy. In 2018, records indicated that only about 4,500 people with disabilities were employed in the public and private sectors out of a total of 320,870 registered individuals with disabilities, reflecting an employment rate of just 1.4% (OKU Rights Matter, 2025). This figure highlights the critical underrepresentation of people with disabilities in the labor market and underscores systemic challenges in achieving workforce inclusivity. Ahmad Rofe and Syed Marzuki (2022) argue that such outcomes are driven by persistent barriers, including societal stigma, limited employer readiness to provide reasonable accommodations, and weak enforcement of inclusive employment policies. Section 29 of the Disabilities Act contains a provision that the principle of equal employment opportunity is not to apply, but the actual practice has not caught up. By July 2024, more than 724,000 people had registered as OKU with the Department of Social Welfare, and these figures are indicative of the growing level of societal recognition as well as the immensity of the task.

Coping with Disability

Disability takes many shapes physical and sensory impairments and cognitive and emotional struggles. Such disabilities, whether congenital, caused by medical conditions, or acquired with age, affect the capability of a person to perform routine activities in life. In Malaysia, disabilities are commonly grouped into several categories, with physical, vision, speech, hearing, psychiatric, and multiple disabilities (Nasir et al., 2024). These include physical, sensorial, and auditory disabilities most frequently. Physical disabilities such as reduced mobility from arthritis, spinal cord injuries, or limb loss can create barriers to routine tasks like walking, dressing, or driving, often requiring the use of assistive devices such as prostheses or wheelchairs. Likewise, individuals with visual or auditory impairments face distinct challenges in their daily lives. For example, reading or navigating public spaces can be difficult for the visually impaired, while those with hearing loss may struggle with conversations even when using hearing aids, sign language, or a combination of both. These sensory limitations often reduce opportunities for social interaction and can contribute to feelings of exclusion or alienation from society.

The impact of disability extends beyond physical limitations, encompassing significant social and emotional costs. Families and communities often bear the weight of restricted access and societal barriers, while structural challenges such as the absence of universal design, limited accessibility of facilities, and persistent discriminatory practices continue to hinder the quality of life for people with disabilities. These barriers create long-lasting obstacles, contributing to intergenerational cycles of marginalization in education and employment (Mitra, 2017).

In Malaysia, the enactment of the Persons with Disabilities Act 2008 marked a step toward greater inclusion by promoting accessibility in education, employment, and public facilities, as well as fostering awareness of disability rights. While the law has been in the right direction, it has been poorly enforced, and there are still a lot of loopholes. Much more work must be done to make sure that people with disabilities have equal

opportunity, independence, and dignity of full participation in society (Yaacob & Hasan, 2019; Mustapha & Abdullah, 2021). Despite its progressive framework, much remains to be done to ensure genuine equality of opportunity, independence, and dignity for people with disabilities in Malaysian society.

Overcoming Challenges

AI and software are reshaping the accounting profession. They make simple tasks of regular accounting, but they also enable accountants to report on huge, complicated data sets. This is transforming the work and capability of accountants. The new technology is also opening the industry and giving opportunities to people with disabilities who have never been able to get in and move along in their lives. It also makes it more productive and efficient.

For decades, people with impairments have fought to become accountants. The story is playing out differently, however, as progressively advanced assistive technology becomes possible to support and enrich the lives of people with physical, sensory, or cognitive disabilities. Automation lets robots do simple jobs, which frees up professionals to work on more important things like analysis, interpretation, and strategic decision-making, where they may use their expertise in a better way.

This shift toward inclusivity is also beginning to be recognized within schools and professional institutions. For example, the Association of Chartered Certified Accountants (ACCA) has incorporated accommodations into its examination framework to ensure that students with disabilities can undertake their assessments on equal terms. Similarly, the UK Equality Act 2010 emphasizes that individuals should not be disadvantaged in assessment or evaluation due to their personal circumstances, mandating reasonable adjustments in education and employment contexts. These measures align with broader international commitments to disability inclusion in professional qualifications and lifelong learning (Waterfield & West, 2005).

Recent studies continue to claim that AI's effect on making a more sustainable accounting family will be both very disruptive and very positive. AI-powered solutions make it easier to manage complex data and rely less on manual data processing. This opens new opportunities for those who may have been left out in the past. This move will transform the lives of disabled people and help the profession by bringing in more talented people and making the practice more distinct. By integrating these technologies, accounting can not only leverage diverse talents but also strengthen inclusivity and innovation within the field (Kokina & Davenport, 2017).

3. Methodology

This paper focuses specifically on the role of AI and assistive technology in supporting special needs accountants in Malaysia. The scope contains an exploration of the barriers faced by accountants with disabilities, technological tools, and the best practices in technology adoption. A content analysis of previous literature is employed as the primary technique for data collection. The purpose of this study is to:

- Identify and analyze challenges. It is to understand the barriers and obstacles of impaired workers.
- Examine current technological applications to assess how AI and assistive technologies are currently being utilized in helping disabled workers.
- Explore comparative insights; to review international practices and successful initiatives in leveraging AI and assistive technology for persons with disabilities, highlighting lessons that could be applied in the Malaysian or broader regional context.
- Propose practical solutions; to recommend strategies for enhancing accessibility, improving workplace inclusivity, and guiding policymakers, educators, and industry stakeholders in empowering special needs accountants.

By addressing these objectives, the study aims to bridge the research gap on comprehensiveness within the accounting profession and provide a comprehensive overview of how AI and assistive technology can be harnessed to create an equitable and supportive professional environment.

4. Findings

The findings of this study highlight how advances in assistive technologies, when integrated with accounting practices, are reshaping the professional landscape for accountants with disabilities. As the accounting profession becomes increasingly digital, the availability of inclusive tools has emerged as a critical factor in ensuring equitable participation.

Tools for Special Needs Accountants

The development of current assistive technology has greatly impacted the transformation of the professional situation for accountants with disabilities. These developments in assistive technology have promoted more autonomy, inclusivity, and productivity by responding to a wide range of disabilities, such as visual, auditory, physical, and cognitive. The emergence in the use of assistive technologies being integrated into accounting workflow, such as screen readers, speech-to-text software, and ergonomic input devices, is significant in supporting individuals with specific challenges (Smith and Jones, 2024). Assistive technology facilitates giving equal opportunities to all the accountants regardless of their disabilities.

Visual

For accountants with visual impairments, tools like JAWS (Job Access with Speech) or NVDA (Nonvisual Desktop Access) allow users to work with accounting software and spreadsheets using auditory feedback. These screen readers convert text and numerical data into speech or braille, allowing users to perform tasks such as data entry, auditing, and report generation (Wentz, Jaeger, & Lazar, 2011).

In Malaysia, although the adoption of AI and assistive technologies within the accounting field is increasing (Tan & Lee, 2024), there remains a lack of empirical studies focusing specifically on their integration into the workflows of visually impaired accountants. While research on this area is still limited, current developments suggest that the profession is moving in the right direction toward incorporating such tools to meet the needs of visually impaired professionals. Several technologies available in the Malaysian market cater to this group. For example, AI-based Optical Character Recognition (OCR) and Intelligent Document Processing solutions, such as MataOCR and MetaBot, can identify printed or scanned text and extract data from invoices, receipts, pay slips, and bank statements in multiple languages (MataOCR, n.d., Metabot Sdn. Bhd., n.d.). These tools enable visually impaired accountants to convert hardcopy documents into digital formats, reducing reliance on manual data entry, minimizing errors, and enhancing efficiency. Similarly, QuickScan by QNE Optimum Sdn. Bhd. Allows users to upload documents, such as bills or payment vouchers, which are then processed using OCR technology (QNE, n.d.). The system automatically converts the detected text into accounting transactions, which are then recorded in the general ledger, thereby streamlining the accounting process for visually impaired professionals.

In addition to commercially available products, various support systems have been established to promote the adoption of AI and assistive technologies for individuals with visual impairments. For instance, non-profit organizations such as the National Council for the Blind Malaysia (NCBM) have contributed to the development of text-to-speech engines and assistive tools in Bahasa Melayu (NCBM, n.d.). Complementing these efforts, academicians from the Faculty of Engineering at Universiti Teknologi Malaysia (UTM) have researched assistive mobile applications that employ techniques similar to QuickScan, enabling the conversion of text into audio output. Their studies also extend to wearable, navigational, and physical assistive devices that utilize sonar technology to detect obstacles. These initiatives demonstrate that AI and assistive technologies in Malaysia are moving in the right direction to support accountants with visual impairments. For example, Sin et. al. (2015) introduced a Mobile Text Reader application at UTM that captures images of text, applies OCR, and generates audio output for users with low vision. Additional studies include a sonar-based obstacle detection device for the visually impaired (Kamaludin et al., 2015) and a wearable navigation vest incorporating vibration feedback and ultrasonic sensors (Azam et al., 2024).

Auditory

For deaf and hard-of-hearing employees, Automatic Speech Recognition (ASR) and real-time captioning embedded in productivity platforms like Microsoft Teams and Google Meet have become mainstream (Otter.ai, 2023). Speech-to-text applications such as Otter.ai can live-transcribe spoken conversations, enabling users to

follow meetings or conversations by reading a live transcript. Modern hearing aids and assistive tech also increase clarity and sound direction, which leads to better interaction experiences in team or group settings.

The other study further emphasizes the potential of AI in supporting communication and enhancing work efficiency for professionals with hearing impairments, including those in the accounting profession. AI-powered ASR systems, for instance, facilitate interaction between deaf accountants and their hearing colleagues by converting speech into text in real time (Violeta & Toda, 2023). Similarly, advances in AI-based sign language recognition enable the interpretation of hand gestures and motions into text or speech, thereby bridging interactions with individuals unfamiliar with sign language (Chen et al., 2024). Beyond communication, AI applications can automate routine accounting tasks, supporting deaf accountants in focusing on higher-order responsibilities such as data analysis, workflow management, and strategic decision-making (Tan & Lee, 2024). Collectively, these innovations underscore the role of AI in enhancing inclusivity, productivity, and career progression for accountants with hearing impairments.

Physical impairment

For those with physical impairments like low mobility or limited hand dexterity, technology can be tailored with less reliance on manual input. Professionals with physical impairment would benefit from adaptive hardware such as voice-controlled interfaces, eye-tracking systems, or one-handed keyboards, which make it easier to use accounting systems like QuickBooks or SAP without using the traditional data entry method. An example of eye-tracking technology facilitates human–computer interaction through ocular movements, serving as a substitute for conventional input devices such as the mouse and keyboard. This method is particularly advantageous for individuals with severe mobility impairments. In this context, Meena and Salvi (2025) introduced a gaze-controlled virtual keyboard that integrates deep learning techniques with standard camera hardware, demonstrating its effectiveness in enabling communication for users with both mobility and speech limitations. Similarly, speech recognition tools like Dragon NaturallySpeaking allow accountants with physical limitations to dictate entries, manage emails, and control software applications entirely through voice commands. This cuts down on the old-school typing, giving you a hassle-free flow of hands.

Smart prosthetics are also promising nowadays, which represent assistive technologies for accountants with physical impairments. One of the examples is myoelectric prosthetic hands, such as the *Bebionic Hand* or the *i-LIMB* are equipped with multi-articulating fingers and customizable grip patterns, allowing users to perform delicate office tasks such as typing on a keyboard, handling documents, using a calculator, or writing with a pen (Ottobock, 2023). These smart prosthetics are embedded with sensors, robotics, and AI to enable more precise and adaptive movement

Equally important is the challenge of providing both physical comfort and ergonomic support. Adjustable desks, such as the Fully Jarvis Standing Desk, and chairs intended for lengthy sitting sessions, like the Herman Miller Aeron Chair, can also help prevent strain and improve posture. Innovative solutions of this kind are particularly valuable for individuals who experience persistent fatigue or chronic pain. When conventional tools such as a standard keyboard or mouse cannot be fully utilized, alternative devices provide practical options. For example, one-handed keyboards such as the Maltron Single-Handed Keyboard and adaptive devices like the Logitech Adaptive Mouse are specifically engineered to meet the needs of users with mobility restrictions or limb differences.

Most studies, such as Ali et al (2024), Rusdi et al (2021), and Yunos et al (2022), focus on general professionals with limited abilities. Thus, it can be concluded that there is still a lack of evidence and data on studies focusing on accountants in Malaysia. But there are some AI and assistive technology tools that are available in Malaysia and applicable to accountants with physical impairments, such as TM One Voice AI by TM One (TM One, n.d.). These are AI voice assistance products that permit voice or speech commands instead of using keyboard and mouse as the methods of control of software, such as starting an accounting software program, navigating menus navigation and executing commands. The usage of ergonomic hardware is also available, such as ergonomic keyboard, mouse, chairs, desk and etc., that are available in local markets such as Harvey Norman Malaysia and many more. These ergonomic devices help accountants with limited physical abilities, reduce fatigue and strain, reduce the risk of injury, and provide comfortable workstations that can automatically improve the morale of the employees. Thus, with the current development, it can be assumed that Malaysia is

on the way to breaking the barriers in the adoption of AI and assistive technology to accommodate the accountants with physical impairments.

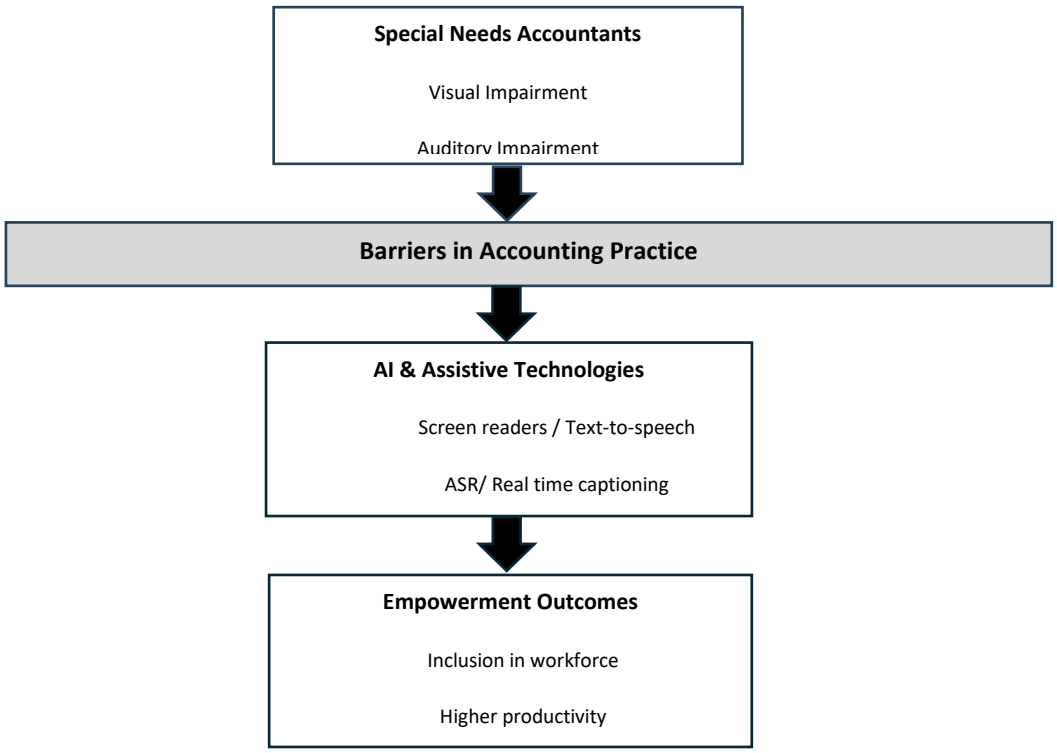
Cognitive disability

The term "cognitive disability" is broad and can encompass conditions such as autism, ADHD, learning disabilities, and intellectual disabilities. Many professionals with these conditions are considered neurodiverse. Nowadays, professional bodies and employers are increasingly working to support neurodiverse individuals and create more inclusive environments, offering resources and accommodations. For example, Universiti Putra Malaysia (UPM) has reported success stories of accounting graduates with dyslexia who leveraged assistive learning tools during their studies (Rahman & Wahab, 2022). This highlights the potential of individuals with special needs to thrive in the profession when support and inclusive practices are in place (UPM News, 2025).

For accountants with cognitive disabilities who face challenges in managing deadlines, remembering multi-step procedures, or processing complex accounting standards, AI-powered tools, such as smart reminders, task management apps, and intelligent note-taking assistants, serve as practical supports to overcome these barriers. Tools like Otter.ai automatically transcribe and summarize audit meetings, enabling accountants to review essential points without relying solely on memory. This will help accountants with short-term memory loss (Qi F., 2025). Similarly, Notion AI and Trello with automation features assist in breaking down complex tasks into smaller, manageable steps, thus reducing cognitive overload (Notion, n.d.).

Therefore, AI tools and assistive technologies should not be viewed merely as supplementary aids but rather as essential instruments that enable professionals with disabilities to contribute their expertise with independence and confidence. When effectively integrated into professional environments, such tools enhance not only accessibility but also visibility and inclusivity within the accounting community.

Conceptual Framework



The conceptual framework illustrates how special needs accountants, who consist of individuals with visual, auditory, physical, and cognitive disabilities, are likely to be confronted with hurdles that deny them full participation in the accounting profession. The obstacles could vary from difficulties in reading lengthy

numerical data, limited access to auditory signals in meetings, physical challenges in using standard office machinery, and limitations in processing or memorizing technical data.

To address these challenges, AI and assistive technologies are mediating technologies that act as intermediaries between disability and professional ability. Screen readers, text-to-speech and Braille displays for the blind, Automatic Speech Recognition, real-time captioning, AI-speech-to-text technologies, and hearing aids for the deaf, smart prostheses and ergonomic AI software for physically disabled accountants, and cognitive assistance software like digital reminders or adaptive learning software for cognitively disabled individuals are some examples.

The interaction between the type of impairment and appropriate technological support yields empowerment outcomes. These outcomes are greater involvement in the workforce as technology equips disabled accountants to compete on an equal basis, greater productivity as work can be performed better, independence, and fairness as they rely less on others. Lifelong learning as flexible AI will consistently provide opportunities for skill acquisition.

Hence, the framework describes the way AI and assistive technologies have a central role in transforming barriers into opportunities and ultimately promoting equity and professional growth for special needs accountants.

5. Conclusion

The integration of AI and assistive technologies is reshaping the accounting profession by promoting inclusivity, improving efficiency, and creating new opportunities for individuals with disabilities. Technologies such as eye-tracking systems, speech-to-text applications, sign language recognition, and wearable navigation devices address persistent barriers that have historically restricted participation by accountants with special needs. By automating routine processes and facilitating communication, AI enhances professional productivity while enabling individuals with visual, auditory, and mobility impairments to participate more fully in accounting practice.

In Malaysia, initiatives led by academic institutions, non-profit organizations, and technology developers indicate promising progress toward inclusivity. Nevertheless, to fully realize the potential of these innovations, stronger collaboration is required among policymakers, educators, industry practitioners, and disability advocacy groups. Targeted investment in localized solutions, particularly in Bahasa Melayu and within the Malaysian socio-cultural context, is essential to further strengthen accessibility.

The adoption of AI and assistive technologies thus represents more than a technological advance; it embodies a societal commitment to equity and diversity within the accounting profession. By removing systemic barriers and empowering accountants with disabilities, these innovations lay the foundation for a more inclusive, resilient, and future-ready profession.

At the same time, the intersection of AI and assistive technology is redefining the practice of accounting work and expanding avenues of participation. These technologies hold immense potential to dismantle obstacles that have long hindered professionals with disabilities. However, these technologies by themselves are not enough to make a qualitative impact. To reach adaptable, open, and barrier-free solutions, especially considering the many different demands of end users, development must also take place through multi-stakeholder collaboration between educators, employers, policy makers, and technology developers.

It is a critical stage in the digital era to consider how employees are trapped in the workplace systems. A digital infrastructure can be established, rebuilt, or even remodelled to accommodate individuals who possess diverse sensory, motor, and linguistic capacities. When an entire industry takes the initiative to develop and integrate inclusive strategies with universal design and equitable accommodation, the implications benefit not only the profession but society at large. It's not about recruitment targeting, but investing and making it feasible over time, and practicing the walk, and ensuring that structural barriers to human potential are peeled away, so that the profession in any workplace, and in any community, reflects the spread of talents in the population and an

environment in which all people can thrive.

Future Direction/ Limitation

While previous literature provides valuable conceptual insights, it remains limited in accounting-specific evidence, the range of disabilities addressed, and practical integration strategies. Most existing studies concentrate on general education or IT settings, which restricts their applicability to the accounting profession. Key gaps include challenges in integrating assistive technologies with platforms such as SAP and QuickBooks, high implementation costs, and insufficient focus on psychiatric or cognitive disabilities. Future research should address these gaps by conducting empirical studies in accounting firms, advancing AI applications, and aligning policy with inclusive objectives. Greater emphasis on local innovations in Malaysia and comparative international practices will also be essential for designing scalable and inclusive solutions.

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The Emergence of Neuroaccounting: A Bibliometric Analysis of Financial Decision-Making Research

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Abstract: This paper aims to examine the intellectual landscape and thematic evolution of neuroaccounting, an emerging interdisciplinary field that integrates neuroscience, psychology, behavioral finance, and accounting to understand financial decision-making. Despite its conceptual relevance, neuroaccounting remains underrepresented in scholarly indexing and lacks a systematic bibliometric synthesis. Using a bibliometric analysis of 482 documents published between 1980 and 2025, this study investigates publication trends, citation metrics, document types, keyword patterns, and journal contributions. The research sample includes peer-reviewed articles, book chapters, conference papers, and other scholarly outputs indexed across major academic databases. Findings reveal a steady increase in academic interest, with notable growth in publications and citations from 2018 onward. Core themes such as cognitive biases, heuristics, behavioral finance, and investment decisions dominate the literature, even though "neuroaccounting" is not yet a mainstream keyword. High-impact contributions often originate from decision science and strategy journals, while behavioral finance journals serve as primary publication venues. Network and density visualizations highlight tightly connected thematic clusters centered on decision-making under uncertainty. The study's implications suggest that neuroaccounting is conceptually robust but still fragmented, requiring further empirical research in real-world settings and broader geographic representation. Limitations include citation lag in recent publications and the evolving terminology surrounding the field. This paper contributes by positioning neuroaccounting as a unifying label that bridges established research domains, offering a foundation for future interdisciplinary collaboration and methodological innovation in accounting and financial behavior research.

Keywords: *Neuroaccounting, Financial Decision-Making, Behavioral Finance, Bibliometric Analysis*

1. Introduction

In recent years, the convergence of neuroscience and accounting has led to the emergence of a field of research known as neuroaccounting. It is an interdisciplinary approach that integrates the techniques and knowledge of cognitive neuroscience, psychology, and behavioral economics to improve the understanding of how individuals interpret accounting information, make financial decisions, and respond to risk and uncertainty (Tank & Farrell, 2022). Neuroaccounting has emerged as a discipline that improves the understanding of the human decision-making process. This discipline examines the neurological basis of people's mental states during the decision-making process (Coşkun & Karakoç, 2020). A person's behaviors and psychological composition are crucial in the accounting reports that are evaluated and communicated to third parties. Although accounting consists of objective data due to its mathematical and numerical principles, it also includes subjective data due to various perspectives and interpretations (Coşkun & Karakoç, 2020). Dickhaut, Basu, McCabe, and Waymire (2010) argue that neurons coordinate human brain functions for obtaining and evaluating information that can lead to economic decision-making. According to Ahmad (2010), neuroaccounting is an emerging scientific discipline that examines the relationship between accounting principles and the cognitive functioning of the human brain in the context of economic decision-making and the construction of economic institutions.

Neuroaccounting is an application of methods and tools from cognitive neuroscience to understand accounting activities and address accounting issues (Guo, Cheng, & Zhang, 2022). Neuroaccounting analyses the impact of brain functions on the development of business practices, focusing on understanding the meaning of accounting numbers, analyzing accounting reports, and the decision-making process through theoretical frameworks based on cognitive and behavioral neuroscience. It aims to clarify the interactions between neurons during accounting processes and shows that accounting is not only dependent on numerical data but

also on human elements. Neuroaccounting shows that there is a strong parallel relationship between culturally evolved accounting and human brain processes in the process of making economic decisions (Dickhaut et al., 2010).

Corporate financial reporting constitutes a significant external information system that collectively establishes the framework necessary for informed economic decision-making. Neuroaccounting represents a specialized area within accounting research that integrates principles from accounting, finance, and neuroscience to investigate the neural mechanisms that influence financial decisions made by external stakeholders (Guo et al., 2022). Financial decisions involve complex scenarios where large amounts of information, heterogeneity, volatility, and significant uncertainty collectively impact the decisions of stakeholders (Ortiz-Terán, Diez, Sepulcre, Lopez-Pascual, and Ortiz, 2021). Neuroaccounting explores the realm of brain value representation to provide insights into financial decisions. The relevance of neuroaccounting to corporate finance is unveiled by examining how it influences financial reporting and valuation policy of firms, the corresponding regulatory framework, and the impact of financial disclosure on investment decisions of investors. Investors not only focus on information in financial statements but also on narrative disclosures and on overall economic conditions while making their investment choices. Both enhanced interpretability and clarity of financial disclosures will increase the investor's tendency to invest.

Neuroaccounting remains comparatively underexplored, although neuroeconomics has evolved into well-established research with significant theoretical and empirical contributions (Glimcher & Fehr, 2013), which makes a bibliometric review valuable. Therefore, a bibliometric analysis is used in this paper to provide a comprehensive data-driven review of research on neuroaccounting with a focus on financial decision-making. Bibliometric approaches provide a comprehensive framework for the quantitative study of large bibliographic datasets and allow for the objective mapping of intellectual and social structures within a given field. This study aims to map the knowledge structure, trends, and key contributors in research on neuroaccounting and financial decision making. In addition, the research objective for this study is to represent the landscape of neuroaccounting by analyzing publication trends, identifying leading authors, institutions, and countries, exploring thematic clusters and keyword trends, and suggesting avenues for future research directions.

The subsequent sections of this paper are structured as follows. Section 2 contains the literature review, Section 3 outlines the research methodology, Section 4 presents the findings, and Section 5 concludes the study with a summary of the findings and recommendations for future research.

2. Literature Review

Neuroeconomics has emerged as a multidisciplinary field that integrates neuroscience, psychology, and economics to investigate the neural mechanisms underlying decision-making. It challenges the classical economic notion of rational agents by incorporating emotional and cognitive biases into models of behavior (Camerer, Loewenstein, & Prelec, 2005). Foundational theories such as dual-process theory and prospect theory have become central to this discourse. Dual-process theory distinguishes between System 1 (fast and intuitive thinking) and System 2 (slow and analytical thinking), offering a framework for understanding how individuals navigate complex decisions (Krämer, 2014). Prospect theory complements this by illustrating how individuals evaluate gains and losses asymmetrically, with loss aversion playing a dominant role in shaping economic behavior (Tversky & Kahneman, 1979).

Building on these foundations, neuroaccounting has emerged as a specialized domain within neuroeconomics focusing on accounting-specific decision contexts such as auditing, fraud detection, financial reporting, and investment behavior. It seeks to uncover the cognitive and emotional mechanisms that influence professional judgment in high-stakes environments. Tank and Farrell (2022) conducted a systematic review of neuroscience-informed accounting research, identifying two dominant streams which are decision facilitating and decision influencing. Decision facilitating examines how individuals process accounting information, while decision influencing explores how individuals respond to controls and incentives. The result suggests that neuroaccounting is coalescing into a distinct subfield mirroring the developmental trajectory of neuroeconomics. This evolution reflects a growing recognition that accounting decisions are not purely rational but are shaped by affective and cognitive processes that can now be empirically observed and modeled.

While dual-process and prospect theory remain foundational, additional theoretical lenses offer valuable extensions to neuroaccounting. Cognitive load theory elucidated how task complexity and information density in accounting environments can overwhelm working memory, leading to heuristics shortcuts or judgment fatigue (Sweller, 1988). Moral foundations theory provides a framework for understanding how ethical intuitions such as fairness, loyalty, and authority manifest in financial reporting, audit decisions, and regulatory compliance (Graham, Haidt & Nosek, 2009). These perspectives enrich neuroaccounting's conceptual scaffolding and invite more nuanced investigations into the interplay between cognition, emotion, and ethics.

Recent methodological advances have further expanded the possibilities for neuroaccounting research. Rotaru, Rose, Ganbold, Rose, Loveridge, and Stamatelatos (2024) introduced a comprehensive guide to neuropsychological tools applicable to accounting studies, including near-infrared spectroscopy (fNIRS). These techniques offer real-time, non-invasive insights into emotional and cognitive responses, allowing researchers to study decision-making in more ecologically valid settings. This methodological diversification enhances the precision and depth of neuroaccounting investigations, particularly in contexts where traditional self-report measures fall short. The convergence of neurophysiological data with artificial intelligence and machine learning opens new frontiers for neuroaccounting research. Predictive models trained on biometric inputs such as pupil dilation, galvanic skin response, and neural activation patterns can enhance fraud detection, risk profiling, and behavioral forecasting (Rotaru et al., 2024). This integration marks a shift toward neuro-informed decision support systems where accounting technologies not only process data but also anticipate cognitive and emotional responses.

The scope of neuroaccounting is also broadening beyond financial reporting and auditing. Chen, Presslee, and Yang (2025) employed fNIRS to examine how functional diversity within managerial teams influences creativity in accounting-related decision-making. The findings highlight the relevance of neuroaccounting in organizational behavior and strategic control systems, suggesting that accounting research can benefit from interdisciplinary approaches that incorporate neuroscience, psychology, and managerial science. This underscores the potential of neuroaccounting to inform not only individual judgment but also group dynamics and institutional design. Neuroaccounting also holds implications for policy and regulation. Insights into cognitive biases and affective triggers can inform the design of disclosure standards, audit protocols, and ethics training programs. Regulators and standard-setting bodies may benefit from neuroscientific evidence when crafting interventions that promote transparency, accountability, and ethical conduct in financial decision-making.

Despite its promise, neuroaccounting remains underexplored in bibliometric terms. While bibliometric analyses have been widely applied in finance, behavioral economics, and neuroscience to map intellectual structures and research trends, neuroaccounting has yet to receive comparable attention. Existing reviews, such as that by Tank and Farrell (2022), offer conceptual insights but lack the systematic mapping needed to quantify the publication patterns, co-authorship networks, and thematic evolution. This gap limits the ability to assess the maturity of the field, identify influential contributors, and uncover emerging research clusters. A comprehensive bibliometric overview would provide a much-needed empirical foundation to guide future inquiry and foster interdisciplinary collaboration.

Bibliometric mapping has proven instrumental in consolidating emerging fields such as behavioral finance and behavioral accounting. For instance, Kumar and Choudhary (2023) conducted a comprehensive bibliometric analysis of over 1,500 articles, identifying five dominant research themes and visualizing author networks using VOSviewer and Biblioshiny. Similarly, Alam, Ahmad, Akhter, and Aziz (2025) employed Biblioshiny to map thematic clusters and citation trends, offering a systematic overview of behavioral finance's intellectual structure. These studies demonstrate how bibliometric techniques such as co-citation analysis, keyword clustering, and author centrality can illuminate the structural contours of a field, guide future inquiry, and foster scholarly convergence. Applying such methods to neuroaccounting would provide a much-needed empirical foundation to assess its maturity, map its thematic evolution, and identify emerging research clusters.

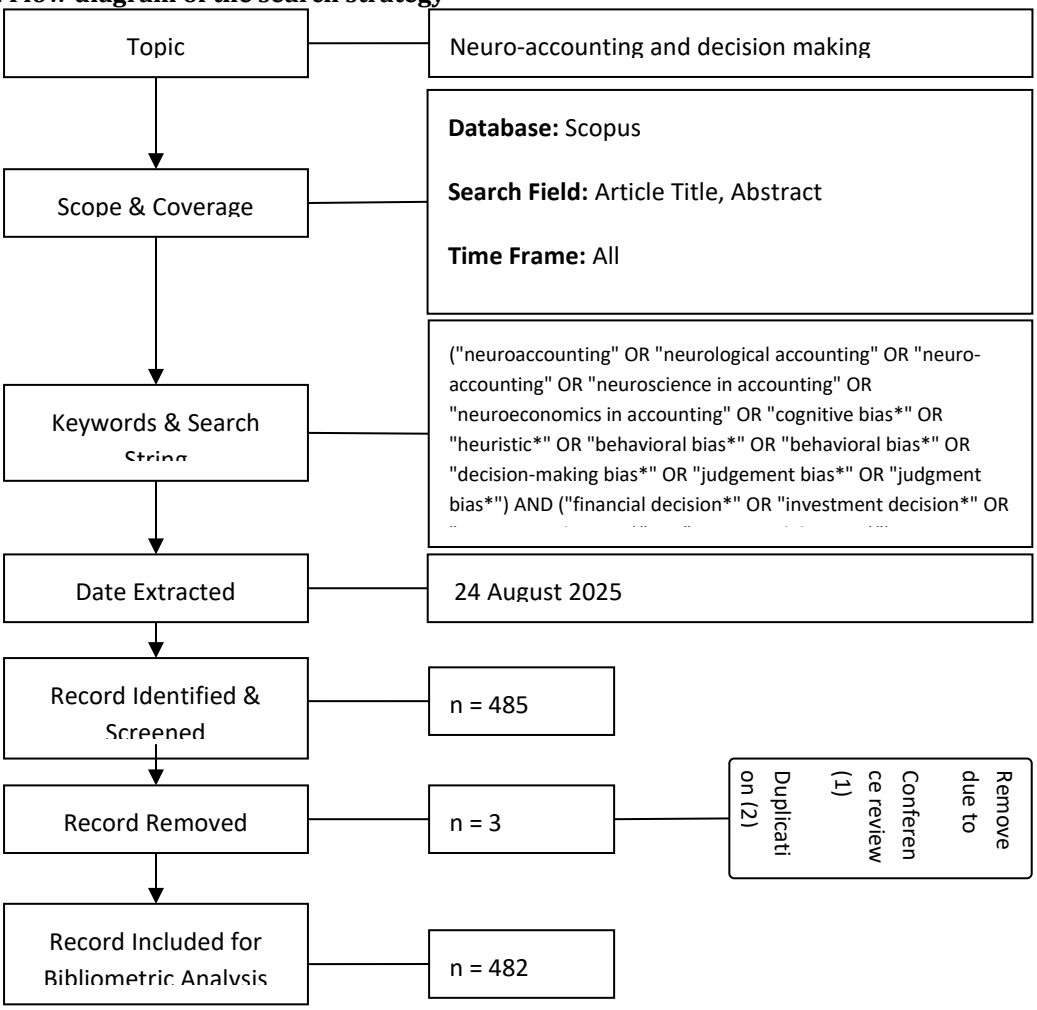
The integration of neuroscience into accounting research invites reflection on the epistemological boundaries of the field. Neuroaccounting challenges traditional conceptions of objectivity and rationality by foregrounding embodiment, emotion, and neural variability (Gallese, Mastrogiorgio, Petracca & Viale, 2021). Hence, it prompts a reexamination of what constitutes valid evidence on accounting scholarship and encourages

methodological pluralism that embraces both behavioral and biological data. Given the interdisciplinary nature and growing relevance of neuroaccounting, there is a pressing need for a systematic bibliometric review to chart its intellectual landscape. This would illuminate the field's current status, highlight key contributors and themes, and identify gaps ripe for exploration. By bridging neuroscience and accounting, neuroaccounting offers a transformative lens through which to understand and improve professional judgment, ethical behavior, and financial decision-making.

3. Methodology

In this study, a bibliometric analysis was used to map, measure, and visualize the development of academic literature on neuro-accounting and financial decision-making. This study does not focus on a systematic literature review but aims to provide a quantitative and visual overview of the intellectual structure and thematic development of the field over time. The analysis was carried out using Scopus metadata, a comprehensive and high-quality bibliographic database suitable for tracking academic and social science research. Scopus was selected for this study because of its extensive journal coverage and rich metadata, particularly in the social sciences and economics-related research. To retrieve relevant publications, a well-formulated search term was used in the Scopus database, which ensured that articles related to neuro-accounting and financial decision-making were included, as shown in Figure 1.

Figure 1: Flow diagram of the search strategy



Source: Zakaria et al. (2021), Moher et al. (2009)

The retrieved dataset comprised 482 publications, including metadata such as title, author, abstract, keywords, source title, year of publication, number of citations, and document type. The data was exported from Scopus in CSV format and carefully cleaned to remove duplicates and incomplete entries. Two main tools were used: biblioMagika® (Ahmi, 2024) for descriptive statistics such as publication trends, citation metrics, and productivity by document type, source title, and author, and VOSviewer for the creation and visualization of keyword co-occurrence maps to uncover key themes and emerging topics over time.

4. Findings and Results

The bibliometric analysis includes a total of 482 documents published between 1980 and 2025, as shown in Table 1. From the dataset, 46 years were identified as "citable years", indicating that scholarly output in this field has increased in importance and influence over time. This is also underpinned by the total of 14,522 citations, giving an average of 30.13 citations per document, with 379 documents cited, which is quite remarkable given the specialized nature of the topic. The h-index of 49 and the g-index of 113 indicate that a considerable proportion of the studies are widely recognized, with several highly cited. The m-index calculated at 1.065 indicates a constant scientific impact per year. Finally, the annual citation rate of 322.71 citations per year is a clear indication that neuroeconomics is not only gaining momentum but is also becoming increasingly relevant in explaining real-world phenomena in the area of financial judgment and behavior.

Table 1: Data description

MAIN INFORMATION	DATA
Publication Years	1980 - 2025
Total Publications	482
Citable Year	46
Number of Contributing Authors	1278
Number of Cited Papers	379
Total Citations	14,522
Citation per Paper	30.13
Citation per Cited Paper	38.32
Citation per Year	322.71
Citation per Author	11.36
Author per Paper	2.65
Citation sum within h-Core	13,709
h-index	49
g-index	113
m-index	1.065

Source: Generated by the author(s) using biblioMagika® (Ahmi, 2024).

Table 2 provides a detailed breakdown of document types within the neuro-accounting literature and shows a clear dominance of articles in peer-reviewed journals, accounting for 77.80% of all documents (n = 375). This trend emphasizes the academic maturity of the field, as most articles appear in established journals. The second largest category is book chapters, which account for 13.07 % of publications (n = 63). Conference papers (3.32 %) and review articles (3.11%) appear less frequently but provide important snapshots of ongoing research. A small proportion of publications are in the form of books (2.49 %) and a single note (0.21%).

Table 2: Document type

DOCUMENT TYPE	TOTAL PUBLICATION	PERCENTAGE
Article	375	77.80%
Book Chapter	63	13.07%
Conference Paper	16	3.32%
Review	15	3.11%
Book	12	2.49%
Note	1	0.21%

Source: Generated by the author(s) using biblioMagika® (Ahmi, 2024).

Table 3 shows the annual research output and citation metrics for the period from 1980 to 2025. The annual increase in the number of research papers on neuro-accounting and financial decision making reflects a gradual but notable evolution in the academic study of this area over the past four decades. The earliest recorded publication dates to 1980, and in the 1980s and early 1990s, there was only one publication per year. During this time, the field remained largely a niche area with one to three publications per year and a modest number of citations. A significant turning point occurred in 1993 when a single article received an extraordinary 5,388 citations, suggesting that it became a foundational reference for subsequent neuro-accounting research. This difference had a major impact on the field's citation metrics and demonstrates how seminal publications can shape new disciplines. A similar rise in influence can be seen in the early 2000s, with a gradual increase in publication volume and consistent citation activity, particularly from 2007 to 2010, when the citations per publication (C/P) ratio was high (127.25) 2007.

The years 2018 to 2022 were particularly productive, with an annual output of 22 to 36 publications and a consistently high number of contributing authors and citations. In 2022 alone, there were 99 contributing authors, 31 cited publications, and a total of 630 citations, indicating dynamic and collaborative research. In 2023 and 2024, the publication volume increased to 60 and 74 publications, respectively, suggesting strong and growing momentum in this area. However, as these are the most recent years, the citations per article are naturally lower due to the inherent citation lag (8.55 in 2023; 4.11 in 2024). The preliminary data for 2025 already show 54 publications with a total of 164 authors involved, indicating another active year. Although the number of citations is still low at this early stage (n = 56), this is to be expected due to the time lag in citation accumulation.

Table 3: Annual Research Output and Citation Metrics

Year	TP	NCA	NCP	TC	C/P	C/CP	*h*	*g*	*m*
1980	1	1	1	31	31.00	31.00	1	1	0.022
1985	1	2	1	2	2.00	2.00	1	1	0.024
1986	1	2	0	0	0.00	0.00	0	0	0.000
1987	1	4	1	157	157.00	157.00	1	1	0.026
1989	1	1	1	19	19.00	19.00	1	1	0.027
1990	1	1	1	16	16.00	16.00	1	1	0.028
1991	3	4	3	308	102.67	102.67	3	3	0.086
1992	1	2	1	9	9.00	9.00	1	1	0.029
1993	1	2	1	5388	5388.00	5388.00	1	1	0.030
1995	1	1	1	12	12.00	12.00	1	1	0.032
1996	2	3	2	62	31.00	31.00	2	2	0.067
1997	2	3	2	104	52.00	52.00	2	2	0.069
1998	2	6	2	102	51.00	51.00	2	2	0.071
1999	2	4	2	231	115.50	115.50	2	2	0.074
2002	3	7	3	297	99.00	99.00	3	3	0.125
2003	1	1	1	38	38.00	38.00	1	1	0.043
2004	2	4	2	49	24.50	24.50	2	2	0.091
2005	3	6	3	61	20.33	20.33	3	3	0.143
2007	4	11	4	509	127.25	127.25	3	4	0.158
2008	3	8	3	263	87.67	87.67	3	3	0.167
2009	7	13	4	92	13.14	23.00	3	7	0.176
2010	10	27	10	251	25.10	25.10	7	10	0.438
2011	7	16	7	464	66.29	66.29	6	7	0.400
2012	9	23	7	239	26.56	34.14	7	9	0.500

2013	12	35	12	284	23.67	23.67	9	12	0.692
2014	18	32	12	395	21.94	32.92	7	18	0.583
2015	12	35	10	408	34.00	40.80	7	12	0.636
2016	20	44	17	403	20.15	23.71	9	20	0.900
2017	17	44	15	813	47.82	54.20	10	17	1.111
2018	22	51	20	484	22.00	24.20	12	22	1.500
2019	28	69	25	611	21.82	24.44	11	24	1.571
2020	32	82	32	516	16.13	16.13	12	22	2.000
2021	28	72	27	401	14.32	14.85	11	19	2.200
2022	36	99	31	630	17.50	20.32	13	24	3.250
2023	60	186	48	513	8.55	10.69	12	20	4.000
2024	74	213	52	304	4.11	5.85	9	13	4.500
2025	54	164	15	56	1.04	3.73	4	6	4.000
Total	482	1278	379	14522	30.13	38.32	49	113	1.065

Note: TP=total number of publications; NCA=number of contributing authors; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; g=g-index; m=m-index.
Source: Generated by the author(s) using biblioMagika® (Ahmi, 2024)

The dissemination of research on neuro-accounting in financial decision making occurs in a variety of academic journals, as shown in Table 4, reflecting the multidisciplinary nature of the field. Among the academic journals, the Review of Behavioral Finance proved to be the most productive source with 16 publications and 48 authors. Although the total number of citations for this journal is modest (356), its influence is underpinned by an h-index of 22.25 and a g-index of 23.73, suggesting a steady visibility within the academic community. This is consistent with the journal's thematic focus on the behavioral aspects of finance, which overlaps closely with neuro-accounting. Other active contributors include Investment Management and Financial Innovations and Management Decision, each publishing 12 articles. While the former journal has a lower citation impact (only 47 total citations, C/CP = 4.70), the latter journal shows a stronger scientific commitment with 224 citations and a balanced h-index (18.67) and g-index.

In addition, the Strategic Management Journal, although contributing only 6 publications, recorded a remarkable 5,952 citations, an average of 992 citations per publication cited. The field of Decision Support Systems also shows a high scientific influence with 508 citations in only 6 publications, resulting in a C/CP of 84.67. The Journal of Economic Behavior and Organization and Investor Behavior: The Psychology of Financial Planning and Investing also serve as important platforms that focus on the study of cognitive biases and provide a theoretical basis for many neuro-accounting studies. Overall, the citation metrics show that most publications are in behavioral finance and management topics. In contrast, high-impact articles are often found in decision science and strategy journals, which shows how broad the topic is in terms of concepts and methods.

Table 4: Most Productive Source Title

SOURCE TITLE	TP	NCP	TC	C/CP	h	g
Review of Behavioral Finance	16	48	15	356	22.25	23.73
Investment Management and Financial Innovations	12	37	10	47	3.92	4.70
Management Decision	12	19	12	224	18.67	18.67
International Journal of Bank Marketing	9	24	9	169	18.78	18.78
Management Science	8	23	8	384	48.00	48.00
Global Business Review	7	19	7	57	8.14	8.14
Decision Support Systems	6	17	6	508	84.67	84.67
Journal of Economic Behavior and Organization	6	16	5	77	12.83	15.40
Investor Behavior: The Psychology of Financial Planning and Investing	6	11	6	108	18.00	18.00

Journal of Property Investment and Finance	6	17	5	109	18.17	21.80
Strategic Management Journal	6	17	6	5952	992.00	992.00

Note: TP=total number of publications; NCA=number of contributing authors; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; g=g-index; m=m-index.
Source: Generated by the author(s) using biblioMagika® (Ahmi, 2024).

Table 5 presents the ten most highly cited documents in this area and shows several key contributions that have significantly shaped the theoretical framework and the empirical investigation. The most influential work is the article published by Amit and Schoemaker (1993) with 5,388 citations and 163 citations per year. This is followed by Chen et al. (2007), whose study on the trading performance and behavioral biases of investors in emerging markets has been cited 362 times. Overall, the most highly cited papers in the field of neuro-accounting research reflect a rich interdisciplinary foundation, with important contributions from strategic management, behavioral economics, marketing, and decision sciences.

Table 5: 10 Highly cited documents

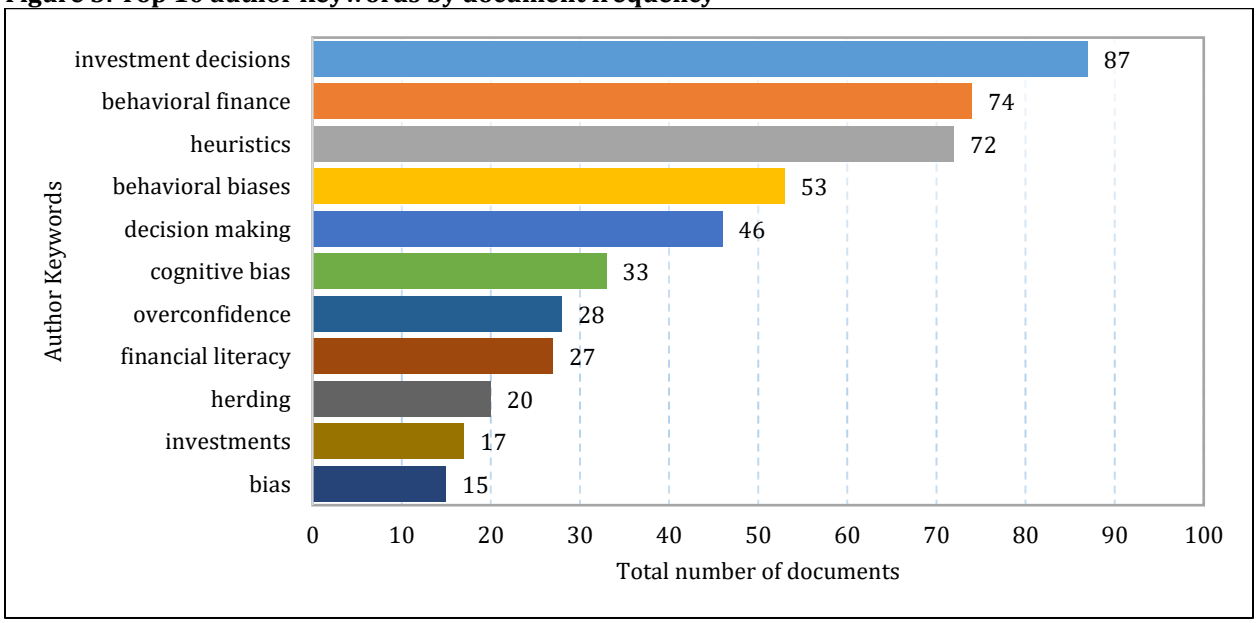
AUTHOR(S)	TITLE	SOURCE TITLE	TC	C/Y
Amit R.; Schoemaker P.J.H. (1993)	Strategic assets and organizational rent	Strategic Management Journal	5388	163.27
Chen G.; Kim K.A.; Nofsinger J.R.; Rui O.M. (2007)	Trading performance, disposition effect, overconfidence, representativeness bias, and experience of emerging market investors	Journal of Behavioral Decision Making	362	19.05
Schoemaker P.J.H. (1991)	When and how to use scenario planning: A heuristic approach with illustration	Journal of Forecasting	266	7.60
Leigh W.; Purvis R.; Ragusa J.M. (2002)	Forecasting the NYSE composite index with technical analysis, pattern recognizer, neural network, and genetic algorithm: A case study in romantic decision support	Decision Support Systems	228	9.50
Daniel K.; Titman S. (1999)	Market Efficiency in an Irrational World	Financial Analysts Journal	208	7.70
Wübben M.; Wangenheim F.V. (2008)	Instant customer base analysis: Managerial heuristics often "get it right"	Journal of Marketing	183	10.17
Ireland R.D.; Hitt M.A.; Bettis R.A.; De Porras D.A. (1987)	Strategy formulation processes: Differences in perceptions of strength and weakness indicators and environmental uncertainty by managerial level	Strategic Management Journal	157	4.03
Hauser J.R.; Toubia O.; Evgeniou T.; Befurt R.; Dzyabura D. (2010)	Disjunctions of conjunctions, cognitive simplicity, and consideration sets	Journal of Marketing Research	115	7.19
Tiwana A.; Jijie W.; Keil M.; Ahluwalia P. (2007)	The bounded rationality bias in managerial valuation of real options: Theory and evidence from IT projects	Decision Sciences	92	4.84
Yaniv I. (1997)	Weighting and trimming: Heuristics for aggregating judgments under uncertainty	Organizational Behavior and Human Decision Processes	88	3.034
Van Bruggen G.H.; Smidts A.; Wierenga	Improving decision-making by means of a marketing decision	Management Science	88	3.14

B. (1998)	support system			
Bhandari G.; Hassanein K.; Deaves R. (2008)	Debiasing investors with decision support systems: An experimental investigation	Decision Support Systems	63	3.50
Koehler J.J.; Mercer M. (2009)	Selection neglect in mutual fund advertisements	Management Science	59	3.47
Roberts C.; Henneberry J. (2007)	Exploring office investment decision-making in different European contexts	Journal of Property Investment and Finance	53	2.79
Leigh W.; Paz M.; Purvis R. (2002)	An analysis of a hybrid neural network and pattern recognition technique for predicting short-term increases in the NYSE composite index	Omega	47	1.96
Leigh W.; Modani N.; Hightower R. (2004)	A computational implementation of stock charting: Abrupt volume increase as a signal for movement in the New York Stock Exchange Composite Index	Decision Support Systems	47	2.14
Huhmann B.A.; Bhattacharyya N. (2005)	Does mutual fund advertising provide necessary investment information?	International Journal of Bank Marketing	45	2.14
Hutchinson J.W.; Alba J.W.; Eisenstein E.M. (2010)	Heuristics and biases in data-based decision making: Effects of experience, training, and graphical data displays	Journal of Marketing Research	42	2.63
Emmanuel C.; Harris E.; Komakech S. (2010)	Towards a better understanding of capital investment decisions	Journal of Accounting & Organizational Change	41	2.5625
Wickham P.A. (2003)	The representativeness heuristic in judgments involving entrepreneurial success and failure	Management Decision	38	1.65

Note: TC=total citations; C/Y=average citations per year
Source: Generated by the author(s) using biblioMagika® (Ahmi, 2024).

The keyword analysis in Figure 3 highlights the thematic priorities of researchers in the field of neuro-accounting and financial decision-making. The most frequently used author keyword is “investment decisions” (87), followed by “behavioral finance” (74) and “heuristics” (72), indicating a strong focus on how cognitive shortcuts influence investment behavior. Other important keywords are “behavioral biases” (53), “decision making” (46), and “cognitive bias” (33), all of which reflect the field's focus on psychological and neurological factors in decision-making under uncertainty. Keywords such as “overconfidence” (28), “financial literacy” (27), and “herding” (20) refer to specific behavioral phenomena that are frequently studied in the literature. Interestingly, terms such as “investment” and “bias” also appear frequently, suggesting that the language around this research is based on both technical and psychological concepts. Although neuro-accounting is the central theme of this study, the term itself does not appear as a dominant keyword in the dataset. This can be attributed to the fact that neuro-accounting remains an emerging and interdisciplinary concept that is often embedded in broader topics such as investment decisions, behavioral finance, heuristics, and cognitive biases.

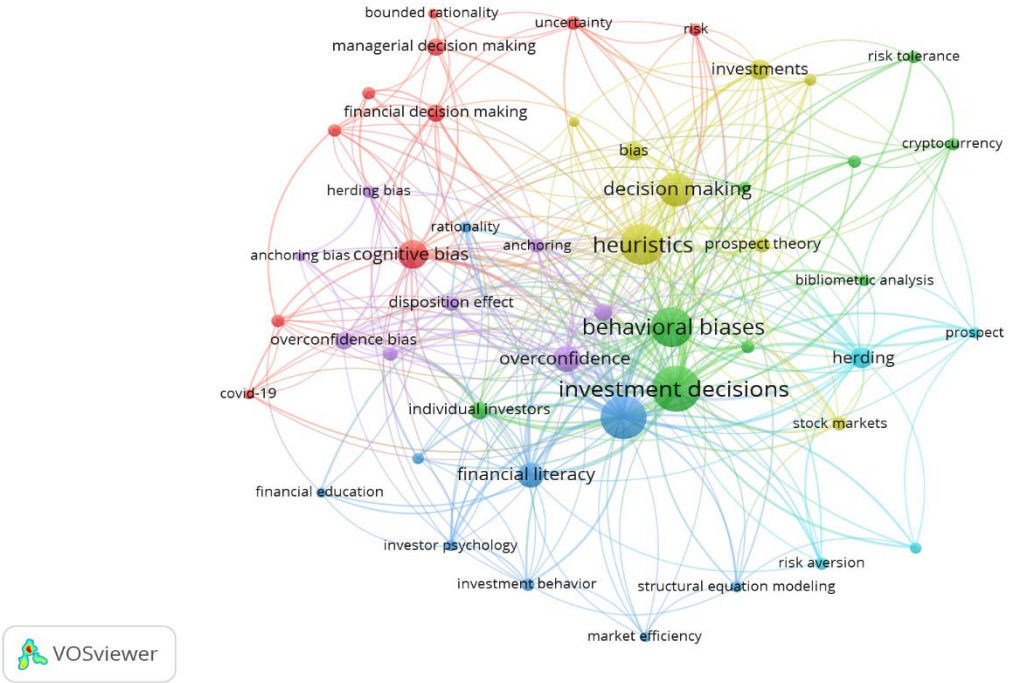
Figure 3: Top 10 author keywords by document frequency



Source: Generated by the author(s) using biblioMagika® (Ahmi, 2024).

The network visualization in Figure 4 provides a comprehensive overview of the intellectual structure, thematic clusters, and the temporal development of research in the field of neuro-accounting and financial decision-making. The network map clearly shows several interconnected clusters that form the conceptual backbone of the area. At the center of the network, key concepts such as “investment decisions", “heuristics”, and “behavioral biases” appear as large, interconnected nodes, underlining their central importance in the literature.

Figure 4: Network visualization of the co-occurrences analysis of authors' keywords



5. Conclusion and Recommendations

The bibliometric analysis of 482 documents published between 1980 and 2025 reveals that neuroaccounting, while still emerging, is gaining significant traction within the academic community. The identification of 46 citable years and a cumulative citation count of 14,522, averaging over 30 citations per document, has demonstrated a growing scholarly influence. Metrics such as the h-index (49), g-index (113), and m-index (1.065) further confirm that a substantial portion of the literature is widely recognized and consistently impactful. The annual citation rate of 322.71 citations per year underscores the increasing relevance of neuroeconomics and neuroaccounting in explaining real-world phenomena related to financial judgment and behavior. The dominance of peer-reviewed journal articles (77.80%) and the steady rise in publication volume, particularly from 2018 onward, reflect the academic maturity and momentum of the field. Notably, the surge in publications in 2023 and 2024, and the preliminary data for 2025, indicate sustained interest and expanding collaboration, as evidenced by the growing number of contributing authors. The citation lag observed in recent years is expected and does not detract from the field's upward trajectory.

Journal analysis confirms the multidisciplinary nature of neuroaccounting, with behavioral finance and management journals serving as primary publication venues. However, the most influential articles, such as those published in the Strategic Management Journal and Decision Support Systems, originate from decision science and strategy domains, suggesting that high-impact contributions often emerge from adjacent disciplines. This reinforces the idea that neuroaccounting is conceptually broad and methodologically diverse. The keyword analysis and network visualizations further illuminate the thematic structure of the field. Core concepts such as "investment decisions," "heuristics," and "behavioral biases" dominate the intellectual landscape, forming tightly interconnected clusters. Although "neuroaccounting" itself is not a dominant keyword, the findings support its conceptual relevance indirectly. The prevalence of constituent elements of cognitive biases, heuristics, behavioral finance, and investment decisions demonstrates that the field's foundations are already well-established, even if the term "neuroaccounting" is not yet mainstream.

The contribution of this study is to show that neuroaccounting bridges these established clusters and can be positioned as a unifying label that consolidates fragmented research streams. By mapping the intellectual structure, publication trends, and thematic priorities, this analysis provides a foundation for advancing neuroaccounting as both a theoretical framework and a practical research agenda. It highlights the field's potential to inform professional judgment, ethical behavior, and financial decision-making in increasingly complex and cognitively demanding environments.

To advance the discipline meaningfully, future research should prioritize empirical investigations within authentic accounting environments to enhance ecological validity. Stronger collaborations between neuroscientists and accounting scholars are essential to deepen methodological rigor and theoretical integration. Moreover, neuroaccounting frameworks should be extended to emerging domains such as ESG disclosures, AI-mediated financial decisions, and sustainability reporting. Amplifying contributions from developing nations will enrich the field with diverse perspectives and contextual relevance. Finally, integrating text mining and machine learning into bibliometric analyses can uncover latent patterns and accelerate knowledge synthesis, offering a more nuanced understanding of the field's evolution and future trajectory.

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The Law of E-Waste: Closing the Loop for Green Digital Technologies and Economic Resilience- A Malaysian Perspective

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Abstract: The exponential growth of digital technologies globally has led to a parallel surge in electronic waste (e-waste), posing significant environmental and health risks while also representing a potential resource for valuable materials. Malaysia, as a rapidly digitalising nation, faces mounting challenges in managing its e-waste stream effectively. This paper examines the current legal and regulatory landscape governing e-waste in Malaysia, focusing on its adequacy in promoting a circular economy model – closing the loop – for green digital technologies and fostering economic resilience. Through a comparative analysis with established frameworks in the European Union (Waste Electrical and Electronic Equipment - WEEE Directive) and Japan (Law for Promotion of Effective Utilization of Resources), this paper identifies critical gaps in Malaysia's approach, particularly concerning Extended Producer Responsibility (EPR), formal collection systems, and integration of the informal sector. It argues that adopting comprehensive, specific e-waste legislation incorporating mandatory EPR, clear collection and recycling targets, and mechanisms to formalise informal collection is crucial. Such reforms are vital not only for mitigating environmental harm but also for unlocking the economic potential of urban mining and supporting Malaysia's transition towards a sustainable and resilient digital economy.

Keywords: *E-waste, Environmental Law, Circular Economy, Extended Producer Responsibility (EPR), Comparative Law.*

1. Introduction and Background

The relentless pace of technological innovation, coupled with increasing consumer appetite and ever-shorter product lifecycles, has unleashed a global electronic waste (e-waste) tsunami (Akhtar, 2024). The United Nations' Global E-waste Monitor 2024 paints a stark picture: the world generated a record 62 million metric tonnes of e-waste in 2022, a figure rising five times faster than documented recycling efforts. This deluge of discarded electrical and electronic equipment (EEE) represents not only a monumental environmental challenge but also a squandering of valuable resources.

Malaysia, a nation at the forefront of the global Electrical and Electronics (E&E) industry and a rapidly digitalising economy, finds itself at the epicentre of this digital paradox (Akhtar, 2024). The very sector that fuels its economic growth and technological advancement is simultaneously the source of one of its fastest-growing and most hazardous solid waste streams. This is not a simple problem of waste disposal but a structural consequence of an economic model where the environmental costs of consumption have not been fully integrated into the product lifecycle. The legal and regulatory frameworks have struggled to keep pace with this economic and technological acceleration, creating a critical vulnerability.

The central thesis of this analysis is that Malaysia's current legal framework for e-waste is fundamentally bifurcated. It provides robust, cradle-to-grave regulation for industrial e-waste but leaves a critical legislative vacuum for the enormous and growing stream of household-generated e-waste (Ilankoon, 2023). This "household hiatus" creates a cascade of negative consequences, including severe environmental degradation, significant public health risks, the loss of billions of ringgit in recoverable resources, and the proliferation of a dangerous informal recycling sector. This article argues that closing this regulatory loop through the enactment of a comprehensive, mandatory Extended Producer Responsibility (EPR) framework is not merely an environmental necessity. It is a strategic imperative for achieving the nation's ambitions for economic resilience, resource security and a sustainable circular economy, as articulated in national policies such as the

Twelfth Malaysia Plan and the Circular Economy Blueprint for Solid Waste.

2. Literature Review

To comprehend the legal challenge, one must first grasp the sheer scale of the e-waste problem in Malaysia. The available data, though sometimes varied across sources, consistently points to a massive and escalating issue.

E-Waste Generation Volumes

Estimates of annual e-waste generation in Malaysia highlight the magnitude of the flow. Multiple sources cite a figure of approximately 365,000 tonnes generated annually, a weight exceeding the iconic Petronas Twin Towers (Akhtar, 2024). The Global E-waste Monitor 2020 provided a similar figure, estimating that Malaysia generated 364 kilotons (kt) of e-waste in 2019, which translates to an average of 11.1 kg per capita. Historical data reveal a clear upward trend. Between 2005 and 2023, Malaysia produced a cumulative total of nearly 2.62 million metric tonnes of e-waste (Palansamy, 2025b). A significant spike occurred in 2020, with a record 904,008.90 metric tonnes generated, a surge largely attributed to increased purchases of electronic devices during the nationwide Movement Control Order (MCO). Projections indicate this growth will continue unabated, with forecasts predicting Malaysia will generate 24.5 million units of e-waste by 2025 (Akhtar, 2024).

The Management Gap: Collection and Recycling Rates

Despite the colossal volume of e-waste generated, formal collection and recycling systems capture only a small fraction. In 2023, Malaysia's national e-waste recovery rate stood at a modest 21.1%. Out of 65,280.14 metric tonnes officially collected, only 13,759.98 metric tonnes were recovered as products or raw materials (Palansamy, 2025b). While this figure is slightly above the 2020 global average of 17.4%, it lags considerably behind regional economic peers such as Singapore (59%), South Korea (49%), and Taiwan (60%) (Akhtar, 2024).

The management gap is most pronounced for household e-waste, where the recycling rate is estimated to not exceed 25%. Some reports suggest that as few as 5% of consumers dispose of their e-waste through proper channels, either by recycling it or returning it to the manufacturer (Palansamy, 2025a). This implies that hundreds of thousands of tonnes of e-waste from households are unaccounted for annually, likely ending up in municipal landfills, being hoarded in homes, or, most problematically, being diverted into the informal sector (Akhtar, 2024). This statistical chasm between generation and collection represents a "dark flow" of unmanaged waste, which is the primary source of environmental contamination and the lifeblood of the hazardous informal recycling economy. It is a direct measure of the current regulatory system's failure to capture and manage the bulk of the nation's e-waste.

Composition and Key Sources

The scope of e-waste officially targeted by the Department of Environment (DOE) for management is currently limited to six specific items: mobile phones, computers, televisions, air-conditioners, refrigerators, and washing machines. Mobile phones and personal computers are the most commonly discarded items. Data indicates a sharp increase in e-waste from specific categories over the last decade. For instance, e-waste from television sets, personal computers, and rechargeable batteries nearly doubled from 463,866 metric tonnes in 2011 to 832,692 metric tonnes in 2020. Similarly, waste from air-conditioners and washing machines rose from 172,281 metric tonnes in 2010 to 211,348 metric tonnes in 2020.

Table 1: Comparative E-Waste Statistics for Malaysia (Selected Years)

YEAR	TOTAL GENERATION (METRIC TONNES - DOE/LOCAL SOURCES)	TOTAL GENERATION (METRIC TONNES - GLOBAL MONITOR)	PER CAPITA GENERATION (KG)	TOTAL COLLECTED (METRIC TONNES)	FORMAL RECOVERY RATE (%)
2019	~365,000 (annual estimate)	364,000	11.1	N/A	N/A
2020	904,008.90	N/A	N/A	N/A	30.67 (overall recycling)
2021	N/A	N/A	N/A	2,459 (household	<25 (household

YEAR	TOTAL GENERATION (METRIC TONNES - DOE/LOCAL SOURCES)	TOTAL GENERATION (METRIC TONNES - GLOBAL MONITOR)	PER CAPITA GENERATION (KG)	TOTAL COLLECTED (METRIC TONNES)	FORMAL RECOVERY RATE (%)
				only)	estimate)
2023	65,280.14 (reported generation)	N/A	N/A	65,280.14	21.1
2025	24.5 million units (projection)	N/A	N/A	N/A	N/A

Note: Data discrepancies exist due to different methodologies (e.g., weight vs. units, industrial vs. household, reported vs. estimated generation). "N/A" indicates data not available in the reviewed sources for that specific metric and year.

3. Research Methodology

This article is prepared based on doctrinal study and analysis. Web resources, laws, and policies implemented by the Malaysian government are carefully analysed to serve as an input for future research to be conducted on e-waste management in Malaysia.

4. Results

Malaysia's legal approach to e-waste management is a tale of two systems. While industrial e-waste is governed by a strict and comprehensive regulatory regime, household e-waste exists in a legal grey area, creating a fundamental imbalance that undermines the nation's environmental and economic goals.

The Legal Foundation: Environmental Quality Act 1974 (EQA 1974)

The Environmental Quality Act 1974 (Act 127) serves as the foundational environmental law in Malaysia, providing the overarching legal authority for pollution control and waste management (Environmental Quality Act 1974). While not specific to e-waste, its broad provisions empower the Minister to regulate activities that could harm the environment. Key sections such as Section 24 (prohibiting soil pollution), Section 29 (prohibiting waste discharge into Malaysian waters), and particularly Section 34B (prohibiting the improper placement or deposit of scheduled wastes) establish the legal bedrock upon which more specific regulations are built.

The Industrial Mandate: Environmental Quality (Scheduled Wastes) Regulations 2005

The cornerstone of Malaysia's current e-waste control is the Environmental Quality (Scheduled Wastes) Regulations 2005, enacted under the EQA 1974 (Awang, 2010). These regulations are robust and prescriptive, establishing a cradle-to-grave management system for hazardous wastes generated by industries. E-waste is explicitly classified under this regime with the code SW110 (Ilankoon, 2023).

The definition of SW110 is comprehensive, covering "waste from electrical and electronic assemblies containing components such as accumulators, mercury-switches, glass from cathode-ray tubes... or contaminated with cadmium, mercury, lead, nickel, chromium, copper, lithium, silver, manganese or polychlorinated biphenyl".

The Regulations impose stringent obligations on industrial waste generators, including:

Proper Storage: Wastes must be stored in compatible, durable, and clearly labelled containers that are kept closed to prevent spillage. On-site storage is limited to a maximum of 180 days or a quantity not exceeding 20 metric tonnes.

Mandatory Tracking: All movements of scheduled waste must be documented and reported through the Electronic Scheduled Waste Information System (eSWIS), ensuring a clear chain of custody (Palansamy, 2025a).

Licensed Disposal: SW110 waste can only be transported by licensed contractors and delivered to DOE-licensed recovery facilities for treatment and disposal.

The Household Hiatus: A Critical Regulatory Void

The primary weakness of the Malaysian system lies in the fact that the stringent requirements of the 2005 Regulations are designed for industrial entities and are practically unenforceable on millions of individual

households (Ilankoon, 2023). This creates a critical regulatory void. While household e-waste technically falls under the SW110 definition, its management is left on a largely voluntary basis, relying on public awareness campaigns and drop-off initiatives (Palansamy, 2025a).

The consequences of this "household hiatus" are severe. With low public awareness and participation, vast quantities of household e-waste are improperly disposed of—either co-mingled with municipal solid waste destined for landfills or sold to informal collectors (Akhtar, 2024). This not only represents a failure of waste management but also creates the conditions for a hazardous shadow economy to thrive.

The De Facto Solution: Socio-Legal Impact of the Informal Sector

The regulatory gap for household e-waste has given rise to a large and active informal sector that has become the de facto collection system for a significant portion of the country's e-waste (Ilankoon, 2023).

Socio-Economic Role: This sector provides a source of livelihood for many individuals who operate as collectors, often using modified bicycles or small trucks to gather discarded electronics from homes and businesses. They are driven by a direct economic incentive, as households can often sell their old appliances for a small sum of cash.

Environmental and Health Catastrophe: The methods employed by this sector are primitive, unregulated, and extremely dangerous. To extract valuable materials like copper, gold, and silver, informal operators often resort to open burning of circuit boards and cables or using hazardous chemicals like acid for leaching (Ali & Talmizi, 2024). These practices release a cocktail of toxic substances—including lead, mercury, cadmium, dioxins, and furans—directly into the air, soil, and water systems. This poses severe and direct health risks, such as respiratory illnesses, neurological damage, and cancer, to the workers (who often lack any protective equipment) and the surrounding communities (Mawardi et al., 2025).

Legal Status: These operations are illegal, operating "under the noses of the authorities". This shadow economy is also frequently linked to the illegal importation of e-waste from developed countries, further exacerbating Malaysia's environmental burden.

The bifurcated legal framework creates a perverse economic incentive that actively undermines formal, safe recycling. The informal sector can afford to pay households for e-waste precisely because it externalizes all environmental, health, and safety costs onto the public. Formal, licensed recyclers, who must bear the high operational costs of complying with the 2005 Regulations (e.g., pollution control, worker safety, proper disposal of hazardous residues), cannot compete on price (Sofian Azizi et al., 2023). This price disparity creates a powerful economic current that pulls the vast majority of household e-waste away from the regulated system and into the most dangerous and polluting channels. The law, through its omission, has inadvertently nurtured the very problem it should be designed to solve.

Discussion

Existing Measures: Malaysia vs Advanced Jurisdictions

The challenge of e-waste management is not occurring in a policy vacuum. It is intrinsically linked to Malaysia's broader national ambitions to transition towards a green, resilient, and circular economy. A series of high-level government plans and roadmaps signal a clear political will to move beyond the traditional "take-make-dispose" linear model.

National Policy Framework

Several key national strategies underscore the government's commitment to circularity and sustainable waste management:

Twelfth Malaysia Plan (12MP) (2021-2025): This five-year development plan sets an ambitious target of achieving a 40% national recycling rate by 2025. Crucially, it explicitly prioritizes the adoption of the Extended Producer Responsibility (EPR) approach as a key policy tool to achieve this goal (Akhtar, 2024).

Circular Economy Blueprint for Solid Waste (2025-2035): Launched by the Ministry of Housing and Local Government, this blueprint provides a more detailed roadmap. Its strategic pillars include establishing EPR legislation, introducing zero-waste-to-landfill certification for manufacturers, developing integrated waste

management facilities like waste-eco parks, and using data systems to track the waste value chain.
Other Supporting Roadmaps: The principles of circularity and EPR are echoed in other strategic documents, including the New Industrial Master Plan 2030 (NIMP 2030), the Green Technology Master Plan, and the Malaysia Plastics Sustainability Roadmap (2021-2030), which also advocates for an EPR scheme.

This consistent, cross-ministerial consensus on the need for a circular economy and EPR demonstrates a high-level strategic direction. However, a significant "policy-implementation gap" exists. While these roadmaps articulate the "what" and "why," the specific, legally binding regulations required to operationalize these ambitions for household e-waste—the largest unmanaged stream—remain pending. The nation has a destination but lacks the legal vehicle to get there.

Economic Resilience through Urban Mining

A central pillar of the circular economy for e-waste is the concept of "urban mining"—the process of recovering valuable materials from discarded products (Espinoza et al., 2020). E-waste is not just waste; it is a rich, above-ground reservoir of resources. The total value of raw materials contained in global e-waste was estimated at a staggering $57 billion in 2019.

For Malaysia, this represents a significant and largely untapped economic opportunity. Recoverable materials from its e-waste stream include precious metals like gold, silver, and palladium, as well as base metals like copper and aluminium. Developing a robust urban mining industry would not only generate substantial revenue and create high-skilled jobs but also enhance national economic resilience by reducing dependency on volatile global supply chains for virgin raw materials (Mawardi et al., 2025).

Green Digital Technologies and the E-Waste Nexus

The transition to green technologies presents both a challenge and an opportunity. The rapid adoption of Electric Vehicles (EVs), for instance, is creating a new and complex e-waste stream in the form of end-of-life batteries. Malaysia has set an ambitious goal of having 1.5 million EVs on its roads by 2040. However, the country currently lacks the technical capacity for large-scale EV battery disposal and recycling. These batteries are rich in critical minerals like lithium, cobalt, and nickel, but are also highly hazardous if mismanaged.

A functioning circular economy for e-waste is therefore a prerequisite for the sustainable growth of green technologies. This requires leveraging Malaysia's strong E&E manufacturing base to pioneer and adopt advanced recycling technologies, such as AI-driven sorting systems and hydrometallurgical processes for battery material recovery, thereby transforming a future liability into a strategic asset.

Table 2: Key Malaysian Policies and Roadmaps Influencing E-Waste Management (2018-2035)

POLICY/ROADMAP TITLE	TIMEFRAME	KEY OBJECTIVES	SPECIFIC RELEVANCE TO E-WASTE/EPR	RESPONSIBLE MINISTRY/AGENCY
Twelfth Malaysia Plan (12MP)	2021-2025	Advance green growth, enhance sustainability, and achieve a 40% recycling rate.	Prioritises the adoption of the EPR approach to support the circular economy.	Ministry of Economy
Circular Economy Blueprint for Solid Waste	2025-2035	Transition to a circular economy for solid waste and reduce landfill dependency.	Explicitly includes establishing legislation for EPR and zero-waste-to-landfill certification.	Ministry of Housing and Local Government (KPKT)
New Industrial Master Plan 2030 (NIMP 2030)	2023-2030	Drive industrial development, focusing on high-tech and sustainable sectors.	Promotes circular economy principles to enhance sustainability and resource efficiency in manufacturing.	Ministry of Investment, Trade and Industry (MITI)

POLICY/ROADMAP TITLE	TIMEFRAME	KEY OBJECTIVES	SPECIFIC RELEVANCE TO E-WASTE/EPR	RESPONSIBLE MINISTRY/AGENCY
Malaysia Plastics Sustainability Roadmap	2021-2030	Achieve plastic circularity, reduce plastic pollution.	Outlines a framework for an EPR scheme for packaging, including the establishment of a Producer Responsibility Organisation (PRO).	Ministry of Natural Resources and Environmental Sustainability (NRES)
Green Technology Master Plan	2017-2030	Mainstream green technology into national development.	Proposes the development of EPR policies to facilitate growth in resource recovery.	Ministry of Natural Resources and Environmental Sustainability (NRES)

Extended Producer Responsibility (EPR): The Linchpin for a Coherent System

To bridge the gap between national ambition and on-the-ground reality, a single policy instrument stands out as the linchpin: Extended Producer Responsibility (EPR). This approach is consistently identified in Malaysia's own strategic documents as the key to unlocking a circular economy for waste.

Core Principles of EPR

EPR is an environmental policy approach that extends a producer's responsibility—whether financial, physical, or both—to the post-consumer stage of a product's life cycle. It is founded on the "polluter pays" principle, shifting the economic burden of waste management from municipalities (and by extension, taxpayers) to the producers and consumers of the products that become waste. This creates a powerful incentive for producers to design products that are more durable, easier to repair, and less hazardous, as these design choices directly impact their end-of-life management costs (Directive 2012/19/EU, 2012).

Malaysia's EPR Journey

Malaysia is not starting from scratch. The legal foundation for EPR already exists in principle within national legislation. Section 102 of the Solid Waste and Public Cleansing Management Act 2007 (Act 672) grants the Minister the authority to introduce take-back and deposit-refund systems, while the broad powers under the EQA 1974 also provide a basis for such schemes.

To date, however, the application of EPR in Malaysia has been limited to voluntary, industry-led initiatives, such as the Malaysian Recycling Alliance (MAREA), which is primarily focused on post-consumer packaging waste. The government has clearly signalled its intent to move beyond this. The national policy trajectory indicates a planned transition from the current voluntary phase (2023-2025) to a mandatory EPR scheme beginning in 2026, with packaging and electronics identified as the priority sectors.

Key Components and Challenges of a Malaysian EPR System

Implementing a successful mandatory EPR system for e-waste will require several critical components:

Producer Responsibility Organisation (PRO): An independent, non-profit, industry-funded PRO will be essential to manage the system. Its roles would include collecting fees from producers, coordinating nationwide collection and recycling logistics, managing data, and ensuring compliance on behalf of its members.

Financing Model: The system would be financed through an eco-modulated fee paid by producers for each EEE unit placed on the market. This fee would vary based on the product's recyclability and hazardous content, incentivizing better design. This central fund would then be used to pay for the entire chain of collection, transport, and environmentally sound recycling.

Collection Infrastructure: The EPR fund would finance the establishment of a convenient and comprehensive collection network. This would formalize and expand existing channels, such as retailer take-back schemes, and support new ones, like door-to-door collection services, to effectively divert e-waste from landfills and the informal sector (Mat Sari, 2021).

Transparency and Data Management: A robust, transparent reporting system is non-negotiable. It must track material flows from the point of sale to final recycling, verify collection and recycling rates, and prevent fraud. This would likely involve a significant upgrade and integration of existing platforms like eSWIS and the MyEwaste app (Palansamy, 2025a).

A crucial function of this system is solving the "negative value" problem. Certain e-waste items, like old refrigerators containing ozone-depleting CFCs or CRT televisions with leaded glass, cost more to treat safely than the value of the materials recovered (Yusof, 2025). The informal sector simply cherry-picks valuable parts and illegally dumps these hazardous, costly-to-treat components (Masrom, 2019). A properly designed EPR financing mechanism addresses this by using the fees collected from all products, including high-volume and profitable items like smartphones, to create a central fund. This fund then cross-subsidizes the collection and proper treatment of "negative value" items, making it economically viable for formal recyclers to handle them. This mechanism is the only way to ensure all e-waste is managed responsibly, not just the profitable parts.

International Benchmarking: Lessons from European and Japanese Legal Models

As Malaysia charts its course, it can draw valuable lessons from established e-waste management frameworks in other jurisdictions. The European Union and Japan, in particular, offer two distinct yet successful models for comparison.

The European Union Model: Comprehensive and Prescriptive

The EU's approach is characterized by a comprehensive, legally binding framework that addresses the e-waste problem from both upstream and downstream.

Waste Electrical and Electronic Equipment (WEEE) Directive (2012/19/EU): This directive forms the cornerstone of downstream management. Its key features include legally binding, ambitious collection targets (e.g., a rate of 65% of the average weight of EEE placed on the market), a broad "open scope" that covers virtually all EEE, mandatory producer registration in each member state, and the establishment of producer-financed take-back systems. This ensures producers are directly responsible for funding the collection and recycling of their products at end-of-life.

Restriction of Hazardous Substances (RoHS) Directive (2011/65/EU): This directive provides the upstream control. It restricts the use of specific hazardous substances (such as lead, mercury, cadmium, and certain flame retardants) in the manufacturing of new EEE. By designing hazards out of the product from the beginning, the RoHS Directive simplifies and reduces the cost and environmental risk of end-of-life treatment.

The primary lesson from the EU model is the effectiveness of a holistic, top-down legal architecture that combines stringent downstream collection and financing obligations with proactive upstream substance restrictions.

The Japanese Model: Shared Responsibility and Specificity

Japan's model is notable for its clear allocation of roles and its targeted, product-specific approach.

Law for the Recycling of Specified Kinds of Home Appliances (HARL): This law establishes a unique "shared responsibility" model for four major appliance categories: televisions, refrigerators, washing machines, and air conditioners. The roles are explicitly defined:

- Consumers pay a collection and recycling fee at the time of disposal;
- retailers are obligated to collect the old appliance when selling a new one; and
- Manufacturers are obligated to accept and recycle the collected units to meet high, legally mandated recycling rates.

A physical manifest (coupon) system ensures traceability from consumer to recycler.

Law for the Promotion of Effective Utilization of Resources (LPUR): This is a broader law that promotes the 3Rs (Reduce, Reuse, Recycle) across many industries. For e-waste, it encourages voluntary, manufacturer-led collection and recycling schemes for products not covered by HARL, most notably personal computers.

The Japanese model offers Malaysia lessons in the power of simplicity and clearly defined roles. Its consumer-pays-at-disposal financing model presents a viable alternative to the producer-pays-at-production model common in the EU, while its focus on specific, high-volume products demonstrates the potential of a targeted approach.

Table 3: Comparative Analysis of E-Waste Management Frameworks: Malaysia, EU, and Japan

FEATURE	MALAYSIA (CURRENT/PROPOSED)	EUROPEAN UNION (WEEE/ROHS)	JAPAN (HARL/LPUR)
Legal Basis	EQA 1974; Scheduled Wastes Regs 2005; Proposed household regulations.	Legally binding Directives (WEEE & RoHS) transposed into national law.	Legally binding Acts (HARL, LPUR).
Scope	Strict for industrial (SW110); Voluntary/limited for 6 household items.	"Open scope" covering all EEE categories.	Specific (HARL for 4 appliances); Broader encouragement (LPUR for PCs, etc.).
Financing Model	Industry-funded (industrial); Voluntary/none (household); Proposed producer-funded EPR.	Producer-funded (fees paid when placing product on market).	Consumer-funded (fees paid at time of disposal).
Producer Obligations	Strict for industrial generators; Voluntary for household products; Mandatory EPR proposed.	Finance collection/recycling; Meet targets; Register in each country.	Recycle collected units to meet legal rates (HARL); Voluntary collection (LPUR).
Retailer Obligations	Voluntary take-back by some.	Must take back WEEE on a 1:1 basis, and 0:1 for very small WEEE.	Must collect old appliances on a 1:1 basis and transfer to the manufacturer (HARL).
Consumer Obligations	Dispose of e-waste at designated points (voluntary).	Segregate e-waste from municipal waste.	Pay collection and recycling fee at disposal (HARL).
Collection Targets	None for household e-waste; 40% overall recycling goal (12MP).	Mandatory, high-level targets (e.g., 65% of EEE placed on market).	No specific collection target, but high recycling rate mandates imply high collection.
Upstream Controls	None.	Mandatory substance restrictions (RoHS Directive).	Encouraged via LPUR (design for the environment).

5. Managerial Implications and Recommendations

Synthesizing the analysis of Malaysia's domestic challenges, national ambitions, and international best practices, a clear path forward emerges. The following integrated legal and policy recommendations are proposed to close the regulatory loop, formalize e-waste management, and align Malaysia with its circular economy goals.

Legislative Reform: Creating a Unified Framework

The current bifurcation of the legal framework is the root cause of systemic failure. Relying on the 2005 Regulations for households is untenable, and the voluntary system has proven ineffective, as evidenced by chronically low collection rates and the limited public uptake of initiatives like the MyEwaste app (Akhtar, 2024).

Recommendation: Enact new, specific legislation to govern household e-waste. This could take the form of a standalone "Waste Electrical and Electronic Equipment Management Act" or, more pragmatically, a new set of comprehensive regulations under the EQA 1974, titled "Environmental Quality (Waste Electrical and Electronic Equipment) Regulations." This new instrument must be mandatory and should be designed to supersede the voluntary approach for household e-waste, while leaving the effective industrial framework under the 2005 Regulations in place for B2B waste streams.

EPR Implementation Roadmap: A Practical Pathway

A mandatory EPR scheme is the necessary operational engine for the new legal framework. A phased approach will allow industry, government, and consumers to adapt.

Recommendation: Legislate a mandatory, phased-in EPR scheme.

Phase 1 (Years 1-2): The initial phase should focus on the six e-waste categories currently defined by the DOE. The legal mandate for a single, non-profit Producer Responsibility Organisation (PRO) should be established. All producers and importers of these six product types must register with the PRO and begin paying eco-modulated fees into a central, ring-fenced fund.

Phase 2 (Years 3-5): The scope of the EPR scheme should be progressively expanded to align more closely with the EU's comprehensive "open scope" model. This would gradually bring other categories of small appliances, IT equipment, toys, and tools into the system. This phase should also explicitly incorporate challenging future waste streams, most notably EV batteries, ensuring a proactive rather than reactive approach.

Formalising the Informal: From Threat to Asset

The informal sector's extensive collection network is a valuable, albeit currently hazardous, asset. Eradication is impractical; integration is strategic.

Recommendation: Develop a national program to register, train, and license informal collectors, formally integrating them as the crucial "first mile" of the EPR collection system. This program should provide training on the safe handling of e-waste, provision of basic Personal Protective Equipment (PPE), and access to designated aggregation points. The EPR fund could then provide a stable, per-kilogram payment to these licensed collectors for all e-waste delivered to authorized recyclers. This formalizes their role, provides a safer and more stable livelihood, and decisively cuts off the supply of materials to illegal, polluting backyard operations (Ilankoon, 2023).

Strengthening Enforcement and Upstream Controls

A successful EPR system depends on robust enforcement and a long-term vision that extends to product design.

Recommendation 1 (Enforcement): Enhance digital tracking and transparency. The new regulations should mandate the use of a unified digital platform—an evolution of eSWIS and MyEwaste—for all stakeholders. Producers would report sales data, retailers would report take-backs, licensed collectors would log collections, and recyclers would report processing outputs. To ensure integrity and prevent fraud, the use of technologies like blockchain should be explored to create an immutable ledger tracking e-waste from cradle to grave (Xavier et al., 2021).

Recommendation 2 (Upstream Controls): Introduce a "RoHS-Lite" regulation. While a full ban on substances may be complex to implement initially, Malaysia should enact regulations that mandate design for recyclability. This would require producers to meet certain standards for ease of disassembly and material separation. Furthermore, producers should be required to declare the hazardous substance content of their products, a principle borrowed from Japan's LPUR. This information is critical for recyclers to manage materials safely and efficiently, reducing costs and environmental risks downstream. It is far more effective to design out a hazard than to manage it as toxic waste decades later.

By adopting these integrated recommendations, Malaysia can move beyond its current fragmented approach. It can forge a coherent legal and operational framework that not only mitigates the environmental and health risks of e-waste but also unlocks its economic potential, firmly placing the nation on a path towards a resilient and sustainable circular economy.

Conclusion

Malaysia stands at a critical juncture in managing its electronic waste. The current legal framework, while providing a foundation through scheduled waste regulations, is insufficient to address the scale and complexity of the e-waste challenge posed by rapid digitalization, particularly concerning household e-waste. Relying on fragmented regulations and voluntary initiatives hinders the transition towards a circular economy, leading to environmental pollution, health risks, and the loss of valuable secondary resources.

Learning from the comprehensive, EPR-based systems implemented in the EU and Japan, and Malaysia has a clear pathway forward. Enacting dedicated e-waste legislation that mandates EPR, sets clear collection and recycling targets, integrates the informal sector safely, and promotes green design is essential. Such reforms

are not merely an environmental necessity but a strategic imperative for fostering innovation in green digital technologies, creating economic opportunities through urban mining and recycling industries, and ultimately building a more resilient and sustainable national economy. Closing the loop on e-waste is fundamental to ensuring that Malaysia's digital future is both prosperous and environmentally sound. Further research should focus on the socio-economic impacts of formalizing the informal sector and the specific design of an optimal EPR financing mechanism for the Malaysian context.

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Balancing Job Demands and Resources: Enhancing Resilience in the Accounting and Auditing Profession

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Abstract: This conceptual paper examines the growing prevalence of resilience among accountants and auditors through the perspective of the Job Demands–Resources model. These professions are often linked with heavy workloads, long hours, role ambiguity and limited social support, which can increase psychological stress and lead to serious mental health issues. These factors affect not only individual well-being and job satisfaction but can also undermine the organisation's performance and damage its reputation. Based on existing literature, this paper develops a framework that charts the relationship between excessive job demands and negative impact at individual and organisational levels, with burnout and mental health strain as the primary determinants of harm. Ultimately, it emphasises the organization's role in implementing flexible work arrangements, providing training and role clarity, establishing effective reward and recognition systems, and fostering supportive leadership to mitigate the risk. Institutions also have a role in addressing the issue through their regulatory guidelines, corporate culture reform and curriculum reform. This framework highlights the important role of both institutional and organisational responses in enhancing professional resilience, improving audit quality, and safeguarding the sustainability of the profession. This paper also discusses the practical implications and future research suggestions, focusing on embedding mental health awareness into accounting education and professional standards.

Keywords: *Job Demands–Resources Model, Stress, Burnout, Mental Health, Accounting Profession, Auditing Profession*

1. Introduction

It is not unusual for accountants and auditors to raise concerns about the tight deadlines and strict monitoring in the workplace. Regardless, they continuously uphold the integrity to ensure the works are delivered as per the expected standard. The working environment often leads auditors and accountants to experience long working hours, high stress, and burnout. The challenges come in various aspects, including demanding clients, competitive work cultures, and strict regulatory scrutiny. About one in every eight people, which is approximately 970 million people worldwide, has a mental disorder, according to the Institute for Health Metrics and Evaluation (World Health Organization, 2022). This number not only affects the accounting and auditing profession but also expands to individuals across all areas, professions, and socioeconomic levels. Therefore, it is essential to address and understand how this concern affects individuals at both the national and global levels.

The National Health and Morbidity Survey (NHMS) 2023 has reported an increase in the number of depression cases, with one million people aged 16 and older being affected by these mental conditions. This number has doubled since 2019 cases (Institute for Public Health, 2024). These trends can be observed in the daily lives of professionals, whom they personally experience firsthand, as the data indicates. This is especially for professionals in their late 20s who work in urban areas, such as Kuala Lumpur, who face high expectations for job performance, excessively long working hours, and limited time for their personal lives. Not only that, many of them have to take extra online jobs due to the high cost of living, which can add more stress in life and cause more harm to their mental health (Abu Hassan & Abeyasinghe, 2024). The study by Pega et al. (2021)found that long working hours are significantly related to the increased risk of coronary heart disease and stroke. This study encompasses data from 194 countries spanning the period from 2000 to 2016. This finding proves that excessive job demand not only harms the mental condition of individuals but also affects their overall health, mentally and physically. Therefore, urgent action is needed to address work-related stress in today's professional environments. Even though mental health problems do exist in various professions, it is consistently known that auditors and accountants are very demanding and high-pressure professions, which

always expose them to high mental and emotional risk.

The Malaysian government has taken several steps to address this concern by enacting policies, such as the Mental Health Act 2001, and introducing institutional responses through agencies like the Malaysian Mental Health Association (MMHA). MMHA has promoted Mental Health First Aid (MHFA) programs, under the Societies Act 1966, to identify and respond accordingly to any early signs of stress, anxiety, and depression. A study shows that most mental illnesses can become worse if one has been exposed to stress for a long time (Arnsten, 2009). Hence, these initiatives may support the efforts that the companies have already been making at the workplace level. This issue should not be handled by an individual but requires full attention from both employees and the professional community as a whole.

Concern over workplace well-being, particularly in the accounting and auditing fields, has increased, drawing attention to the need to investigate the causes, effects, and potential solutions to this issue. It is particularly crucial in Malaysia, where there has been a significant rise in the number of residents suffering from depression. Given the common long hours, heavy regulatory demands, and competitive culture in the accounting and auditing industry, it is essential to know how to balance job demand with available resources. The findings from this study can help local firms, regulators, and universities implement early interventions to mitigate the issue.

This concept paper utilises the Job Demands–Resources (JD-R) model to further explain the sources of stress faced by accountants and auditors. The focus is on how high job demands can affect employees' overall well-being and their performance at the workplace. Heavy workload, role uncertainty and low social support can impact accountants' and auditors' ability to remain resilient in the industry. According to Demerouti et al. (2001)Job demands such as long working hours, unclear job responsibilities, demanding clients, and a lack of social support can decrease employees' energy and increase the risk of burnout. Meanwhile, institutional and organisational resources needed to be utilised effectively to achieve the greatest benefit. In these professions, there is always an imbalance between high demands and limited resources, which often leads to mental health problems, burnout, stress, and high turnover. Thus, properly strategizing the available resources may be a mechanism that enables the organisation to safeguard audit quality and public trust in Malaysia's financial systems.

This paper also discusses how resilience plays a key role in helping accountants and auditors manage stress and prevent burnout by enabling them to adapt to challenges, maintain emotional stability, and recover quickly from work-related pressures. When job demands are high, employees experience psychological and professional strain, which often leads to burnout, subpar audit work, and increased turnover. However, having job resources such as supportive leadership, clear roles, effective teamwork, and mental health-friendly policies can help protect employees from mental health challenges and build their resilience. By having resilience at both the individual and organisational levels, it can keep employees healthy and motivated, protect audit quality, and ensure the company stays strong and successful in the long run.

This paper is organised into several sections. The second section presents relevant literature reviews that draw on the JD-R model as the theoretical foundation. Section Three outlines the methodology underpinning this conceptual study. Section Four presents a schematic overview, while Section Five provides a detailed explanation of the key factors influencing high job demands and their impact on individual well-being and company performance. It also discusses how both organisational and institutional support can help to reduce these negative effects. Finally, this study concludes with key insights, theoretical and practical implications, and recommendations for future research.

2. Literature Review

Job demands such as extended working hours, client complexity, regulatory scrutiny, and role ambiguity consume employees' mental and physical energy, leaving them vulnerable to exhaustion. Understanding these issues from the JD-R perspective is valuable because it helps explain how job demands and available resources affect employees' stress levels, motivation, and performance. Job resources, such as supervisor support, collegial teamwork, organisational recognition, and work–life balance initiatives, serve as protective factors

that mitigate stress, foster resilience, and sustain employee engagement (Bakker & Demerouti, 2017). When demands outweigh resources, the imbalance drives burnout and deteriorating mental health. The interrelation of these elements has a negative impact, as highlighted, illustrating why stress is so pervasive in the accounting profession and emphasising the critical importance of organisational interventions to restore balance.

Stress and Burnout in High-Demand Professions

Stress refers to the mental and physical reactions that arise in response to workplace demands that exceed an employee's coping ability. Burnout, a prolonged state of emotional exhaustion, depersonalization, and reduced professional efficacy, often arises from chronic stress (Maslach & Leiter, 2016). Research has consistently shown that accounting and auditing professionals are highly vulnerable to these outcomes due to workload intensity, role ambiguity, and organisational pressures (Almer & Kaplan, 2002; Herda & Lavelle, 2012). Accountants and auditors often deal with a huge amount of work that further requires them to work extended hours under tight deadlines. Mental health is rarely openly discussed within the profession, and stigma often prevents individuals from seeking help. Professionals often feel unable to discuss mental health because of anxiety about being judged as incapable or lacking strength. This internalised stigma creates a barrier to seeking help or disclosing struggles. Many professionals worry that disclosing mental health concerns may harm their career, risking exclusion, judgment, or negative evaluations. This concern is especially prominent during performance assessments, where revealing a history of mental health issues could result in bias or disadvantage. Studies have consistently linked such perception to burnout, emotional exhaustion, and mental health deterioration.

Corporate Culture and Mental Health

Corporate culture, defined as the shared values, beliefs, and practices within an organisation, plays a crucial role in shaping employee behaviour and well-being (Dóra et al., 2019). A supportive organisational culture cultivates motivation, collaboration, and resilience, whereas toxic cultures, characterised by excessive overtime and a lack of recognition, exacerbate stress. Reports from former Big Four employees reveal the consequences of toxic organisational cultures where excessive work hours and presenteeism are normalised, resulting in burnout and, in tragic cases, death (Mahanta, 2024). A survey conducted by The Association of Chartered Certified Accountants (ACCA) further shows that 71% of auditors in Big Four firms reported mental health suffering due to workplace pressures (McCann, 2024). Work environments that foster stress, conflict, and toxic behaviours can significantly harm employees' mental health and overall well-being (Monteiro & Joseph, 2023).

Since accountants and auditors work within organisations, their well-being is deeply influenced by corporate culture. Organisational culture can be understood as a collective system of beliefs and thought patterns established by leaders and founders, which are subsequently embraced by all employees in the organisation. The prevailing system of culture within an organisation governs employees' work approaches, patterns of communication, and openness (Dóra et al., 2019). It functions as the "personality" of a company, providing the employees direction in achieving the organisational objectives. A positive corporate culture fosters a healthy working environment that prioritizes employee well-being, potentially leading to an increased happiness index.

Leaders who provide vision, encourage collaboration, and inspire team members help create a psychologically safe and motivating work environment (Corrigan et al., 2003). A review of the literature on workplace culture and employee mental health demonstrates that negative organisational cultures, characterised by unsupportive leadership, excessive job demands, and a lack of work-life balance, can significantly harm employees' mental well-being (Monteiro & Joseph, 2023). Conversely, supportive workplaces offer protective factors like social support, fair job expectations, and effective policies, which enhance mental health outcomes (Monteiro & Joseph, 2023). Unfortunately, many accounting and audit firms perpetuate unhealthy behaviors, such as praising long hours and discouraging rest, under the guise of loyalty and success. For example, media coverage has drawn attention to the dangers of toxic workplace culture, as highlighted by the sudden death of Anna Sebastian Perayil, a 26-year-old EY accountant in India, which her family attributed to relentless overwork and which sparked widespread criticism of high-pressure environments in global audit firms (Patel, 2024).

3. Methodology

Data Sources and Analytical Approach

This study employs a conceptual approach to investigate the factors that influence the professional resilience of accountants and auditors. According to Meredith (1993)Conceptual research is useful for bringing variations of findings into a logical framework and for promoting theoretical advancement in areas related to professional well-being. JD-R offered a methodical framework for understanding how high job demands can cause stress and ultimately lead to burnout when they are not balanced by sufficient resources (Demerouti et al., 2001). The JD–R Model is useful in providing viewpoints on the possible responses that can be made by the institutional and organisational levels to overcome the issues. When combined, these viewpoints enable a comprehensive analysis that connects the impact of personal experiences to job demand and organisational and institutional practices.

This study also draws on the existing body of literature on occupational stress, burnout, and well-being in professional service firms. Industry surveys and reports from accounting associations, audit oversight bodies, and mental health organisations were also being analysed and included in this study. The case-based narratives and media reports, particularly those that shed light on workplace cultures within accounting and audit firms, are also included in this study to strengthen the conceptual findings. Together, these diverse materials enable the study to synthesise scholarly insights with practical realities, providing both theoretical grounding and applied relevance. This multi-source approach facilitates triangulation by combining academic, regulatory, and practitioner perspectives. (Bowen, 2009), thereby enriching the conceptual analysis and ensuring relevance to both theory and practice.

The analysis focused on the mechanism by which recurring patterns and conceptual linkages are identified, organised, and interpreted. The analysis is structured around two key themes derived from the conceptual framework:
Job Demands: High workloads, long hours, client complexity, and regulatory scrutiny. These demands can deplete mental and physical resources, leading to negative outcomes such as burnout, reduced job satisfaction, and impaired audit quality, affecting both individual well-being and organisational performance.
Job Resources: Coping mechanisms, organisational support, resilience strategies, and institutional responses that help buffer against the negative impacts of demands.

By integrating these themes, the methodology provides both descriptive insights into the lived realities of accounting and auditing professionals and interpretive analysis that connects workplace experiences to broader theoretical constructs. The approach thus advances understanding of how stress and burnout emerge, persist, and can be addressed within the accounting and auditing profession.

Methodological Justification

Adopting a conceptual analysis is particularly suitable for exploring job demands from a psychological perspective within the accounting and auditing profession for several reasons. First, the phenomenon is multidimensional and under-researched in this specific professional context. While stress and burnout have been studied extensively in healthcare, education, and general organisational psychology, their intersection with accounting and auditing remains comparatively underexplored. Using a conceptual approach facilitates the consolidation of scattered findings into a coherent structure that integrates job demands and the impact of the job resources in response to the issues.

Second, given the sensitivity and stigma surrounding mental health in professional service firms, empirical data, particularly from practising accountants and auditors, may be difficult to obtain openly and reliably. By relying on secondary sources such as scholarly research, institutional surveys, and practitioner accounts, this study overcomes barriers to disclosure while still capturing a rich understanding of the phenomenon.

Third, conceptual research facilitates theory building and refinement. (Meredith, 1993). In this case, the JD–R model was used to explain the research issues faced by the accountants and auditors. The integration of the model in this conceptual paper contributes to theoretical development by contextualising established models within the distinctive realities of the accounting and auditing profession.

Finally, this approach enables practical relevance. By drawing on multiple secondary sources, including regulatory guidelines and reports from professional bodies, the analysis connects academic insights with real-world practices and policy debates. This makes the study not only theoretically rigorous but also directly applicable for firms, regulators, and professional associations seeking to address systemic challenges in workplace well-being.

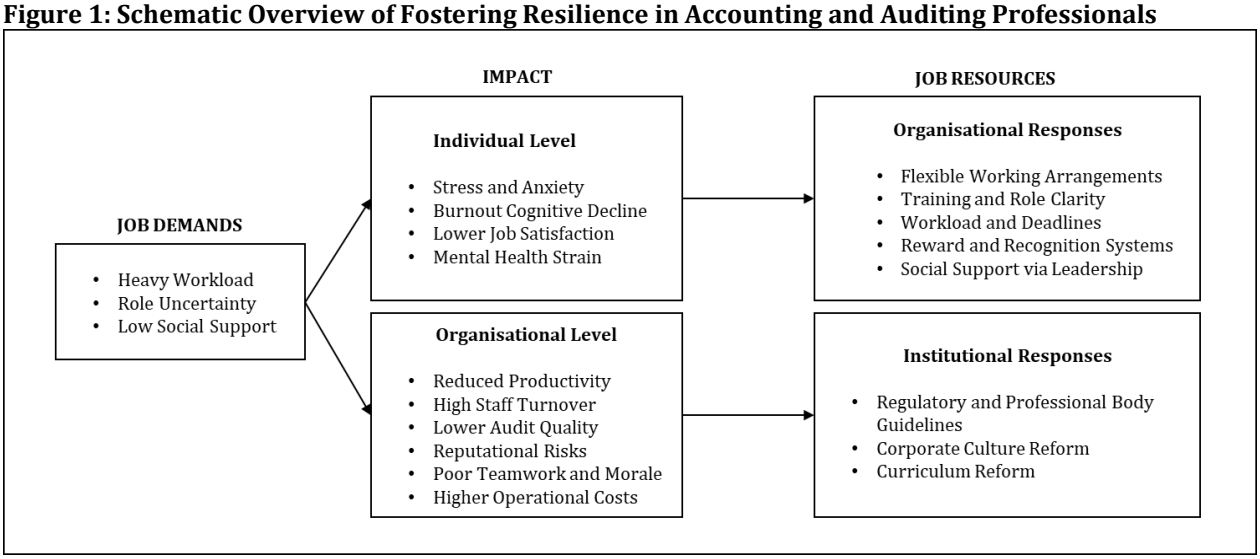
In summary, the conceptual methodology employed is well-suited to generating integrative insights that bridge theory and practice, highlight critical gaps, and lay the groundwork for future empirical investigations.

Schematic Overview

The schematic overview (Figure 1) synthesises the JD–R model in the context of the accounting and auditing profession. It illustrates how job demands (heavy workload, role uncertainty, and low social support) may have a negative impact if no measures are taken to address the issue. To overcome these, the resources available need to be utilised effectively. Resources play a dual role: they buffer the negative impact of high job demands and simultaneously enhance engagement and motivation. (Bakker & Demerouti, 2017). Resources like peer support and supervisory guidance, for example, are crucial in determining job satisfaction and lowering burnout in the accounting and auditing fields. (Charoensukmongkol et al., 2016). It has been demonstrated that these supports, in particular, increase coping skills, reduce the likelihood of burnout, and strengthen resilience. (Schaufeli, 2017).

The elements of work that demand consistent effort and energy are known as job demands. These consist of a high workload, unclear roles, and a lack of social support. While a certain amount of pressure can spur performance, long-term or severe demands deplete workers' mental and physical reserves. This imbalance frequently results in tension, discontent, burnout, and ultimately mental health strain over time. In addition to lowering organisational productivity, the imbalance may raise operating expenses. On the other side, job resources are what enable workers to better handle these demands. These tools improve resilience, engagement, and motivation in addition to mitigating the harmful consequences of stress. Therefore, finding a balance between the demand for jobs and the available resources is crucial. Organisations that have enough resources foster a more positive work environment where people can handle stress, stay healthy, and produce better work.

Figure 1: Schematic Overview of Fostering Resilience in Accounting and Auditing Professionals



4. Understanding the Balance: Demands, Impacts, and Resources

Job Demands in the Accounting and Auditing Profession

Heavy Workload

Professionals in this sector often face demanding deadlines, lengthy hours, and stressful reporting seasons. These elements contribute to burnout, decrease recuperation time, and may cause burnout. (Hameli et al., 2024). One of the most commonly mentioned stressors in the accounting and auditing industry is a demanding workload. Consistently working 55 or more hours a week is linked to a 17% increased risk of heart disease and a 35% increased risk of stroke, according to the World Health Organisation (Johnson & Jasarevic, 2021). These findings are based on two systematic reviews and meta-analyses, synthesising data from over 2,300 surveys conducted across 154 countries between 1970 and 2018, encompassing more than 1.6 million participants. Additionally, during the busy season, workload pressures arise from the strain of limited audit resources, combined with the requirement to complete audits within a tight timeframe (Winoto & Harindahyani, 2021). Prolonged exposure to excessive workloads leads to emotional exhaustion, reduced concentration, and high turnover intention (Park et al., 2021). Over time, workload stress undermines audit quality, as fatigued professionals may overlook errors or take shortcuts. Workloads should be structured to challenge employees appropriately, avoid excessive demands, ensure a comfortable work environment, require task completion as necessary, and align with their skill sets (Herawati et al., 2023).

Within the JD–R model, heavy workload is one of the primary causes that requires sustained determination, often exceeding employees' available time and energy. When workloads are consistently excessive, they deplete emotional and physical resources, leading to strain, fatigue, and ultimately burnout. The JD–R framework also emphasises that without sufficient job resources, such as autonomy, task delegation, and adequate staffing, employees are unable to balance these demands, thereby exacerbating the risk of emotional exhaustion.

Role Uncertainty

In the accounting and auditing fields, professionals frequently interact with various stakeholders. Variations in job expectations can lead to confusion. Such role confusion can increase stress and impact the decisions made by professionals. Employees may feel pressured by mixed expectations from stakeholders. Accordingly, role uncertainty weakens the ability to make effective decisions and triggers anxiety (Hegazy et al., 2023). This may lead to difficulties in coordinating the workload amongst the accountants and auditors. When audit teams are poorly coordinated, communication gaps may exist, resulting in unequal workload distribution (Annelin & Svanström, 2022). Prior studies, such as Hegazy et al. (2023) Found that role uncertainty may contribute negatively to burnout, absenteeism, job dissatisfaction, and higher turnover.

Within the JD–R model, role uncertainty is a stressor that consumes employees' cognitive and emotional resources. When people are uncertain about their roles, reporting lines, or performance expectations, they often spend more time and energy trying to figure things out, rather than focusing on meaningful and productive work. These could lead to emotional exhaustion and disengagement, ultimately causing unfavourable effects or challenges in sustaining resilience at work.

Low Social Support

Job demands refer to the challenges and workload employees face, thus increasing the need to engage coping strategies and relief mechanisms to manage them (Winoto & Harindahyani, 2021). Social support may include emotional encouragement, practical assistance, and guidance from colleagues, supervisors, and family (Drageset, 2021). In high-pressure professions, given the harmful effects of burnout on employee satisfaction, organisations should ensure that workers receive adequate support from both coworkers and supervisors to help prevent burnout (Charoensukmongkol et al., 2016). Social support may come from various sources beyond the workplace, but support from coworkers and supervisors is considered the most impactful (Love et al., 2007). Lack of support not only weakens resilience but also amplifies the spread of stress across teams.

In high-pressure environments, the absence of supervisor or peer support tends to intensify stress and accelerate burnout, whereas supportive environments characterised by open communication, recognition, and

collegiality can significantly foster resilience and well-being (Herawati et al., 2023). However, support from leaders through mentoring and from peers through teamwork can act as a buffer, helping to replenish psychological energy and strengthen employees' ability to cope.

Impacts of Job Demands on Individual and Organisational Well-being

Individual-Level Effects

Stress can be described as emotional exhaustion, anxiety, depression, and a decline in motivation. As such, the stress could result in cognitive impairments such as poor decision-making and a lack of concentration (Hegazy et al., 2023). For auditors, excessive stress can heighten the risk of mistakes and oversights, which in turn directly compromise audit quality and erode client trust. Job stress in the accounting and auditing profession often manifests as burnout, typically defined by emotional exhaustion that can lead to a reduction in personal accomplishment (Maslach & Leiter, 2016). These symptoms have been consistently linked to reduced well-being and job performance in professional service settings (Demerouti et al., 2001; Fogarty et al., 2000).

Stress can disrupt the cognitive abilities that auditors and accountants depend on for sound professional judgment. Neuroscience research indicates that acute stress rapidly impairs prefrontal cortex functions, including working memory, attention control, and flexible thinking (Arnsten, 2009). Chronic stress can alter brain structures in ways that impair executive functioning and self-regulation (Liston et al., 2009). In real-world work settings, this translates into slower information processing, diminished focus, increased errors, and a limited attention span. The negative impact could lead to poorer decision-making and a higher tendency to engage in reduced audit-quality practices, including premature sign-offs and cursory testing (Fogarty et al., 2000; Sweeney & Pierce, 2004).

In addition, workplace stress often leads professionals to experience lower levels of job satisfaction. These contribute to negative affective outcomes such as depression, sleep disturbance, and somatic complaints (Ganster & Rosen, 2013). These symptoms further reduce motivation and engagement, perpetuating a cycle of diminished performance. In the accounting field, prior studies have shown that burnout mediates the relationship between role stressors such as heavy workloads and role ambiguity, and negative outcomes, including job dissatisfaction, absenteeism, and turnover intention (Fogarty et al., 2000; Herbohn, 2004).

Excessive job demands such as heavy workloads, role uncertainty, and limited social support need to be addressed. If these issues are not addressed, employees may become overwhelmed, experience higher stress levels, and face mental health challenges. Over time, these problems can also reappear and affect the organisation as a whole.

Organisational-Level Effects

At the organisational level, wide-ranging implications may emerge, such as lower productivity and high staff turnover. Chronic stress and burnout among accountants and auditors contribute to decreased productivity, low morale, and increased turnover intentions (Fogarty et al., 2000; Hameli et al., 2024). Workloads during peak seasons may have a direct impact on public accountants' job burnout, a type of dysfunctional stress (Sweeney & Summers, 2002), which may affect the high attrition rate, particularly costly for accounting and audit firms, as well as the workflow continuity and knowledge transfer. Burnout reduces motivation and engagement, causing talented professionals to disengage or exit the profession altogether (Ganster & Rosen, 2013).

Stress also undermines team cohesion, leading to communication breakdowns and inconsistent application of auditing standards. (Herbohn, 2004) And may result in low audit quality. Over time, staff frequently work with clients experiencing long-term, severe mental illness, and the environment can become emotionally demanding and exhausting (Corrigan et al., 2003). These auditors may cut corners by signing off on procedures prematurely, conducting only superficial testing, or failing to maintain proper documentation. These reduced audit-quality practices increase the likelihood of material misstatements being overlooked, weaken the effectiveness of risk assessments, and ultimately compromise the credibility of the audit process.

Furthermore, excessive job demands exacerbate negative outcomes and put the company's reputation at risk.

This reduces employee well-being while also impairing ethical judgment and decision-making (Arnsten, 2009; Hegazy et al., 2023). These stress-induced cognitive impairments increase the likelihood of oversight, material misstatements, and even unethical behaviour by auditors (Fogarty et al., 2000; Hegazy et al., 2023). Such unnecessary action may jeopardise the organisation's professional reputation and long-term credibility.

Long working hours, heavy workloads, and regulatory pressures can drain employees' energy, leading to burnout and disengagement (Bakker & Demerouti, 2017). Some professionals may be unwilling to put in extra effort if they feel their high job expectations are not fairly paid. This can lower motivation, weaken teamwork, reduce communication, and lead to employees losing interest in their work. Over time, this can create a culture where people only do the bare minimum instead of working toward shared goals. This kind of culture reduces productivity, breaks trust within audit teams, and harms the quality of work.

An imbalance between high job demands and limited resources can lead to higher operating costs for the organisation. When organisations fail to provide adequate resources or opportunities for recovery, this imbalance intensifies, resulting in high turnover. These problems increase the organisation's costs because they have to spend more on hiring, training new staff, and dealing with lower productivity.

Mobilising Job Resources: Organisational and Institutional Strategies for Resilience

Addressing job demands in accounting and auditing requires coordinated organisational and institutional interventions. These two interventions serve a critical role in shaping how professionals cope with high-pressure environments. While job demands are often unavoidable in this accounting and auditing field, their impact can be mitigated with appropriate strategies. This may include elements such as the introduction of flexible working arrangements, allowing employees to enrol in proper training and guidance, together with exposure to relevant time management practices, complemented by an efficient reward system, and strengthening social support through leadership practices. At the same time, institutional measures such as providing guidelines from regulatory and professional bodies, revamping corporate culture, and curriculum reforms form the broader framework needed to sustain resilience across the profession. Focusing on both levels is essential, as organisational strategies alone may not be sufficient without effective implementation at the firm level. These resources enhance employee coping capacity, reducing the risk of emotional exhaustion (Maslach & Leiter, 2016).

Organisational responses

Implement Flexible Working Arrangements (FWAs)

Organisations can promote work–life balance by enforcing reasonable working hours and providing flexible arrangements. Flexible work arrangements (FWAs) provide an effective means of mitigating the negative impact of heavy workloads in auditing. As job resources, they help cushion the strain created by long hours, tight deadlines, and intense time pressure (Aoife et al., 2025). Flexible work arrangements give employees greater control over when, where, and how they work, allowing auditors to better manage their energy and maintain productivity. Studies indicate that auditors with access to FWAs experience lower levels of emotional exhaustion and depersonalization, two major signs of burnout (Almer & Kaplan, 2002). Organisations that provide employee assistance programs, flexible work arrangements, and recognition systems have been shown to reduce turnover and increase engagement (Maslach & Leiter, 2016).

Although concerns exist regarding audit quality and data security during remote work, these can be managed with robust audit technologies, proper planning, and frequent communication (Aoife et al., 2025). When supported with the right tools and oversight, FWAs not only preserve audit quality but also enhance efficiency by reducing commuting time and allowing greater flexibility in task management. Beyond operational benefits, FWAs serve as a sustainable strategy that alleviates stress, prevents burnout, and fosters higher engagement, thereby aligning employee well-being with long-term organisational performance.

Invest in Proper Training and Guidance

Accounting and audit firms should invest in targeted training programs for their employees, focusing on simplifying complex procedures, clarifying role responsibilities and providing a guideline to deal with the excessive job demand. This reduces confusion, enhances efficiency, and prevents workflow bottlenecks. Soft

skills serve as buffers in high-stress audit environments (Samagaio et al., 2024). Training programs should extend beyond technical skills to encompass soft skills, including leadership, emotional intelligence, and effective communication. These soft skills enable auditors to effectively manage people, articulate their thoughts clearly, and respond calmly under pressure. For example, emotional intelligence helps them recognise and control their own stress while understanding others' emotions. Good communication ensures that tasks and expectations are clearly understood, reducing confusion about roles. Leadership skills enable team members to guide and support one another, particularly during busy audit periods. Altogether, these abilities make work smoother, reduce misunderstandings, and help everyone understand their responsibilities more clearly, thereby increasing role certainty. Role uncertainty is a significant stressor in auditing, as unclear responsibilities and expectations lead to increased anxiety and reduced performance (Hegazy et al., 2023).

Furthermore, encouraging open communication channels between staff and management fosters shared understanding, promotes collaboration, and creates a healthier organisational climate (Hegazy et al., 2023). This allows organisations to better understand the level of training and support employees require. By reducing role ambiguity through structured training and clear guidance, firms can alleviate stress and strengthen workforce resilience.

Workload and Time Management Practices

Issues due to unrealistic deadlines and excessive workloads are frequently cited as the most significant job demands in auditing (Herawati et al., 2023). Within the JD–R framework, unmanaged workload constitutes a demand that drains resources, while realistic deadlines function as a resource that protects employees from burnout (Bakker & Demerouti, 2017). Firms must therefore prioritise workload management by setting achievable deadlines, distributing assignments evenly, and avoiding over-concentration of tasks during peak audit seasons. Strengthening resilience through greater attention to work–life balance is seen as essential, since neglecting members' mental health would undermine the profession's ability to effectively support client adaptation and innovation (Branicki et al., 2023).

Practical measures may include staggering client deliverables, adopting workflow management systems, and assigning additional staff during high-pressure periods. Adjusting workloads not only protects employee well-being but also preserves audit quality, as auditors under extreme time pressure are more prone to errors, ethical lapses, and oversight (Hegazy et al., 2023). Assigning employees tasks that match their abilities without overwhelming them can enhance performance (Herawati et al., 2023). By aligning task demands with available resources, firms ensure a healthier balance that sustains productivity, reduces turnover, and enhances long-term organisational credibility.

Reward and Recognition Systems

Reward and recognition systems serve as critical job resources within the JD–R framework by buffering against high job demands such as heavy workload, long hours, and workplace stress (Bakker & Demerouti, 2017). Recognition of employees' efforts plays a vital role in fulfilling psychological needs such as value and belonging, thereby strengthening resilience and reducing emotional exhaustion. Empirical evidence shows that peer recognition significantly enhances positive psychological functioning and well-being, which in turn predicts higher well-being (Merino & Privado, 2015). Moreover, both supervisor and coworker recognition are negatively correlated with burnout, especially emotional exhaustion, while different forms of recognition (respect, care, esteem) uniquely contribute to mitigating specific burnout dimensions and fostering personal accomplishment (Renger et al., 2020).

Empirical data support the powerful impact of recognition on well-being. A global survey of over 3,000 employees found that 84% reported that burnout negatively affected their mental health, but 69% believed their well-being would improve if they were simply thanked more often for their work (Reward Gateway, 2022). Recognition also fosters engagement, another key resource in JD–R theory. Engaged employees are more resilient to job stressors and less likely to suffer burnout. Employee awards promote recognition, gratitude, and morale, which aid emotional recovery and performance.

Most empirical study shows that timely, honest, and personalised appreciation works best. Jo and Shin's (2025). A large-scale study showed that recognition has a big, positive effect on employee engagement. This

shows how important it is for increasing motivation and well-being. In conclusion, reward and recognition programs are useful workplace tools when properly planned and executed. They assist in combating the weariness and disengagement that accompany long-term stress by attending to the emotional needs of workers, increasing engagement, and fostering trust. By doing so, these systems promote the mental health of workers as well as the general performance of the company.

Strengthening Social Support Through Leadership Practices

Accounting and audit firms should adopt leadership styles that foster collaboration to strengthen social support. Clan control is an informal control mechanism based on shared values, collective norms, and mutual expectations (Cameron & Quinn, 2006)Clan control-based leadership that emphasises personal interaction, decentralised authority, and mutual trust, cultivating a culture that fosters appreciation and stronger bonds among team members. However, effective leadership in audit firms does not have to rely only on close, family-like (clan) control. Leaders who focus on building good relationships, use a mix of leadership styles, and combine them with other approaches can also be effective. In mental health teams, strong and supportive leadership fosters a positive work culture that can significantly reduce employee stress and burnout (Corrigan et al., 2003).

Based on the JD–R model, leadership styles like clan control and other relationship-focused approaches can be important sources of support at work. These types of leadership help reduce the stress caused by heavy workloads or unclear job roles by giving employees social support, trust, and a sense of safety (Bakker & Demerouti, 2017). Effective leadership, therefore, is not optional but essential for maintaining the mental health of accountants and auditors, as well as safeguarding audit quality. Research shows that when supportive leadership, peer collaboration, and recovery opportunities are present, employees are protected against strain and foster resilience (Bakker & Demerouti, 2017). Conversely, when these elements are lacking, chronic strain escalates, reinforcing the risks of cognitive impairment, burnout, and professional misconduct.

Institutional responses

Regulatory & Professional Bodies Guideline

At the profession-wide level, regulatory and professional bodies, such as the International Federation of Accountants (IFAC), the Malaysian Institute of Accountants (MIA), and the Association of Chartered Certified Accountants (ACCA), play a central role. By integrating mental health and well-being criteria into firm evaluations, these institutions create external incentives for organisations to prioritise employee welfare. Burnout hurts employees' physical and psychological health, as well as their job performance and occupational functioning (Salvagioni et al., 2017). Regulatory frameworks should develop criteria to prohibit excessive overtime and encourage accountants and auditors to work within reasonable timelines. These overviews enable equitable task division, particularly during peak audit periods. These may help alleviate uncertainty and prevent overlapping responsibilities. Furthermore, effective standards can help auditors identify early stress issues and provide advice on treatments like job rotation or workload changes. Such institutional interventions expand the structural resources available to individuals, ensuring that demands do not consistently outweigh coping capacities.

Corporate Culture Reform

Beyond formal policies and regulations, a strong workplace culture of health makes a significant contribution to employee well-being. Empirical evidence shows that workplaces with higher employee engagement and lower levels of stress and depression create a more positive and healthy work culture (Marenus et al., 2022). Leaders should set the example by valuing employee well-being as much as productivity, which helps reduce the stigma around mental health issues. By recognising and rewarding efficiency, innovation, and audit quality, rather than just long working hours or physical presence, leaders can help change the workplace culture toward healthier practices. A culture that emphasises sustainable performance becomes a resource in itself, enhancing employee engagement and mitigating the risk of burnout (Bakker & Demerouti, 2017).

Corporate culture plays a critical role in shaping employee behaviour and well-being, in achieving the targeted organisational performance. In the accounting and auditing profession, a culture that normalises long hours, excessive pressure, and presenteeism can exacerbate stress and burnout. This may subsequently compromise

the outcome of the work. Reforming corporate culture to prioritise supportive leadership, open communication, teamwork, and recognition can foster a healthier work environment and build resilience among the accountants and auditors. Such a culture encourages knowledge sharing, collaboration, and resilience, enabling employees to cope more effectively with job demands.

Curriculum Reform: Mental Health in Accounting Education

A third strand of institutional response lies in accounting education reform. Branicki et al. (2023) Underscore that the accounting profession must prioritise health and well-being, particularly mental health, as the pandemic exposed how demanding work environments strain professionals. The profession must begin early by equipping students with resilience and mental health awareness before they enter the workforce. Embedding mental health and stress management in the accounting curriculum helps students prepare for the inevitable demands of the profession, reducing role uncertainty and anxiety during the transition to practice (Branicki et al., 2023).

Industry leaders have increasingly recognised that professional competence alone is insufficient; emotional intelligence and psychological resilience are equally vital. Accordingly, several Big Four firms (e.g., Deloitte, PwC, KPMG) are now integrating EI and well-being training into their internal development programs, and there is growing advocacy for embedding such training into accounting education programs (Micallef et al., 2023). Additionally, ACCA highlights that resilience is a skill that can be developed through training, and it is just as important as technical knowledge in professional education. Their recent guidance emphasises strategies such as stress management, building supportive relationships, and maintaining physical health to help professionals strengthen their resilience and well-being (Yeung, 2024). This reform is important to ensure that future accountants and auditors enter the profession with the skills to manage stress, avoid burnout, and build long-lasting, effective careers.

In summary, institutional responses provide multiple layers of support to help employees manage stress and burnout. Rules and guidelines set clear standards for employee well-being. Meanwhile, corporate culture reform that promotes supportive practices, combined with curriculum reform, may help future accountants become mentally prepared for the job's challenges. Together, these elements can create an effective approach to reducing burnout, supporting both long-term career growth and high audit quality.

5. Conclusion and Recommendations

This study examined the concept of stress and burnout among accounting and auditing professionals, as well as potential solutions to address these issues using the JD-R framework. It was found that the professions are inevitably marked by high job demands such as heavy workloads, role uncertainty, and strict time pressures. These demands, when not counterbalanced by sufficient resources, can lead to stress, emotional exhaustion, and burnout. However, having supportive workplaces, flexible work options, ways to build resilience, and strong company policies can help protect employees from these problems.

Equally important are institutional responses, including structured role training, realistic deadline management, and accessible social support systems, which not only safeguard employees' well-being but also uphold audit quality and professional standards. Unlike much of the existing literature, which broadly associates high-pressure professions with stress and burnout, this paper maps the specific pathways through which excessive job demands in accounting and auditing translate into adverse psychological and organisational consequences. By positioning resilience as a central mechanism for coping with these pressures, the study advances theoretical understanding of how organisational and institutional resources can protect against burnout and sustain professional performance. Beyond extending the JD–R model, the study contributes to practice by directly linking resilience to audit quality, client trust, and the long-term sustainability of the profession.

The implications of this study operate at both the individual and organisational levels. For individuals, the findings underscore the importance of self-care, autonomy, and access to effective coping mechanisms in sustaining performance in high-pressure environments. At the organisational level, the study highlights the importance of proactive leadership, structured training, and policies that promote psychological support for

employees. Together, these efforts help create healthier workplaces, making the organisation stronger and enabling employees, such as accountants and auditors, to be more resilient.

From a policy perspective, several implications emerge. Accounting and audit firms should implement structured interventions such as flexible work arrangements, clearer role definitions, supportive leadership practices, and competency-based appraisal systems to alleviate stress and build resilience. At the institutional level, regulators, professional bodies, and universities can complement these efforts by embedding mental health awareness and resilience training into accounting education and professional standards. Regulators may also consider setting guidelines to limit excessive overtime, particularly during peak audit seasons, to safeguard both employee well-being and audit quality. Collectively, these policies can restore balance between job demands and resources, enhance resilience across the profession, and promote a healthier, more sustainable accounting and auditing practice.

However, this study is constrained by its dependence on conceptual synthesis and secondary sources rather than on empirical field data. The focus on the Malaysian auditing and accounting context may also constrain the generalizability of findings across different institutional and cultural settings. Future research should therefore employ mixed-method or longitudinal approaches to examine causal relationships between demands, resources, and outcomes. Cross-country comparative studies or sector-specific investigations could further enrich understanding, particularly as new technologies, hybrid work arrangements, and regulatory changes reshape the profession.

Overall, this study contributes by extending the JD–R framework to the professional resilience among accountants and auditors, offering practical strategies to mitigate stress and burnout while emphasising the critical role of organisational and institutional resources in sustaining both professional well-being and audit quality.

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Influence of Job Demands, Job Control and Social Support on Malaysian Independent Musicians' Job Stress and Career Change Intentions

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Abstract: The Job Demand-Control (JDC) and its extended version, the Job Demand-Control-Support (JDCS) model, provide a theoretical lens to study how distinct job features impact overall well-being and career longevity. This study investigates the experiences of 385 Malaysian independent musicians' job stress and career change intentions by concentrating on job demands along with job control and social support's direct and moderating influences. Adopting a quantitative methodology grounded in a cross-sectional design and non-probability sampling, this study used Smart PLS for the structural model evaluation. Findings indicate that stress-inducing job elements significantly affect musicians' job stress. The data analysis conducted allowed for the exploration of the impact and interrelationships among the studied variables. The study unveiled significant positive associations between job demand and job stress. However, social support and job control exhibited insignificant relationships with job stress. Only social support, and not job control, was found to moderate the relationship between job demand and job stress. This outcome underscores the buffering role of social support in mitigating the effect of job demand on job stress. This study offers a basis for future theoretical advancements and research on the occupational sustainability of Malaysian independent musicians by empirically validating the extended JDCS model with career change intentions. These findings contribute to a deeper understanding of how psychosocial factors affect the career sustainability of independent musicians in Malaysia.

Keywords: *Job Demand, Job Stress, Job Control, Social Support, Career Change Intentions, Independent Musicians, Malaysia.*

1. Introduction and Background

Numerous studies have investigated both internal and external determinants that substantially affect mental and physical health. Since the 1950s, scholarly interest in the psychosocial dimensions of work has progressively developed, gaining significant traction during the 1960s with the emergence of occupational psychology and research on the psychosocial work environment (Johnson et al., 1996). The 1960s represented a pivotal phase, characterized by an intensified emphasis on understanding how various aspects of the work environment impact employee well-being (Cox et al., 2000). Despite the well-documented associations between psychosocial work factors and health outcomes within the general workforce, research focusing specifically on the psychosocial work environment of musicians remains scarce (Detari et al., 2020).

Research indicates that exposure to psychosocial factors and stress is interconnected (Leka & Jain, 2010). Previous studies examining the stress experienced by musicians have investigated psychosocial factors (e.g., Holst et al., 2012; Kenny et al., 2012). Empirical evidence has shown that musicians experience significant mental health challenges, including high levels of stress, anxiety, and depression due to the demanding nature of their profession (Cardoso et al., 2025). That said, independent musicians have emerged as prominent figures in the future of the music industry. The independent music industry is currently valued at US$104.61 billion (2024) and forecasted to reach $149.91 billion by 2029 (Thompson, 2025). In 2023, non-major labels and self-releasing artists accounted for an impressive 46.7% of the global recorded music market on an ownership basis, equating to revenues of $14.3 billion (Witt, 2024). In Malaysia, the local music industry achieved a significant milestone, generating RM339 million in 2024, making it the highest revenue in the history of the local music industry (Nst Entertainment, 2025). According to Statista Market Insights, revenue is projected to continue growing at approximately 5.7 percent CAGR from 2024 to 2027 (Statista, 2024). The Malaysian Communications Ministry's new initiatives highlight the government's recognition of the music industry as a potential revenue source (The Star, 2025).

Despite the substantial global revenue generated by independent musicians, only 12% are engaged as full-time professionals (Pilkington, 2024). Furthermore, one in five musicians has contemplated changing careers

(Cihak, 2021) and 64% are considering exiting the music industry altogether (Burns, 2020). These statistics underscore the volatility and instability of the music profession, with many musicians struggling to sustain their careers. This situation emphasizes the urgent need for a more comprehensive support framework to enable independent musicians to thrive. While Pilkington (2024) identified financial limitations as a primary factor driving career transitions, Musgrave (2023) highlighted the presence of numerous other stressors that hinder career advancement. Addressing these diverse sources of stress could contribute to the development of more sustainable careers, particularly in fields where organizational support structures are lacking.

Resolving this issue necessitates a theory or model that includes variables beyond financial considerations. One of the major models that has been widely accepted is the Job Demand-Control Model. Based on Karasek's Job Demand-Control Model (1979), demanding tasks that offer low control negatively affect worker well-being, while job control can moderate the impact of job demands on strain. Johnson and Hall (1988) extended the model (Job Demand-Control-Support Model) with the supposition that social support from co-workers and supervisors also buffers the effects of job demands on job strain. This addition emphasizes the crucial role of a supportive work environment in alleviating stress levels. In the context of an independent career, it will be interesting to assess the model. Thus, this study examines how job demands contribute to job stress among Malaysian independent musicians, and how job control and social support may mitigate these effects, along with the consequent effect that job stress has on their career change intentions.

2. Literature Review

Job Demands of Independent Musicians

Based on a review of past literature, this study employed the interpretation of job demands as a multidimensional measurement that consists of five stressors. Creativity demands have been incorporated as an additional key dimension for independent musicians.

- Physical Demands. Physical demands are associated with the health of performing artists. Long et al. (2012) indicate that musculoskeletal problems arise from physically demanding work and strenuous conditions, such as heavy lifting, awkward postures, and repeated motions.
- Cognitive Demands. Musicians exhibit cognitive demands through performance, creation, and response, which are associated with working memory processes (Pozenatto, 2020).
- Quantitative demands refer to components of the work environment related to workload and work pace, necessitating physical and/or psychological exertion (Van Veldhoven, 2013).
- Emotional Demands. Emotional demands pertain to the process of regulating emotions and expressions in response to assessment, criticism, and performance anxiety (Holst et al., 2012; Kenny, 2012).
- Creativity Demands. Creativity demands can be viewed as the ability to generate novel and effective ideas, artifices, or solutions (Runco, 2014).

Job Control

Job control is defined as comprising decision authority and skill discretion (Cattell et al., 2016). First, decision authority is how and what to do at work (Mauss et al., 2018). For example, in Holst et al. (2012), job control addressed the 'how' as being how much work is to be assigned, and the 'what' as what task an employee can choose to work on. Second, skill discretion includes the requirement of initiative, the possibility of learning new things through work, and the opportunity to develop skills, possibilities for development, and a variety of work (Holst et al., 2012; Mauss et al., 2018). For this study, the decision authority will be the focus.

Social Support

Social support refers to the perceived or actual receipt of social resources (Uchino, 1996). It is measured as a multidimensional concept that consists of support from peers, family, and fans (Pejtersen et al., 2010; Vaag et al., 2014).

Career Change Intentions

Career change intentions are defined as a move into a position of greater managerial responsibility and organizational status, a transfer to a similar job in a new company or industry, or a lateral move into a different

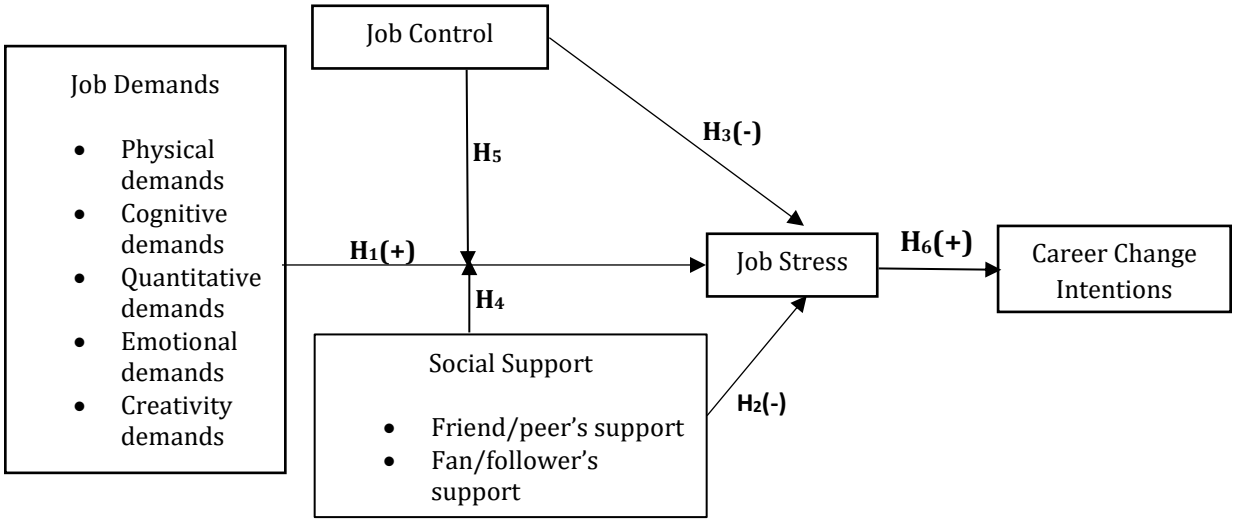
work function within a familiar field (Ibarra, 2002).

Hypothesis Development

This study employed the Job Demand-Control-Support (JDCS) model (Karasek, 1979; Johnson & Hall, 1988) to develop several hypotheses, extending it with career change intentions as the outcome variable to job stress. The Job Demand-Control model (JDC) explained that high job demands combined with low job control increase job strain. The model was later expanded to the Job Demand-Control-Support (JDCS) model, which explains the relationship between job demand, job control, and job support on job stress (Karasek & Thorell, 1990). Various researchers have utilized the JDCS model to understand the impact of job demands on well-being (e.g., Del Pozo-Antunez et al., 2018; Ariza-Montes et al., 2018). Past studies have shown that job stress predicts job turnover intention positively and significantly (Aqeel et al., 2021; Abarghouei et al., 2016), demonstrating the substantial effect job stress has on intention to leave (Tabur et al., 2022; Liu et al., 2019). Consequent to the JDCS model and preceding discourse, the subsequent hypotheses have been formulated (Figure 1).

Figure 1 presents the theoretical model and hypotheses for this investigation. It includes the direct effects of four factors and two moderator effects.

Figure 1: Model Hypotheses



H1: Job demands are positively related to job stress of Malaysian independent musicians.
H2: Social support is negatively related to the job stress of Malaysian independent musicians.
H3: Job control is negatively related to the job stress of Malaysian independent musicians.
H4: Social support moderates the relationship between job demands and job stress of Malaysian independent musicians.
H5: Job control moderates the relationship between job demands and job stress of Malaysian independent musicians.
H6: Job stress is positively related to career change intentions of Malaysian independent musicians.

3. Research Methodology

The unit of analysis and population of interest for this study comprised independent musician respondents in Malaysia, who produce and distribute music without the support or control of a record label (CENDANA & Kreativekat Resources, 2019). Participants were independent musicians grouped by age from 18 to 50. Power calculations with a standard margin of error of 5% determined the sample size. The sample size of 385 independent musicians aligns with previous research (e.g., Kenny et al., 2012; Holst et al., 2012). Musicians were defined based on the Three Component Model of Musician's Definition, which consists of multi-faceted perceptions (Zhang et al., 2018). They were sourced from ReverbNation.com, Malaysian Music Community, Rhythm of the Third World (ROTTW)'s Official Group, and live gigs. This study used non-probability sampling,

deliberately selecting participants based on specific qualities (Etikan et al., 2016). Non-probability online sampling is commonly used for population estimates (Baker et al., 2013). Homogeneous sampling, a purposive technique, aims to obtain a sample with similar characteristics or traits.

Job demands comprise five dimensions derived from prior research. The measurement includes seven items for physical demands (Bazazan et al. 2023); four items for cognitive demands (Morgeson & Humphrey, 2006) four items for quantitative demands (Pejtersen et al., 2010), three items for emotional demands (Pejtersen et al., 2010), and four items for creativity demands (Baltzer, 1988). This study utilized a job control measurement developed by Pejtersen et al. (2010) and Dobson (2010b) consisting of five items. Pejtersen et al. (2010) outlined three dimensions for social support, resulting in a total of eight items for family, friends, and fans (Pejtersen et al., 2010; Janosy et al., 2023). The job stress assessment that was developed by Pejtersen et al. (2010) has four items. Whereas the career change intentions were measured with four items (Chen et al., 2022; Karadag & Sahin, 2022). A structural equation modelling approach using Partial Least Squares (PLS-SEM) was employed to test the hypotheses. A bootstrapping procedure with 5,000 resamples was conducted to determine the significance of the path coefficients.

4. Results

A sample of 385 questionnaires was used after outliers were eliminated. Among the respondents (Table 1), 58.4% are male, while the remaining 41.6% are female. The majority of respondents are in their 30s, representing approximately 82.1% of the sample. Additionally, 19.6% are under 30 years old, and 14.7% are in their forties. Most respondents are members of an ensemble, band, or orchestra, accounting for 61% of the total sample, with 39% being solo artists or front figures. The sample includes representation from all sixteen listed genres, with rock (19.5%), pop/singer-songwriter (16.4%), and metal (12.1%) comprising the top three genres, collectively representing almost half of the total sample (48%). The distribution of independent musicians across genres is not even among age groups. Instead, there is a strong overlap, where specific genres (hip hop, punk, emo, metal, and electronic) are significantly more popular among younger musicians (<30 and 30-35). Genres like classical, jazz, blues, and Latin show a higher propensity for older musicians. In terms of primary musical instruments, approximately 30% play guitar, 29.2% are vocalists, and 12% play piano/keyboards. More than half of the musicians in the sample are multi-instrumentalists, with about 20.1% being vocalists, 10.4% being drummers, and 9.9% playing bass guitar. As for social media presence, 43% of participants have fewer than 1,000 fans/followers, while more than half have between 1,000 to 10,000 fans/followers. Only 0.3% have more than 10,000 fans/followers. The majority earn less than RM1,000 as independent musicians, with only 9.2% earning between RM1,001 and RM5,000. More than half of the musicians earn between RM1,000-RM5,000 from other sources of income, with 27.7% earning between RM5,000-RM10,000, and the remaining 2.7% earning more than RM10,000. The demographic statistic of this study is presented below.

Profile of Respondents: Table 1 displays a summary of the characteristics of the total sample of Malaysian independent musicians who participated in the study.

Table 1: Summary of statistics of respondents' demographics

VARIABLE	FREQUENCY	PERCENTAGE(%)
GENDER		
Male	215	58.4
Female	153	41.6
AGE		
<30	72	19.6
30-35	120	32.6
36-40	110	29.9
41-45	54	14.7
46-50	12	3.3
ROLE AS INDEPENDENT MUSICIAN		
Solo/front figure	174	39.0
Member of ensemble/band/orchestra	272	61.0
GENRE		

Classical	46	5.9
Hip Hop	34	4.3
Folk/Acoustic	71	9.0
Rock	153	19.5
Pop/Singer-songwriter	129	16.4
Metal	95	12.1
R&B/Soul	77	9.8
World	43	5.5
Punk/Emo	34	4.3
Blues	34	4.3
Country	2	0.3
Jazz	31	3.9
Electronic	17	2.2
Latin	8	1.0
Reggae	4	0.5
Religious/Worship	7	0.9
PRIMARY MUSICAL INSTRUMENT		
Vocals	153	29.2
Drums	45	8.6
Bass guitar	58	11.1
Guitar	157	30.0
Piano/Keyboard	63	12.0
Electronic	15	2.9
Harmonica	1	0.2
Other string instruments	22	4.2
Other wind instruments	3	0.6
Other percussive instruments	7	1.3
SECONDARY MUSICAL INSTRUMENT		
None	154	40.1
Vocals	77	20.1
Drums	40	10.4
Bass guitar	38	9.9
Guitar	31	8.1
Piano/Keyboard	18	4.7
Electronic	6	1.6
Harmonica	6	1.6
Other string instruments	4	1.0
Other wind instruments	10	2.6
Other percussive instruments	0	0
NO. OF FOLLOWERS/FANS		
Less than 1,000	159	43.2
1,000-10,000	208	56.5
10,001-100,000	1	0.3
100,001-1,000,000	0	0
More than 1,000,000	0	0
INCOME (FROM BEING AN INDEPENDENT MUSICIAN)		
Below RM1,000	334	90.8
RM1,001-RM5,000	34	9.2
RM5,001-10,000	0	0
Above RM10,000	0	0
INCOME (FROM OTHER SOURCES)		
Below RM1,000	6	1.6
RM1,000-RM5,000	250	67.9
RM5,001-10,000	102	27.7

Above RM10,000	10	2.7
Total	**368**	**100**

Table 2: Results of reliability analysis and descriptive data

Variable	Mean	SD	CR	AVE	VIF
Physical demands	3.27	0.43	0.76	0.52	1.07
Cognitive demands	3.27	0.91	0.94	0.79	2.25
Quantitative demands	3.16	0.56	0.77	0.53	1.21
Emotional demands	3.31	0.71	0.84	0.64	1.05
Creativity demands	3.58	0.76	0.92	0.66	2.09
Job control	3.46	0.68	0.86	0.56	1.11
Social support (Friends/peers)	3.35	0.67	0.82	0.70	1.03
Social support (Fans/Followers)	3.14	0.81	0.77	0.79	1.11
Job stress	3.39	0.47	0.89	0.53	1.07
Career change intentions	3.11	0.52	0.86	0.74	2.25

The results from the bootstrapping performed in this study presented mixed findings. Job demands (β=0.67, p=0.001) have a significant positive effect on job stress. Thus, H1 is supported. However, the direct effect of social support on job stress is insignificant (β = -0.08, p = 0.06). Therefore, H2 is not supported. Similarly, the results found an insignificant direct effect of job control on job stress (β = -0.008, p = 0.42). H3 is not validated. For the moderators, social support (β=-0.11, p=0.01) plays a significant role as a moderator between job demand and job stress. H4 is supported. However, job control was found not to moderate the relationship between job demand and job stress (β=-0.03, p=0.23). H5 is not supported. In terms of the outcome variable, job stress demonstrated a significant positive correlation with career change intention (β=0.297, p=0.001). H6 is validated.

Discussion

The JDCS model is widely tested among employees or professionals with organizational support; however, among freelancers or those without employers, the model has yet to be tested. This study fills the theoretical gaps by examining the model for independent careers and the extent of career change intentions. Firstly, job demands and job stress were positively related. The results are in line with Burin & Osorio (2017) and Kenny et al. (2012). The higher the job demands, the higher the job stress. Secondly, social support and job control were found not to be negatively related to job stress. The findings are not in line with the JDCS model. However, the findings are not surprising due to the nature of independent careers. Independent musicians are self-employed; therefore, they control their tasks and responsibilities. Indeed, the entrepreneurial nature of independent musicianship involves simultaneous multiple roles (Hracs & Leslie, 2014; Pizzolitto, 2021) that require increased decision-making; therefore, control could become burdensome rather than beneficial. Social support may not directly influence reducing job stress, but it does play a role as a moderator. Similarly, Aalberg et al. (2019) and Holst et al. (2012) found no significant correlation between social support and musicians' stress reduction. Finally, job stress and career change intentions were confirmed to have a significant positive correlation, which is in line with past studies (e.g., Aqeel et al., 2021; Tabur et al., 2022).

5. Practical Implications

Several practical implications for government bodies and associations can be drawn from this study. Since job stress is significantly related to career change intentions, reducing job stress is significant. Firstly, care should be given to designing beneficial workshops to improve independent musicians' know-how in managing stressors for sustainable careers. Special attention ought to be given to acknowledging that independent musicians have to equip themselves with the skills to manage job demands according to their effects on job stress. This finding supports prior literature suggesting that certain demands, such as emotional and creative ones, may be positively framed as challenge demands rather than hindrance and distressing demands (Fiori et al., 2022; Tang et al., 2021; Duarte et al., 2020). Second, although social support does not directly influence job stress, it is found to moderate the relationship between job demand and stress. Therefore, social support can buffer the effect of job demand on job stress. From a cultural perspective, Malaysia's collectivist orientation necessitates interventions that are culturally sensitive and contextually appropriate. Given the prevailing emphasis on interdependence and social harmony, independent musicians in this context may be less inclined

to assert personal autonomy or actively seek overt forms of support. Consequently, stress-mitigation strategies should incorporate culturally aligned practices such as collective reflection, peer acknowledgement, and the pursuit of shared, community-based objectives. Additionally, accessibility to performances, exposure, and visibility, along with platforms that could further improve the fan/follower base, would go a long way.

Conclusion

The Job Demand-Control-Support (Career Change Intentions) model adopted in this study is an appropriate theoretical framework to analyze the relationship between job demands, job strain, and career change intentions in the context of Malaysian independent musicians. There is a scarcity of studies that have explored the main and multiplicative effects within this model in relation to the job stress and career change intentions of Malaysian independent musicians. Independent musicians would be able to manage their stress levels better by addressing these factors according to their correlation with job stress. Stressors such as overwhelming workload, heavy cognitive attention tasks, and highly physically demanding activities could be brought forward and discussed with managers, ensemble leaders, or friends/colleagues to achieve a better understanding. Treating emotional and creativity demands according to their association with job stress is also warranted. Additionally, there is also the need to recognize the importance of fans and framing job control within the entrepreneurial and cultural context in reducing job stress and mitigating strain. As a conclusion, it can be said that this study confirms the basic postulations of the JDCS model, with job demand predominantly increasing job stress, social support as one of the basic mechanisms for moderating the pressures of being independent musicians, and job stress increasing career change intentions. Thus, contributing towards advancing the understanding of perceived job stress and career longevity of Malaysian independent musicians.

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