

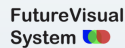


PROCEEDINGS

INTERNATIONAL CONFERENCE ON CREATIVITY, ENTREPRENEURSHIP AND MANAGEMENT (ICCEM 2026)

2-3 July 2026

Chatrium Hotel Riverside Bangkok, Thailand



Proceedings

INTERNATIONAL CONFERENCE ON CREATIVITY, ENTREPRENEURSHIP AND MANAGEMENT (ICCEM 2026)

2–3 July 2026

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Preface

The International Conference on Creativity, Entrepreneurship and Management (ICCEM 2026) was organized by Bangkok University, in collaboration with the Pacific Asia Travel Association (PATA), the MarTech Association, and the Knowledge Management Global Network (KMGN). Held on 2–3 July 2026 at the Chatrium Hotel Riverside Bangkok, the conference aimed to foster the exchange of knowledge among scholars, academics, researchers, and practitioners in the fields of creativity, entrepreneurship, and management. It further sought to provide a platform for presenting cutting-edge academic and research contributions, together with practical innovations that respond to the evolving challenges of today's dynamic global landscape, and to foster collaboration and build academic networks among universities, research institutions, and partner organizations.

It is our sincere hope that this conference will prove valuable to the academic community and its readers alike, and that the knowledge shared herein may be applied to further advance research in these fields.

The organizing committee would like to express its sincere gratitude to the keynote speakers, co-organizing partners, peer reviewers, session chairs, organizing committee members, and authors who submitted their contributions, whose support and dedication made this conference possible.

ICCEM 2026 Organizing Committee

Welcome Remarks

**By the Vice President and
Pro Vice-Chancellor for International Education and Partnerships**

Distinguished keynote speakers, respected co-hosts and partners, honored guests, scholars, researchers, industry leaders, colleagues, ladies and gentlemen,

Good afternoon, and a very warm welcome to the 2026 International Conference on Creativity, Entrepreneurship and Management (ICCEM 2026).

On behalf of Bangkok University, it is my great pleasure to welcome all of you to Bangkok and to this international gathering. We are delighted to host this inaugural conference and are especially pleased to welcome participants from 13 countries who have come together to exchange ideas, share research, and build meaningful collaborations.

This conference is proudly hosted by Bangkok University in collaboration with our valued partners: the Pacific Asia Travel Association (PATA), the MarTech Association (Thailand), and the KM Global Network. I would like to express our sincere appreciation to our co-hosts and partners for their invaluable support in making ICCEM 2026 possible.

Today, we are navigating a world shaped by rapid technological advancement, artificial intelligence, digital transformation, sustainability challenges, and increasing global uncertainty. These developments call for more than adaptation. They require creativity, entrepreneurial thinking, and effective management to develop innovative and sustainable solutions for the future.

ICCEM 2026 provides an important platform where academia, industry, and policymakers can come together to exchange knowledge, foster interdisciplinary collaboration, and strengthen partnerships that extend beyond institutional and national boundaries. Over the next two days, I encourage you to engage actively in the keynote sessions, research presentations, and discussions. Often, the most valuable outcomes of a conference are not only the papers presented but also the conversations, ideas, and collaborations that continue long after the event concludes.

At Bangkok University, we are committed to developing creative minds, entrepreneurial leaders, and globally minded graduates. Hosting ICCEM reflects our commitment to advancing knowledge, promoting innovation, and creating opportunities for meaningful international collaboration. We hope this conference will serve as a catalyst for new research partnerships, innovative projects, and lasting professional friendships.

I would also like to express my sincere gratitude to our distinguished keynote speakers, presenters, moderators, sponsors, organizing committee, and everyone whose dedication has made this conference possible. Most importantly, thank you to all participants for your presence and active engagement.

While you are here, I also encourage you to experience the rich culture, warm hospitality, and vibrant energy of Bangkok and other cities nearby. We hope your stay in Thailand will be both professionally rewarding and personally memorable.

Thank you once again for joining us. I wish you an inspiring, productive, and enjoyable ICCEM 2026.

Welcome to Bangkok University's ICCEM 2026, and thank you.

Sawasdee krub.

Asst. Prof. Dr. Somyot Wattanakamolchai
Vice President and
Pro Vice-Chancellor for International Education and Partnerships

Program

2 July 2026

01.00 PM – 01.30 PM	Registration
01.30 PM – 02.00 PM	Opening Ceremony
02.00 PM – 03.00 PM	Keynote Speaker 1 Khun Cholthawan Sawasdee Country Managing Director -Thailand, Alibaba Cloud Topic: Building the Next Generation of Innovators: AI, Cloud Technology, and Entrepreneurial Mindsets
03.00 PM – 03.20 PM	-- Break --
03.20 PM – 04.30 PM	Keynote Speaker 2 Prof. Dr. Susanne Durst, The Institute for Knowledge and Innovation, Bangkok University Topic: Responsible knowledge management in a BANI world: Higher Education with Attitude
06.45 PM – 08.45 PM	Dinner Cruise

3 July 2026

09.30 AM – 10.00 AM	Registration and Welcome Refreshments
10.00 AM – 12.00 PM	Paper Presentation (Parallel Sessions)
12.00 PM – 01.30 PM	Lunch
01.30 PM – 02.10 PM	Paper Presentation (Parallel Sessions)
02.10 PM – 02.30 PM	-- Break --
02.30 PM – 03.10 PM	Paper Presentation (Parallel Sessions)

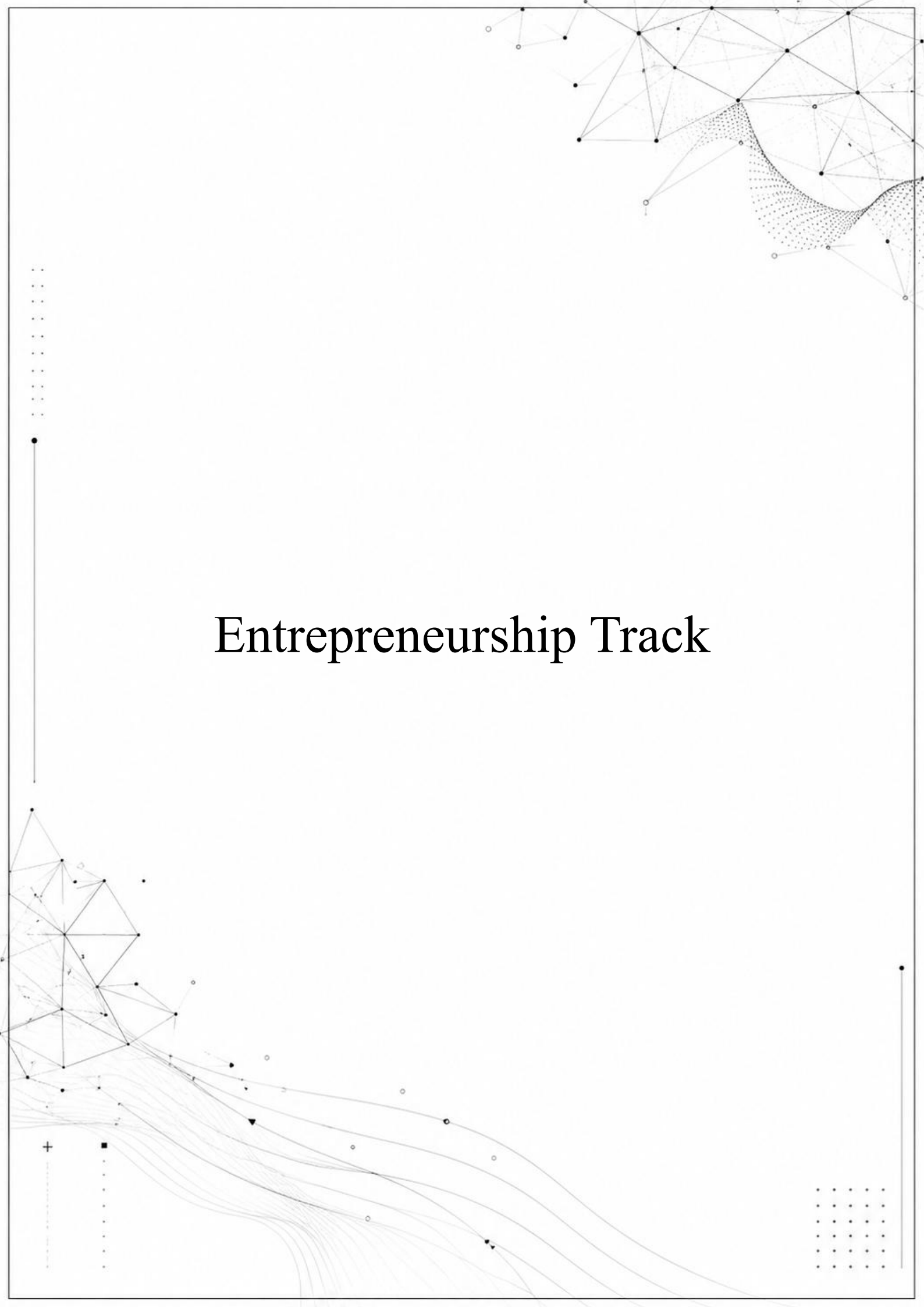
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The page features an abstract geometric design. In the top right corner, there is a complex network of lines and dots, some solid and some hollow, forming a web-like structure. In the bottom left corner, there are several curved lines and a small cluster of dots. In the bottom right corner, there is a grid of dots. On the left side, there is a vertical line with a dot at the top and a series of dots below it. The text "Entrepreneurship Track" is centered in the middle of the page.

Entrepreneurship Track

ENTREPRENEURIAL ECOSYSTEM DYNAMICS AND SME GROWTH: A LITERATURE-INFORMED CAUSAL LOOP DIAGRAM

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Abstract

Entrepreneurial ecosystems are complex and context-dependent systems in which institutions, resources, and actors are all interdependent and collectively influence growth of small and medium-sized enterprises (SMEs) and entrepreneurial activity. However, most existing research relies on static frameworks that provide limited insight into how ecosystem elements interact and change over time. To address this problem, this study applies a system dynamics perspective to synthesize prior ecosystem research. A saturation-based literature search identified 14 studies for inclusion in the final synthesis. These studies were then used to develop a literature-informed causal loop diagram. Using Stam (2015) entrepreneurial ecosystem framework as a foundation, the diagram was then contextualized within a regional entrepreneurial ecosystem, with the growth of SMEs in the health technology industry as its focal outcome. The findings suggest that ecosystem performance depends not only on the presence of individual factors, but also on how these factors interact across regional, organizational, and individual levels. They also indicate that ecosystem structures vary substantially, depending on the industry, location, and available resources. Regional capabilities and knowledge creation/transfer emerge as important factors for SME growth, and collaboration among multiple actors is crucial to improving ecosystems. The study further illustrates how system dynamics can reveal indirect effects, feedback processes, and potential unintended consequences that may be overlooked by static approaches. In doing so, it contributes to entrepreneurial ecosystem research by advancing a context-sensitive, multi-level, and policy-oriented systems perspective.

Keywords: *Entrepreneurial Ecosystem, System Dynamics, Growth Entrepreneurship, Regional Entrepreneurial Ecosystem, Startup Development*

Introduction

Entrepreneurship research has received increasing attention due to its potential to drive regional economic growth. This role is captured by the concept of productive entrepreneurship, defined as entrepreneurial activity that contributes, directly or indirectly, to economic development (Davidsson, 2004). Productive entrepreneurship generates employment, innovation, knowledge creation, and productivity growth. It can be reflected in

indicators such as the number of entrepreneurs and SMEs, as well as the growth of existing SMEs. A central question in regional development is therefore how regions can create environments that enable entrepreneurs not only to establish new ventures but also to sustain and grow them. Entrepreneurial ecosystem theory addresses this question by examining the actors and factors within a region that enable productive entrepreneurship (Stam, 2015).

Although entrepreneurial activity in general contributes to economic development, growth-oriented firms are often considered especially important because of their disproportionate impact. High-growth firms, for example, have been shown to contribute significantly to job creation and innovation, accounting for nearly half of new jobs created in the United Kingdom (Lee, 2014). As a result, much entrepreneurial ecosystem research has focused on understanding the conditions that support the growth of such firms, particularly SMEs.

Despite this growing body of research, entrepreneurial ecosystem research remains a relatively young field. Existing studies are often highly context-specific, and the field continues to face challenges in bridging theory and practice, particularly in generating actionable insights for policy. One challenge is that entrepreneurial ecosystems involve complex interdependencies and feedback processes that are difficult to capture through static analytical approaches. This study seeks to help narrow that gap by applying system dynamics modeling to the study of regional entrepreneurial ecosystems.

This study examines how to foster productive entrepreneurship in a region by identifying the factors and relationships that could be shaping SME growth across the ecosystem literature. The health technology ecosystem is used as the focal context because industry specificity is essential for defining ecosystem boundaries and understanding multi-level connections. Health technology is appropriate because its SMEs are typically growth-oriented (Delmar et al., 2003), healthcare entrepreneurship involves diverse, interdependent stakeholders across multiple levels (Mérindol & Versailles, 2024; Owaishiz et al., 2024; Singh et al., 2023), and in Thailand the sector is concentrated in Bangkok, supported by strong healthcare infrastructure, medical tourism, and growing private and public investment, despite persistent constraints in funding and tech talent (Pangarkar & Vandenberg, 2022).

The paper aims to understand entrepreneurial ecosystem structure through a review of the literature and existing ecosystem studies across industries. Based on a synthesis of this literature, a causal loop diagram (CLD) is developed and adapted to reflect the dynamics of Bangkok's health technology ecosystem. This research provides a foundation for developing a system dynamics model and stakeholder-informed simulations in Bangkok's entrepreneurial ecosystem. Ultimately, this will support policymaking in Bangkok, enable experimentation with ecosystem support strategies, and advance entrepreneurial ecosystem research by better capturing complex systems and deepening the understanding of less-developed ecosystems.

Literature Review

The concept of the entrepreneurial ecosystem (EE) can be traced back to 1993, when James Moore introduced the term “ecosystem” in a business context. His work conceptualized business, entrepreneurial, startup, and innovation ecosystems as systems of interdependent actors that co-evolve over time, analogous to dynamics observed in biological systems (Moore, 1993).

Building on this foundation, the notion of entrepreneurial ecosystems highlights externalities, factors that individual entrepreneurs cannot directly control, such as culture,

institutions, and the broader socio-economic environment (Walrave et al., 2018). This perspective shifts attention beyond firm-level strategy and internal operations to the wider context in which entrepreneurial activity is embedded, emphasizing the role of diverse actors and systemic conditions in shaping outcomes.

Later, Stam (2015) reconceptualized entrepreneurial ecosystems as more than passive environments that merely host successful startups. Instead, he framed them as active, enabling systems characterized by causal structures that support and sustain entrepreneurial activity. Accordingly, he defines an entrepreneurial ecosystem as “a set of interdependent actors and factors coordinated in such a way that they enable productive entrepreneurship” (Stam, 2015; Stam & Van de Ven, 2021).

Within this framework, productive entrepreneurship extends beyond the creation of high-growth firms or unicorns. It encompasses any entrepreneurial activity that contributes directly or indirectly to economic output or enhances the capacity for future production. This broader view includes startups that may not succeed at the firm level but nonetheless play a crucial role in driving market processes, fostering competition, developing regional capabilities, and introducing innovation (Davidsson, 2004).

To operationalize this perspective, Stam (2015) developed a ten-element entrepreneurial ecosystem framework, building on earlier models. The framework was subsequently operationalized and empirically tested by Stam and Van de Ven (2021). Since then, a growing body of research has applied and validated this approach across different contexts, further strengthening its relevance in understanding EEs (Coad & Srhoj, 2023; Leendertse et al., 2022).

As a relatively new field of study, entrepreneurial ecosystem literature still has several limitations. First, it implicitly focuses on mature, top-tier ecosystems, largely because data availability has concentrated research on larger, more developed contexts (Van Dijk et al., 2025). This creates a significant gap in understanding how entrepreneurial ecosystems function in less developed regions, such as Bangkok, where the dynamics may differ substantially. As a result, current insights offer a weak foundation for designing effective policies or strategies to strengthen these ecosystems.

Second, much of this work assumes homogeneous effects, treating ecosystem factors as if they influence firms similarly across different stages of development (Coad & Srhoj, 2023) and as if each element exerts an equal impact on outcomes (Leendertse et al., 2022; Wurth et al., 2022). This simplified perspective overlooks the possibility that certain entrepreneurial ecosystem elements exert disproportionate or context-dependent effects on firm outcomes and growth across different types of firms. These limitations highlight the need for a more nuanced and dynamic understanding of entrepreneurial ecosystems, one that captures how factors interact and how the system evolves over time.

Objectives

This study has two objectives. First, it synthesizes research on entrepreneurial and related ecosystems, focusing on the system perspective and explicitly identified causal relationships. It also examines how system dynamics has been applied to related ecosystem contexts, including innovation, supply-chain, and knowledge-transfer ecosystems. Second, it compares ecosystem models across regions and ecosystem types to determine how contextual conditions influence system structures and interactions among factors. The study provides a foundation for future empirical research and the development of context-sensitive system

dynamics models. From a practical perspective, it aims to help policymakers, ecosystem developers, and practitioners identify influential factors, causal relationships, and potential intervention points.

Conceptual Framework

This study draws on the entrepreneurial ecosystem framework proposed by Stam (2015) and its later development by Stam and Van de Ven (2021), shown in Figure 1. Applying this framework to the context of SMEs within an ecosystem foregrounds three perspectives relevant to this study: factors enabling SME growth, the role of SMEs in strengthening ecosystem development, and the co-evolutionary interactions among ecosystem factors. Guided by these perspectives, the study analyzes prior research to identify key factors and causal relationships.

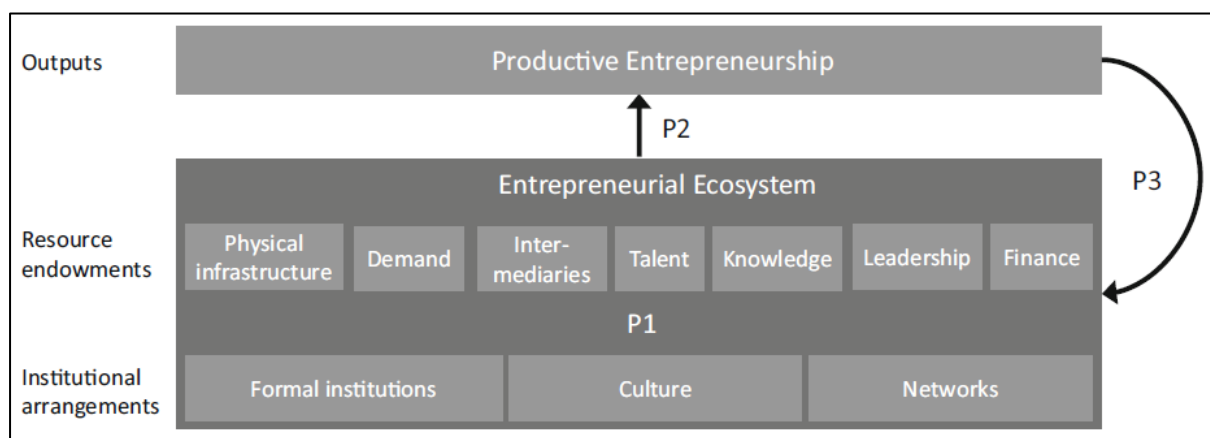


Figure 1 Entrepreneurial ecosystem framework
Source: Stam and Van de Ven (2021)

The framework outlines ten elements in an entrepreneurial ecosystem, organized into two categories: institutional arrangements and resource endowments (Stam & Van de Ven, 2021). Institutional arrangements define the preconditions shaping ecosystem functioning and include (1) *formal institutions*, which refer to the rules of the game in society, including the quality of government and regulatory conditions shaping entrepreneurial activity; (2) *entrepreneurship culture*, which captures the degree to which entrepreneurship is valued and legitimized in a region; and (3) *networks*, which describe the connectedness of businesses and other actors that facilitate information exchange, collaboration, and resource access. Together, these three elements shape the social and institutional context within which entrepreneurial activity emerges.

Resource endowments represent resources that can be mobilized productively within the ecosystem and include (4) *physical infrastructure*, referring to foundational assets and systems that support ecosystem functioning, with later work also incorporating household internet access to reflect digital entrepreneurship; (5) *demand*, reflecting the presence of market opportunities for new ventures; (6) *intermediary services*, encompassing the supply and accessibility of support organizations and specialized business services that facilitate entrepreneurial activity; (7) *talent*, capturing the prevalence of individuals with high levels of human capital and relevant skills; (8) new knowledge, reflecting investments in and production of knowledge that generate innovation opportunities; (9) *leadership*, referring to actors or mechanisms that provide guidance and direction for collective action; and (10) *finance*, referring to the availability of capital invested in venture creation and growth. Collectively,

these ten elements represent the key structural components of the ecosystem and the basis for examining their interactions.

Methodology

This study adopts a literature-informed conceptual model-building approach using system dynamics. System dynamics modeling is an approach for examining systems with multiple interacting components over time (Sterman, 2000). It emphasizes the role of internal feedback loops, nonlinear relationships, and time delays in shaping overall system behavior. These characteristics make system dynamics suitable for capturing interdependent relationships between actors, resources, institutions, and environmental conditions that shape SME growth over time in entrepreneurial ecosystems research.

The core of system dynamics is the idea that people construct mental models of their environment and perceive them as reality (Sterman, 2000). System dynamics modeling is an act of extracting and formalizing multiple mental models from different sources into one, whether through interviews with stakeholders, literature, or textual evidence, with the goal of capturing a shared understanding of system structure, problem dynamics, and potential solutions. In this study, system dynamics is used to develop a conceptual representation of the feedback structures influencing SME growth in Bangkok's health technology entrepreneurial ecosystem through a literature review.

As a first step towards building a validated and functioning system dynamics model, this study conducted literature review to synthesize the collective knowledge of prior system dynamics studies on ecosystem research. The objective of this review is to achieve conceptual synthesis rather than exhaustive evidence aggregation. It aims to integrate factors and factor-level causal relationships proposed across the literature into a coherent structure of an entrepreneurial ecosystem.

The review focuses on studies of regional entrepreneurial ecosystems, startup ecosystems, and business ecosystems. Studies of innovation, knowledge-transfer, and related ecosystems are included when they explicitly address entrepreneurship, firm development, or mechanisms applicable to SME growth. Eligible studies must examine ecosystems as a unit of analysis. In other words, research focused on internal firm processes or individual attitudes or intrinsic values were excluded unless these factors are clearly connected to external factors within the ecosystem. They must also apply a system dynamics approach or a systems perspective on the phenomenon of interest and include causal loop diagrams or stock-and-flow models. This criterion ensures that the proposed causal relationships are explicit and specified at factor level, rather than at macro-level that is too broad to be useful for developing effective interventions.

Since the criteria are relatively narrow and the field is still emerging, peer-reviewed articles, conference papers, scholarly preprints, and working papers were included, with no restriction on publication date. The databases searched were ScienceDirect, ProQuest, SpringerLink, arXiv, EconStor, and Google Scholar. A saturation-based search strategy was used, with researchers continuing to collect articles until no new relevant articles were identified. The articles were then screened based on their title and abstract, followed by full-text assessment, before being included in the corpus.

Search strings were adapted to the search functionality and Boolean-operator limitations of each database. The principal search combined terms relating to entrepreneurial ecosystems with terms relating to system dynamics and causal-loop diagrams. Additional

searches were conducted to identify literature focusing on entrepreneurial-ecosystem actors and supporting concepts.

1. Main search string

The following search string was used in SpringerLink, ProQuest, and Google Scholar:
(*"entrepreneurial ecosystem"* OR *"entrepreneurship ecosystem"* OR *"regional ecosystem"* OR *"business ecosystem"* OR *"innovation ecosystem"* OR *"entrepreneurial environment"* OR *"emerging ecosystem"*) AND (*"system dynamic"* OR *"causal loop diagram"* OR *"causal-loop diagram"*)

2. Simplified search string

Because ScienceDirect imposed limitations on wildcard use and the number of Boolean operators, the following simplified search string was used:

(*"entrepreneurial ecosystem"* OR *"entrepreneurship ecosystem"* OR *"regional ecosystem"* OR *"business ecosystem"* OR *"innovation ecosystem"* OR *"entrepreneurial environment"*) AND (*"system dynamic"* OR *"causal loop diagram"* OR *"causal-loop diagram"*)

3. Searches in smaller databases

Because of the more limited search functionality or narrower coverage of EconStor and arXiv in entrepreneurial ecosystem, three separate searches were conducted:

"entrepreneurship ecosystem"

"entrepreneurial ecosystem"

"causal loop diagram"

The results from the three searches were combined before duplicate removal and screening.

4. Supplementary search focusing on entrepreneurial-ecosystem actors

A broader supplementary search was conducted to identify studies concerning entrepreneurial-ecosystem actors, supporting conditions, barriers, capabilities, and research approaches:

(*"SME"* OR *"startup"* OR *"start-up"* OR *"entrepreneur"* OR *"growth firm"* OR *"gazelle"* OR *"founder"*) AND (*"entrepreneurial ecosystem"* OR *"entrepreneurship ecosystem"* OR *"regional ecosystem"* OR *"business ecosystem"* OR *"innovation ecosystem"* OR *"entrepreneurial environment"* OR *"emerging ecosystem"*) AND (*"concept"* OR *"theore"* OR *"framework"* OR *"empirical"* OR *"growth"* OR *"scal"* OR *"challenge"* OR *"barrier"* OR *"constraint"* OR *"support"* OR *"capability"* OR *"enabl"*) AND (*"quantitative"* OR *"qualitative"* OR *"mixed method"* OR *"system dynamic"*)

The corpus, together with the broader entrepreneurial ecosystem literature, will be used to develop a projected CLD for health technology SMEs within a regional entrepreneurial ecosystem. The diagram synthesized factors and relationships from the literature and project how they may interact in this specific context. To maintain consistency with the existing evidence, every non-obvious factor and causal relationship included in the diagram must be supported by at least one system dynamics study in the corpus, while the broader entrepreneurial ecosystem literature will be used as supporting evidence to ensure that the diagram does not contradict entrepreneurial ecosystem literature.

Previous methodological studies have shown that causal maps and system dynamics models can be developed from literature and other textual sources, providing a basis for this approach (Kim & Andersen, 2012). The CLD in this study was developed using Stella

Architect to construct and visualize the ecosystem's causal structure. Positive links indicate causal relationships in which variables move in the same direction. In other words, when one variable increases, the other also increases, assuming all other factors remain unchanged. Negative links indicate the opposite effect. These relationships visualize reinforcing loops, which amplify changes occurring in the system, and balancing loops, which limit change in the system. Together, they represent feedback processes that may influence health technology SMEs within a regional entrepreneurial ecosystem.

Results

The final search was conducted on February 26, 2026. Of the 2,976 search results, 450 articles were identified for title and abstract screening, 77 underwent full-text review, and 14 were included in the review. All included studies were ecosystem research articles published from 2020 onward represented different regions and contained at least one CLD diagram or systems perspective diagram. Articles were excluded during the full-text review mainly because system dynamics was applied to micro-level systems, such as finance, management, and workplace optimization, or because they did not include system perspective diagrams with explicit causal relationships. The articles included in the review are listed in Table 1.

Drawing on insights from these studies, the CLD was developed using Stam (2015) ten-element framework as a broad conceptual basis. From this starting point, key factors and causal relationships were identified and used to construct a CLD in the context of how entrepreneurial ecosystem factors influence SME growth in the health technology industry as shown in Figure 2.

Table 1 Characteristics of Articles Included in the Final Review Corpus

Paper	Context	Ecosystem Type	Supporting Evidence
Arthur et al. (2023)	UK regions	Innovation ecosystem	Literature + participative research
Daniel et al. (2022)	Great Southern Australia	Agribusiness entrepreneurial ecosystem	33 semi-structured interviews
Hosseinzadeh et al. (2022)	Iran agriculture	Agricultural entrepreneurial ecosystem	Historical databases + domain experts
Hou et al. (2024)	Wuhan & Enshi, China	Regional innovation ecosystem	Regional statistical yearbooks
Konyalioglu et al. (2024)	Manufacturing networks	Coopetition ecosystem	Literature review
Liu et al. (2020)	Chinese bridge mega-projects	Knowledge-transfer ecosystem	Interviews + focus groups + observations + documents
Paasi et al. (2023)	10 innovation ecosystems	Innovation ecosystem	Literature + case interviews + expert workshops

Paper	Context	Ecosystem Type	Supporting Evidence
Secundo et al. (2024)	Italian university	Entrepreneurial university ecosystem	University case study + interviews + documents
Vallejo-Imbaquingo & Robalino-López (2025)	Ecuadorian universities	Academic entrepreneurship ecosystem	Literature + surveys + national indicators
Wurth et al. (2024)	Scottish universities	Entrepreneurial university ecosystem	13 interviews + national datasets
Xue et al. (2026)	China manufacturing industry	Manufacturing industrial ecosystem	National statistics + input-output data
Yung et al. (2023)	PolyU aerospace projects	High-tech innovation ecosystem	2 case studies + assumed simulation values
Zhang et al. (2021)	Chinese high-tech firms	Enterprise innovation ecosystem	Literature + high-tech enterprise data
Zhou et al. (2024)	China home-appliance supply chain	Supply-chain innovation ecosystem	Literature + A-listed company data + expert input

A recurring theme throughout the literature review is the importance of industry-specific factors in shaping models in the ecosystem literature. These factors not only define the boundaries of the model but also introduce greater nuance into its structure. For example, regional demand and regional finance are not typically directly linked, as there is no clear mechanism through which an increase in a region's purchasing power would automatically generate greater financial resources. However, in this context, demand at the industry level refers not to regional purchasing power per se, but to awareness of and interest in the industry's products or services (Hosseinzadeh et al., 2022; Wurth et al., 2024), represented in the diagram as demand in health technology. This perception-based demand shapes overall industry demand and contributes to industry attractiveness, which in turn encourages greater financial investment in the industry and influences individuals to pursue entrepreneurship within the sector as a viable career path (Paasi et al., 2023).

Studies with models in entrepreneurship frequently draw on theories such as embeddedness (Granovetter, 1992) to explain how culture influences entrepreneurial activity at the regional or industry level. Within this broader perspective, entrepreneurial culture, shaped by motivations, the income status of entrepreneurs, and social norms surrounding entrepreneurship as a career choice, has been associated with individuals' tendency to pursue entrepreneurship.

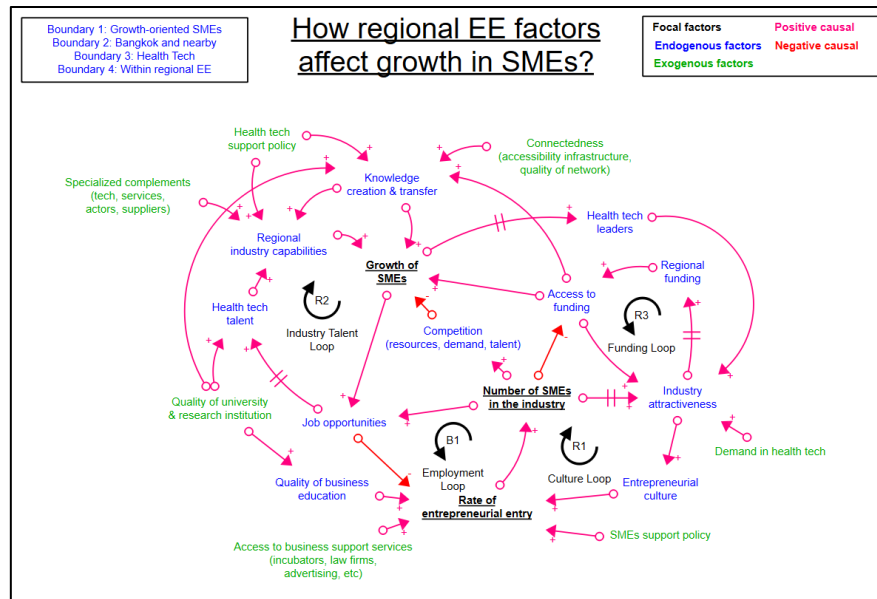


Figure 2 Causal loop diagram (CLD) illustrating how factors in regional entrepreneurial ecosystems influence SME growth in the health technology industry

As shown in the *R1 Culture Loop* in Figure 3, higher industry attractiveness strengthens entrepreneurial culture, which increases the rate of entrepreneurial entry. A higher entry rate then raises the number of SMEs in the industry, which further enhances industry attractiveness. This creates a reinforcing feedback loop in which entrepreneurial culture, SME growth, and industry attractiveness continuously amplify one another.

However, this dynamic is balanced by the *B1 Employment Loop*. As the number of SMEs in the industry increases, job opportunities in the market also rise. Greater job opportunities can draw potential or existing entrepreneurs into employment, reducing the rate of entrepreneurial entry. This balancing feedback loop counteracts the reinforcing culture loop by limiting entrepreneurial activity as employment alternatives become more attractive.

In addition to regional entrepreneurial culture, the rate of entrepreneurial entry is also influenced by the availability of intermediary services, including access to business support services such as incubators, law firms, and advertising agencies, which can lower barriers to starting and growing a business. Government support policies, specifically SME support policies in this context, further encourage entrepreneurial entry by providing institutional and financial support.

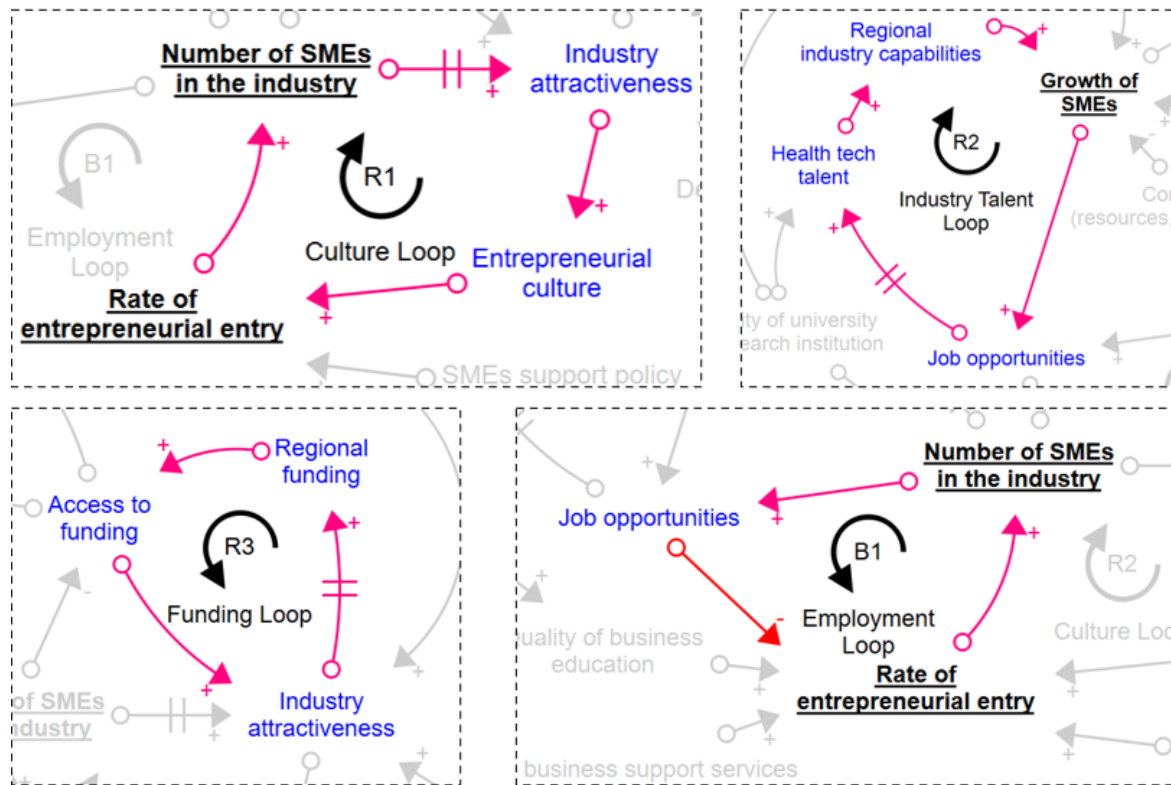


Figure 3 Reinforcing loops (*R1: Culture Loop*, *R2: Industry Talent Loop*, and *R3: Funding Loop*) and balancing loop (*B1: Employment Loop*) identified in the CLD

In addition, business education plays a crucial role in shaping individuals' capabilities and decisions to pursue entrepreneurship (Daniel et al., 2022). The quality of business education is influenced by the quality of universities and research institutions in the region, which contribute to talent development as well as knowledge creation and transfer (Arthur et al., 2023; Liu et al., 2020). In turn, knowledge transfer, which is shaped by the level of knowledge created, accessibility infrastructure, and the quality of networks, acts as a key mechanism for strengthening regional industry capabilities and supporting the growth of SMEs (Liu et al., 2020; Paasi et al., 2023; Vallejo-Imbaquingo & Robalino-López, 2025).

Regional industry capabilities are conceptualized as the collective strength of several distinct factors within a region, including knowledge, talent, regulatory conditions, and specialized complements, and they serve as key drivers of SME growth (Hosseinzadeh et al., 2022; Paasi et al., 2023). Among these factors, specialized complements refer to the presence of supporting systems, such as technologies, services, actors, and suppliers, that enhance SME capabilities, particularly in innovation-intensive industries such as health technology and aerospace. In the health technology context, these specialized complements include specialized manufacturing facilities, healthcare systems, material suppliers, and compliant digital platform providers that support innovation and commercialization.

Similar to the number of SMEs in the industry, the growth of SMEs also increases job opportunities. More job opportunities in the industry attract and develop talent within the health technology sector, which strengthens regional industry capabilities and, in turn, further supports the growth of SMEs. This forms the reinforcing *R2 Industry Talent Loop*, where

SME growth, talent development, and regional capabilities continuously reinforce one another.

At the same time, this growth dynamic is constrained by competition. As the number of SMEs in the industry increases, competition for critical resources, such as market demand, talent, and funding, also intensifies. This can reduce resource availability for individual firms and slow the growth of SMEs through a mechanism of oversaturation, placing natural limits on expansion as the industry becomes more crowded.

The growth of SMEs can also create industry leaders through success stories, which enhance industry attractiveness. Increased industry attractiveness can later stimulate greater regional funding, improving access to funding, which in turn further strengthens industry attractiveness. This forms the reinforcing *R3 Funding Loop*, where industry attractiveness and funding availability mutually reinforce one another.

Discussion

The results support established entrepreneurial ecosystem theory by further emphasizing the importance of context. While most CLDs tend to converge at the conceptual level, the key factors and system structures are more specialized and specific depending on location, industry, available resources, and the actors involved. For example, aerospace ecosystems are strongly influenced by product development and knowledge-transfer processes, while university ecosystems tend to emphasize research commercialization, and agricultural ecosystems, on the other hand, are more directly constrained by natural resources such as land and water (Daniel et al., 2022; Hosseinzadeh et al., 2022; Yung et al., 2023; Wurth et al., 2024). As a result, system dynamics studies appear to place particular emphasis on industry-specific complementary resources because these resources often determine how well an ecosystem performs.

Rather than developing an industry-agnostic CLD, this study applies the factors and causal relationships to the specific context of health technology and growth-oriented SMEs. This helps establish a clearer boundary and ensures that the model can capture factors that are more relevant to the industry. Moreover, health technology firms depend on deep innovation and have the potential for high growth, but their development also requires specialized resources and relationships. These may include clinical knowledge, research institutions, hospitals, regulatory support, investment, and commercialization capabilities.

The literature-informed CLD further suggests that entrepreneurial ecosystems should be studied using a multi-level analytical approach, as the structure and interdependent factors in ecosystems operate across different analytical levels. Macro-level factors, including regulation and government policy, influence meso-level factors such as regional funding, universities, support organizations, and professional networks. These factors then shape micro-level factors such as entrepreneurial entry, firm capability development, and SME growth. Studying only one level of analysis would therefore be likely to provide an incomplete picture of ecosystem behavior.

This study also demonstrates the value of system dynamics for entrepreneurial ecosystem research. While static models can identify important factors, they provide limited insight into indirect effects, feedback loops, time delays, and unintended consequences. A systems perspective instead shows how an intervention directed at one part of the ecosystem may influence several other factors before affecting the intended outcome. For example, policies that encourage new firm creation are often expected to strengthen the ecosystem by

increasing entrepreneurial activity. However, the CLD suggests that greater entry may generate both reinforcing and balancing effects. Although the present conceptual CLD does not test policy interventions directly, it establishes a foundation for later stakeholder validation, quantitative modeling, and policy simulation.

The CLD should nevertheless be understood as a preliminary representation of a health technology SME ecosystem that has not yet been empirically tested. Although every factor and causal relationship in the CLD was identified in at least one article in the review corpus, the model is based on a review and was synthesized by the first author. Given the complexity of entrepreneurial ecosystems and the exploratory nature of this study, not every relationship has been empirically tested.

Further validation is therefore required through qualitative interviews with stakeholders, including entrepreneurs, policymakers, universities, investors, and ecosystem support organizations. Interview data are currently being collected in the context of Bangkok's entrepreneurial ecosystem to refine the literature-based model. The revised model will then inform the development of a computational simulation model using quantitative data from Bangkok to examine behavior over time and test policy scenarios. Together, these stages will contribute to a more empirically grounded and policy-relevant understanding of SME growth within Bangkok's entrepreneurial ecosystem and the wider regional entrepreneurial ecosystem.

The current model also focuses mainly on within-region dynamics. Factors outside of the region such as flows of talent, knowledge, investment, and market access may be particularly important in health technology and should be considered in later stages of the research. Although interregional relationships could be incorporated into the model, doing so would substantially widen the scope and make the analysis difficult to interpret without a clearly defined context. For this reason, Bangkok and its adjacent provinces should be treated as a single regional entrepreneurial ecosystem and will serve as the unit of analysis in subsequent studies in the series.

Lastly, the review shows that the use of system dynamics in entrepreneurial ecosystem research remains limited. Both the SPIDER and PICO frameworks were tested before the main search. However, they produced only a small number of directly relevant studies, making the search scope too narrow. This limited evidence also suggests that the application of system dynamics to entrepreneurial ecosystem research remains an emerging area. However, system dynamics has been used more widely in related fields, including innovation, knowledge-transfer, and coopetition ecosystems (Liu et al., 2020; Paasi et al., 2023) and even more extensively in designing policy interventions in various areas. More entrepreneurial ecosystem research should adopt a system dynamics approach or at least incorporate complex system analysis.

Theoretically, this study applies system dynamics to an area in which its use remains underdeveloped and shows how entrepreneurial ecosystem elements can be represented as interacting causal structures rather than static factors. Practically, it highlights the need for policymakers to consider context, indirect effects, and interactions among actors when designing ecosystem interventions.

Conclusions

Entrepreneurial ecosystem research is still developing, and system dynamics offers a useful way to advance the field by capturing complexity, feedback processes, and changes

over time. This study is the first step towards developing a system dynamics model of SME growth. By synthesizing findings from the literature into a CLD, it provides an initial conceptual representation of the factors, relationships, and feedback processes that may shape SME growth. Although there are multiple factors affecting the growth of SMEs, the model highlights the central role of regional capabilities, universities and research institutions, and knowledge creation and transfer in enhancing growth within the region.

The CLD also points to the involvement of several key actors beyond just private companies, including universities, research institutions, intermediaries, complementary organizations, and government agencies. Strengthening collaboration across these groups could deepen ecosystem networks, improve the flow of knowledge and resources, and create more supportive conditions for SME growth.

Future research should apply policy-oriented systems perspectives, such as system dynamics, to entrepreneurial ecosystem research to examine how interventions may impact the system. It should also adopt a multi-level perspective that connects regions, organizations, and individuals to better capture the broader structure of the ecosystem. It is also essential to define the boundaries of the ecosystem clearly. This includes specifying the industry being studied, establishing criteria for which SMEs and organizations were included or excluded, and deciding whether factors outside the focal region and relationships between regions are included in the analysis.

Comparative studies across different industries within the same region would also help distinguish the effects of regional context from those of industry structure. For example, studying health technology industry and climate technology ecosystems in Cambridge could provide a clearer understanding of which characteristics are specific to the region and which are shaped by the distinct needs of each industry, which will ultimately assess the transferability of system dynamics models across entrepreneurial ecosystems.

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CONFIGURING COMMITMENT, CONTROL, AND EXPOSURE: A DIAGNOSTIC REORIENTATION OF FOREIGN MARKET ENGAGEMENT UNDER UNCERTAINTY

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Abstract

Firms operating across borders face conditions that inherited approaches to foreign market engagement were not designed to address. Geopolitical fragmentation, institutional reversal, and investment screening have produced an environment in which standard prescriptions generate contradictory guidance, because commitment, control, and exposure no longer move together as those prescriptions assume. This paper takes the configuring of these three dimensions as its analytical starting point: commitment as the reversibility of resource allocation, control as the governance of decision authority, and exposure as the dimension on which the consequences of the other two register. Because an action appropriate on one may be counterproductive on another, the three cannot be reasoned about in isolation. The paper is a conceptual synthesis. It reads four bodies of literature in the entry-mode and internationalisation traditions against a shared limitation: each treats uncertainty as a magnitude to be assessed, leaving unasked which kinds of uncertainty are in play. Its contribution is to reorient that prior question. The inherited prescription holds where the firm's unknowns are commercial and inverts where they are institutional: under governance uncertainty, reduced commitment can raise exposure rather than lower it, by forgoing the institutional standing on which the firm's position depends. Structural uncertainty, where the durability of the institutional architecture is itself in question, is the limit case of that inversion and a novel analytical category the inherited registers cannot represent.

Keywords: *International Business Strategy, Entry Mode, Governance, Uncertainty, Exposure, Structural Uncertainty*

Introduction

Firms operating across borders are facing conditions that the inherited approaches to foreign market engagement were not designed to address. Geopolitical fragmentation (Cui et al., 2025; Witt, 2019), supply chain discontinuity and decoupling pressure (Cui et al., 2023; Verbeke & Yuan, 2021), the spread of investment screening regimes (Li et al., 2024), and the reversal of institutional commitments once treated as durable (Gereffi et al., 2025; Luo & Van Assche, 2023) have together transformed the environment in which firms operate.

The standard guidance available to managers now frequently generates contradictory or inadequate prescriptions (Petricevic & Teece, 2019). The received orthodoxy holds that uncertainty calls for lower commitment (Johanson & Vahlne, 1977) and that asset specificity calls for greater control (Williamson, 1985). Yet a firm facing sudden regulatory reversal does not have its position improved by having committed incrementally, and a firm whose proprietary technology is at risk does not resolve its vulnerability by adjusting its equity stake. The categories through which managers have been taught to think about foreign engagement are producing strategic confusion at precisely the moment when clarity is most needed.

Commitment, control, and exposure neither move together in predictable ways nor stand in the relations to one another that the existing approaches assume.

The practical difficulty has a theoretical counterpart. Commitment, control, and exposure have each been theorised with rigour, but within distinct approaches and against distinct framings of the underlying problem. Transaction cost economics and internalisation theory (Anderson & Gatignon, 1986; Williamson, 1985) treat control as the central governance variable and develop an account of when integration is warranted. They address behavioural vulnerability within the transaction register, but treat the institutional environment as background and do not theorise the vulnerabilities that arise from it. The Uppsala model and its successors (Johanson & Vahlne, 1977; 2009) treat commitment as a dynamic process of accumulating market knowledge and engage with the experiential vulnerabilities of foreignness. They bracket questions of governance architecture, however, and have little to say about vulnerability to environmental reversal. Real options reasoning (Kogut, 1991) brings uncertainty explicitly into view and theorises financial exposure with precision. Its framing, however, presupposes the institutional stability whose absence defines the contemporary problem. The institution-based view (Henisz, 2000; Peng et al., 2008) brings governance uncertainty forward as a substantive concern. Yet it has tended to treat institutional context as a modifier of mode choice rather than as a variable that interacts in specifiable ways with the firm's commitment and control profile.

The fragmentation has been acknowledged for some time (Brouthers & Hennart, 2007; Hennart, 2009; Casson & Li, 2022) but has not been resolved. Exposure is dispersed across the approaches, each picking up an aspect without integrating it, and the three dimensions remain theorised separately rather than jointly. The existing approaches are therefore locally coherent but collectively insufficient.

Objectives

This paper takes the joint configuration problem as its starting point. It develops a diagnostic reorientation for cross-border engagement under uncertainty, treating commitment, control, and exposure as the axes against which the existing literature can be read and against which the firm's allocation problem can be specified. The argument proceeds through structured theoretical comparison. Each approach is evaluated diagnostically against the same problem structure, with the aim of identifying not only what each illuminates but where the constitutive blind spots lie, and why those blind spots follow from the approach's own foundational assumptions. The pattern that emerges across the four approaches is consistent and constitutes the paper's integrating diagnostic. Each approach is bounded by an analytical register that determines what counts as uncertainty within its frame. Within that register, uncertainty is treated as a quantity to be assessed in magnitude, and prescriptions are calibrated accordingly. The register itself is not interrogated, and uncertainty arising outside it either does not appear or appears in reduced form.

The paper takes a first step in this direction by distinguishing market, governance, and structural uncertainties that bear differently on the configuration of commitment, control, and exposure. This reorientation did not arise in the abstract. It emerged in the course of compiling an extended study of one firm's engagement in a Southeast Asian market, sustained across more than two decades, and is developed here as a first conceptual statement, ahead of the fuller theoretical development the reorientation requires and the empirical treatment that study will receive in turn.

To indicate what the reorientation yields concretely, one result can be stated in advance: under governance uncertainty, the standard prescription of reduced commitment can raise a firm's exposure rather than lower it, because shallow engagement forgoes the institutional standing on which the firm's position under discretionary action depends.

Yet the contribution is not integrative. The paper does not combine the four approaches into a composite model that retains each one's account of its favoured dimension. The diagnosis is precisely that no such combination reaches the problem: each approach is closed at the level of its register, so what one excludes, the others cannot supply by addition. The advance is instead a reorientation of the prior question: from how much uncertainty a market presents, to which kinds are in play and how they bear on the joint determination of commitment, control, and exposure. Structural uncertainty, a kind the inherited registers do not represent, is identified as part of that reorientation.

The reorientation is not confined to large multinationals. Smaller firms, which carry less institutional standing and hold thinner reserves against a misconfigured posture, are if anything more exposed to the trade-offs the diagnostic identifies. The irreversibility of commitment bites harder where slack is scarce, and the standing that buffers a firm under governance uncertainty is precisely what such firms have had least time to accumulate. For them the prior question of which kind of uncertainty is in play is not a refinement of strategy but a first-order condition of it.

The remainder of the paper proceeds in the following steps. The Allocation Problem sets out the allocation problem in these terms. The Analytical Approach specifies how the four bodies of literature are read against it. Theoretical Diagnostics carries out that reading. Uncertainty Conditions in Cross-Border Engagement distinguishes the uncertainty conditions that bear on the configuration. Diagnostic Implications draws out the implications for managers.

Conceptual Framework

The Allocation Problem

The configuration of cross-border engagement is approached here as an allocation problem with three dimensions: commitment, control, and exposure. Each picks out something the other two do not, and the paper's central claim is that they must be determined jointly rather than sequentially or in isolation.

Commitment refers to the degree to which a firm allocates financial, organisational, and strategic resources to a foreign market in ways that increase sunk costs and reduce reversibility. Higher commitment means fewer options to withdraw or change course without significant cost. Commitment is the resource-allocation dimension, and what it registers is the reversibility characteristics of the firm's posture, not the vulnerabilities to which that posture is subject.

Control refers to the extent to which a firm retains decision authority over value-creating activities. Control is not identical to ownership: a firm may own an operation without effectively directing how it functions, and may exercise meaningful influence without holding a majority stake. Control concerns the governance architecture of the engagement and is analytically distinct from the depth of resources committed to it.

Exposure refers to the degree to which a firm's assets, cash flows, and strategic position become vulnerable to external uncertainty through its chosen mode of engagement. It arises at three levels: asset exposure, the vulnerability of committed assets to value loss; cash flow exposure, the sensitivity of expected returns to regulatory change or exchange rate movement; and strategic-position exposure, the vulnerability of the firm's competitive standing to retaliation or institutional instability. Exposure is the vulnerability dimension, and it accommodates the operational vulnerabilities that attach to market engagement as such, alongside the institutional vulnerabilities that arise from the environment in which the engagement is embedded. These three levels are facets of a single residual rather than a taxonomy of independent kinds. Exposure is not a lever the firm sets alongside commitment

and control but the dimension on which their consequences register: the position that surfaces from how the two are configured.

The three dimensions are linked but not reducible to one another. The relationship between commitment and exposure warrants particular care, since the two are easily collapsed. They are not the same: exposure concerns the vulnerability of the firm's assets, returns, and position, while commitment concerns the reversibility of the resources it has allocated. Commitment shapes exposure rather than constituting it. A firm with low sunk costs and high reversibility can absorb supply disruption, demand variation, or regulatory change by withdrawing or redirecting resources at modest cost; a firm with high sunk costs cannot. Commitment alters the exposure the firm carries, most directly in its asset-exposure component, through the reversibility characteristics of how those assets are held. The strategic-position vulnerabilities that arise from the institutional environment do not originate in the firm's commitment, but the firm's commitment shapes how those vulnerabilities come to bear on it.

The justification for joint determination follows from a feature the existing literature does not register. The dimensions can move in opposing directions under the same conditions, through two distinct mechanisms. An action that is the appropriate response on one dimension may be the wrong response on another. The first instance runs through commitment. Deepening ownership of a foreign subsidiary is an act of commitment that raises asset exposure directly, since it enlarges the stock of committed assets vulnerable to value loss. More importantly, it also reduces the firm's capacity to respond to strategic-position exposure arising from institutional instability, since those resources are now harder to redeploy. The same act also increases control. The configuration of commitment and control therefore conditions how a firm can act on exposure, even when the exposure itself originates outside the firm's governance. The existing approaches have no internal mechanism for registering this trade-off because they theorise the dimensions separately.

The second mechanism, independent of the first, runs through control rather than commitment. Where a firm operates through a local partner, consolidating ownership to concentrate decision authority is the move the inherited logic recommends under asset specificity. That same move can remove the standing through which the partner buffered the firm against discretionary action, raising exposure on the strategic-position dimension even as control increases. The action appropriate on control is in that case counterproductive on exposure. Two independent mechanisms, one operating through commitment and one through control, can each set the dimensions against one another. This is what makes their joint determination a requirement rather than a refinement.

Allocation, on this view, is not a static distributional choice but a coupled process. Decisions taken at one moment produce the structural conditions that shape subsequent strategic possibilities. The configuration through which a firm engages a foreign environment is therefore continuously enacted rather than selected once and held. This processual character is what makes a comparative reading of governance modes insufficient as an analytical method. The question is not which mode is optimal but how the three dimensions are configured, sustained, and reconfigured over time. The next section turns to the existing literature to ask how well each major approach captures this allocation problem, and where each falls short.

Methodology

Analytical Approach

The four approaches examined here are among the principal theoretical lenses in the entry mode and internationalisation literatures. De Villa et al. (2015) systematic review names all four together, alongside a small number of further approaches, as the competing lenses on

market entry mode. Successive stocktaking reviews of entry-mode research identify them recurrently as the field's dominant theoretical frames (Brouthers & Hennart, 2007; Canabal & White, 2008). Dedicated reviews of risk and uncertainty in international business confirm that uncertainty is the organising problem these approaches address (Eduardsen & Marinova, 2020; Liesch et al., 2011; Sniazhko, 2019). The four approaches were selected because each provides the canonical account through which one dimension of the allocation problem has been theorised, or through which uncertainty itself was brought into the analysis. Between them they span the registers within which the problem has been posed: the transaction, the firm-market learning relationship, the financial value of flexibility, and institutional context.

Approaches not treated here do not change the diagnosis, for one of two reasons. Some operate downstream of these foundational statements and inherit the register the diagnosis concerns. Examining them would therefore re-exhibit the limitation rather than escape it. Others treat uncertainty as a magnitude to be assessed. This is the scalar treatment the analysis identifies as the shared limitation, so including them would extend the pattern rather than qualify it. Each approach treated here is read through its foundational statements and their principal revisions rather than through an exhaustive survey. The limitation at issue is constituted at the level of an approach's founding assumptions, and is inherited, not removed, by its later applications. The two further approaches named in De Villa et al. (2015) review illustrate the first reason. The eclectic paradigm is a composite that incorporates transaction cost and internalisation reasoning among its components, so its control logic is already examined here under transaction cost economics and internalisation theory. The industrial network approach extends the Uppsala lineage, whose network turn the 2009 revision draws into the model treated here.

The two questions were applied to each approach on the same criteria. A dimension counts as adequately theorised where the approach yields a determinate and internally grounded account of it, one in which the dimension is derived from the approach's own assumptions rather than entering from outside. A dimension counts as underspecified where it enters only as a by-product of another variable, or where the approach has no internal mechanism through which variation on it could be generated from its own assumptions. The further distinction is between a constitutive blind spot and an incidental omission: whether accommodating the missing dimension would require revising the approach's foundational assumptions, rather than extending its existing logic. Where revision is required, the gap is treated as constitutive of the register, rather than as a topic the approach has not yet got to. These criteria are stated so that the diagnostic basis is explicit and open to inspection, and so that a reader who would draw the boundaries differently can see precisely where and why.

Literature Review

1. Theoretical Diagnostics

Applied in turn, the two questions yield a consistent shape: transaction cost economics theorises control but not the institutional environment; the Uppsala model theorises commitment but not governance; real options theory theorises exposure under volatility but not institutional persistence; and the institution-based view theorises governance uncertainty but not joint configuration.

2. Transaction Cost Economics and Internalisation Theory

Transaction cost economics, as developed by Williamson (1985) and applied to foreign market entry by Anderson and Gatignon (1986), holds that asset specificity creates transaction hazards which hierarchical governance is best placed to manage. High specificity combined with high uncertainty pushes the firm towards internalisation, because the costs of opportunism in market exchange exceed the costs of bringing the activity within the firm.

Control, on this reading, is the central governance variable, and transaction cost reasoning provides a coherent and theoretically grounded account of when it should be sought.

Transaction cost economics identifies the conditions under which integration is warranted, distinguishes meaningfully between governance modes, and offers a determinate prescription for entry mode given a specification of the underlying transaction. Commitment is present in the approach as well, though in a derivative form. Specific assets are by definition difficult to redeploy, so committing them through a particular governance arrangement becomes the mechanism through which the firm signals credible engagement and reduces the hazard of partner opportunism. Commitment, in this reading, is an instrument of governance efficiency rather than a dimension to be managed in its own right. Transaction cost reasoning offers no explanation of how commitment evolves, and the static character of its allocation logic follows directly from this.

The analytical register transaction cost reasoning operates within is the transaction. Within that register, the approach addresses what may be termed behavioural vulnerability, meaning the difficulty of specifying and enforcing contracts, the unpredictability of partner conduct, and the hazards of information asymmetry between parties to an exchange.

This is the kind of vulnerability that governance structures are designed to manage. What lies outside the register, and therefore outside the approach's analytical reach, is the vulnerability that arises from the institutional environment in which the transaction is embedded. The regulatory framework governing the transaction may be revised, the political conditions may shift, the institutional basis on which the governance structure was designed may be altered by actors entirely outside the transactional relationship. Exposure of this kind is not a variable transaction cost economics can accommodate, because the boundary of the register places it beyond the approach's analytical reach.

The closure of the register is structural rather than accidental. Transaction cost reasoning is built to analyse governance efficiency within a given institutional environment, with the institutional environment taken as the stable backdrop against which transactional governance is designed. Treating the institutional environment as a variable would require revising foundational assumptions about the boundary of analysis, not extending the existing logic.

Within that register, a further consequence follows. Transaction cost reasoning treats uncertainty as a scalar magnitude that affects the efficiency calculus uniformly: greater uncertainty generally favours internalisation, because the costs of market governance rise with unpredictability. The approach therefore cannot distinguish between the qualitatively different uncertainty conditions that warrant different organisational responses. A firm facing market uncertainty about demand may benefit from preserved flexibility. A firm facing governance uncertainty about regulatory persistence, by contrast, may find that reduced commitment increases its vulnerability by removing the institutional weight and political relationships that come with deep local presence. The scalar treatment produces the same prescription in both cases.

3. The Uppsala Model and Its Successors

The Uppsala model, developed initially by Johanson and Vahlne (1977) and revised by them in 2009, was grounded in empirical observation of Swedish firms and drew on behavioural theory rather than economic logic. It introduces the commitment dynamic that transaction cost reasoning lacks. Internationalisation, on this reading, is a process of incremental engagement in which firms accumulate market knowledge, deepen their resource commitments as that knowledge develops, and progress through stages of involvement rather than selecting an optimal mode at a single decision point. The model is processual where transaction cost reasoning is static, and it engages with the experiential dimensions of foreignness in ways that supplement rather than displace the governance logic.

The analytical register the Uppsala model operates within is the firm-market learning relationship, with internationalisation understood as the gradual development of that relationship over time. Within that register, the model's contribution to the allocation problem is the temporal articulation of commitment. Commitment, on this reading, is not derived from asset specificity, or selected as the efficient response to a given transaction structure. Instead, it accumulates through engagement, conditioned by what the firm learns and the relationships it builds. The 2009 revision, which reframes the model around the network position of the firm and the liability of outsidership, brings relational and institutional texture into the analysis and engages with experiential vulnerability of a kind transaction cost reasoning brackets. A firm encountering a foreign market faces vulnerabilities of unfamiliarity, distance, and outsidership that are addressed through the gradual accumulation of knowledge and the gradual building of network position.

The Uppsala model underspecifies control and treats exposure unevenly. Governance architecture is largely bracketed; the question of how the firm structures its decision authority over value-creating activities is not the question the model is designed to answer. The processual logic operates at the level of resource commitment and market engagement rather than at the level of governance design. Exposure receives partial treatment through the experiential and relational vulnerabilities the model engages. It does not, however, theorise vulnerability to environmental reversal: the vulnerability that arises when the institutional conditions on which engagement was premised are revised by forces outside the relationship.

The model assumes a learning environment in which knowledge accumulated yesterday remains valid tomorrow. Under conditions of institutional reversal, this assumption fails, and the gradualism the model prescribes becomes an exposure-deepening rather than exposure-managing posture.

The constitutive blind spot follows from the model's foundational orientation. The Uppsala model is descriptive and process-oriented, derived from observation of how firms internationalised in conditions of relatively stable institutional environments. Its prescriptive force depends on the assumption that learning compounds and commitments deepen along trajectories the firm can read in advance. The model does not have an internal mechanism for registering that the trajectory itself may be disrupted. The conditions under which gradual commitment is the appropriate response cannot therefore be specified without reference to a theory of governance uncertainty the model does not contain.

4. Real Options Theory as Applied to Foreign Direct Investment

Real options reasoning, developed in financial economics and applied to foreign direct investment by Kogut (1991), brings uncertainty explicitly into view. The application treats irreversible investments as analogous to financial options, with the value of the option lying in the flexibility to defer commitment until uncertainty resolves. Where transaction cost reasoning advises integration under uncertainty and Uppsala advises gradualism, real options advises the preservation of optionality. Joint ventures, staged investments, and reversible commitments are valued not for their efficiency under given conditions but for the future strategic flexibility they preserve.

The analytical register real options reasoning operates within is the financial value of flexibility under volatility, with the firm's posture analysed in terms of the options it preserves and the conditions under which they may be exercised. Within that register, the contribution to the allocation problem is twofold. It theorises uncertainty as the central variable, where the previous approaches treated it as a parameter, and it theorises exposure with precision in the financial dimension. Cash flow exposure, the sensitivity of expected returns to environmental volatility, is the kind of exposure real options reasoning is built to address. Downside risk is priced; flexibility is valued; the firm's posture is calibrated to the volatility of the environment. The resulting analysis also engages, more loosely, with strategic-position exposure, in the

sense that preserved options retain the firm's capacity to respond to competitive developments that have not yet materialised.

However, this theory underspecifies control almost entirely. Real options reasoning treats governance structures as instruments for preserving or exercising options rather than as the central object of analysis. A joint venture, on this reading, is valued for its optionality rather than for its governance properties. The question of how decision authority is allocated within the venture, and how that allocation conditions what the firm can do, is beyond conceptual reach.

More importantly, real options reasoning treats uncertainty as financial volatility rather than as a governance phenomenon with institutional content. Volatility can be priced because it can be modelled; this is the theory's analytical strength. Yet uncertainty arising from institutional instability is not volatility in this sense. The conditions under which an option can in practice be exercised depend on the persistence of the governance environment within which the option was constructed. That environment is precisely what the financial framing assumes as background.

The structural limitation is that real options reasoning presupposes the institutional stability whose absence defines the contemporary problem. An option to expand a foreign operation is valuable only if the regulatory framework permitting expansion remains in place when the time comes to exercise it. An option to withdraw is valuable only if the conditions under which withdrawal generates expected returns persist. The prescriptions of real options reasoning are calibrated to environments in which the rules of the game are stable enough that volatility within them can be modelled. Under conditions where the rules themselves are in motion, the option calculus becomes unreliable in ways real options reasoning cannot internally diagnose.

5. The Institution-Based View

The institution-based view, developed in work by Henisz (2000) and Peng et al. (2008) among others, brings governance uncertainty forward as a substantive concern. Where transaction cost reasoning treats institutions as background, Uppsala assumes their stability, and real options abstracts them into volatility, the institution-based view places institutional context at the centre of strategic analysis. Political hazards, the credibility of government commitments, the structure of the regulatory framework, and the institutional distance between home and host environments become variables in the analysis rather than parameters held fixed.

The analytical register within which the institution-based view has predominantly operated is institutional context as a parameter affecting mode choice, with the firm's strategic problem framed as the selection of an appropriate mode under given institutional conditions. Within that register, the contribution is analytically substantial. It engages with strategic-position exposure of the institutional kind, theorising the vulnerabilities that arise from political risk, regulatory revision, and institutional instability. It distinguishes between formal and informal institutions, between developed and emerging market contexts, and between the different kinds of governance environments firms encounter. It offers resources for thinking about institutional complexity that the other three approaches lack.

The limitation is more subtle than in the previous cases and lies in how the institutional variable enters the analysis. The institution-based view has tended to treat institutional context as a modifier of mode choice rather than as a variable that interacts in specifiable ways with the firm's commitment and control profile. Higher political hazards, on this reading, push the firm towards different entry modes, lower equity stakes, or particular non-equity arrangements. While institutional context modifies the mode-selection calculus, the institution-based view retains the categorical structure of mode selection. It does not frame the allocation problem around the joint determination of commitment, control, and exposure.

This is the configurational question: how a firm should align its commitment depth, governance architecture, and exposure profile under specific institutional conditions. It is not the question the institution-based view is built to answer.

A further consequence follows from this. Because the institution-based view operates at the level of mode choice rather than configuration, it does not register the trade-offs that arise when the dimensions move in opposing directions. A firm facing institutional instability may need configurations that combine elements the institution-based view treats as alternatives, retaining substantial control while reducing certain forms of exposure, deepening certain commitments while preserving reversibility on others. The institution-based view brings governance uncertainty into view, but does so within an analytical structure inherited from the entry-mode literature. The joint configuration problem remains unresolved.

6. The Pattern Across the Literature

Read in sequence, the four approaches establish a progressive diagnosis. Transaction cost reasoning theorises control but treats the institutional environment as background. Uppsala introduces the commitment dynamic but assumes the stability of the learning environment. Real options brings uncertainty to the centre but in a financial framing that presupposes institutional persistence. The institution-based view brings governance uncertainty forward but within a mode-selection analytical structure that does not reach the joint configuration problem. Each step exposes a limitation in the previous framing rather than simply adding a variable, and the cumulative diagnosis is that the three dimensions of the allocation problem have been theorised separately rather than jointly. Table 1 summarises this diagnosis across the four approaches.

Table 1 Summary of the diagnosis: what each approach theorises and what it leaves outside its register.

Approaches	Analytical register	Dimension adequately theorised	Dimension underspecified	Treatment of uncertainty	Constitutive blind spot
Transaction cost economics and internalisation	The transaction	Control (central governance variable)	Commitment (derivative, static; no account of how it evolves)	Scalar magnitude; greater uncertainty favours internalisation	Institutional environment fixed as stable background; institutional exposure beyond the register
Uppsala model and successors	Firm-market learning relationship	Commitment (temporal accumulation through engagement)	Control (governance architecture bracketed)	Reducible through accumulated knowledge, presupposing a stable learning environment	Trajectory disruption unregistrable; gradualism becomes exposure-deepening under institutional reversal
Real options theory	Financial value of flexibility under volatility	Exposure (financial, cash-flow)	Control	Priced volatility presupposing institutional stability	Institutional instability is not modellable volatility
Institution-based view	Institutional context as a parameter of mode choice	Strategic-position (institutional) exposure	Interaction with the commitment and control profile (joint configuration)	Graded institutional parameter modifying mode choice	Mode-selection structure cannot reach joint configuration; opposing-direction trade-offs go unregistered

The integrating finding cuts across the four readings. Each approach is bounded by an analytical register that determines what counts as uncertainty within its frame: the transaction, the firm-market learning relationship, the financial value of flexibility, or institutional context as a parameter of mode choice. Within that register, uncertainty is treated as a quantity to be assessed in magnitude, and prescriptions are calibrated accordingly. What no approach does is ask which kinds of uncertainty are in play in a given engagement, how they combine, and how that combination bears on the joint configuration of commitment, control, and exposure.

Results

1. Uncertainty Conditions in Cross-Border Engagement

The analysis developed in the previous section identifies what existing approaches miss but does not yet specify the kind of uncertainty that may be in play. Market, governance, and structural uncertainty are read here not as three separate kinds but as degrees of one thing: how far the firm's unknowns reach into the institution. Where those unknowns are commercial, and the institution itself is not in question, the inherited scalar default holds. Where they concern the institution, it inverts. Structural uncertainty is the institutional case carried further still, to where the durability of the architecture itself is in question.

Market uncertainty is in this sense the absence of the institutional problem rather than a third kind. Structural uncertainty, by contrast, carries the governance question further: it is a matter of the durability of the rules rather than their application. The distinctions are offered as a first identification of what the analyst should attend to in configuring commitment, control, and exposure, not as a closed list.

Each marks a depth at which the firm's allocation problem assumes a recognisable shape. Each also bears on commitment, control, and exposure differently, as the firm's unknowns reach further into the institution. The conditions are analytically distinct but not mutually exclusive. More than one may be operative in a given engagement, with varying salience. The analytical work the specification supports is the recognition of how deep the operative uncertainty runs and with what weight, rather than the assignment of situations to discrete categories.

2. Market Uncertainty

Market uncertainty arises where the firm cannot tell in advance whether its offering will find demand, whether its operations will reach viable cost positions, or whether its competitive posture will hold against incumbents and entrants whose conduct cannot be specified ahead of engagement. What is in question here is the firm's own commercial position, not the rules under which the engagement operates. This is the case in which the unknowns are worked out through engagement itself.

Market uncertainty bears most directly on the commitment dimension. The inherited prescription of staged or reversible commitment is at its most defensible here, because the unknowns are worked out through engagement and the value of preserved optionality is high. Control and exposure are present but secondary. The governance architecture can be calibrated to the firm's existing competence in similar engagements, and exposure operates primarily through the financial dimensions that real options reasoning addresses with precision. Under market uncertainty, the reorientation developed here refines the inherited prescriptions rather than displacing them.

3. Governance Uncertainty

Governance uncertainty refers to conditions under which the institutional architecture is in place but the firm cannot rely on the consistency of its application. Regulatory authorities exercise discretion that cannot be specified in advance, enforcement patterns vary across jurisdictions and over time, and the conditions under which the firm's governance choices were made may be reinterpreted by forces operating within the regulatory environment. What

the firm faces is not a learning problem about the market but a relational and political problem about the institutional apparatus through which the market is governed.

Governance uncertainty bears differently on the three dimensions than market uncertainty does, and in ways the existing approaches tend to miscalibrate. Reduced commitment, the standard prescription under uncertainty, can paradoxically increase exposure under governance uncertainty. Shallow engagement removes the institutional weight, the local relationships, and the political legibility that condition how regulatory discretion is exercised. The capacity to respond to exposure when it materialises depends in part on the firm's positioning within the institutional environment, which deeper rather than shallower commitment may sustain.

Control under governance uncertainty is similarly complicated. The inherited prescription that asset specificity calls for full ownership treats control as a single dimension on which more is preferable to less. Under governance uncertainty, however, the firm's effective standing within the institutional environment may depend on the presence of a local partner whose relationships, political legibility, and accumulated institutional position buffer the engagement against discretionary action. Consolidating ownership concentrates decision authority in the firm, but removes the partner whose standing was part of the firm's exposure profile. The configurational logic that governance uncertainty calls for is therefore qualitatively distinct from the prescriptions market uncertainty supports.

4. Structural Uncertainty

Structural uncertainty arises where the institutional architecture's durability is *itself* contingent. It is the governance problem carried further into the architecture: where governance uncertainty concerns whether the firm can rely on the consistent application of the rules, structural uncertainty concerns whether those rules can be treated as durable at all. This usage diverges from the more familiar sense of structural in institutional economics, where the term connotes the durable features of the institutional environment. The paper, by contrast, treats durability itself as a contingent condition, rather than as a property that obtains by default. The variable is not how the operative rules will be applied to the firm but whether those rules can be treated as durable. Structural uncertainty is identified by the architecture's contingent durability, not by whether revision has yet been enacted. Its revisability is live, evident in recurrent but unresolved attempts at revision or in a signalled readiness to revise, rather than in the bare existence of a power to revise.

Structural uncertainty is recognisable through several mechanisms. Regulatory instruments may be alterable through low-friction procedure such as executive instrument or ministerial regulation, such that the conditions of lawful operation can be modified without the parliamentary passage that primary legislation would require. Legislative frameworks may be subject to recurring contestation that does not reach resolution, such that the operative regime is at no point settled and the firm cannot treat its position as durable. Regulatory regimes may be substantively revised or replaced by successor frameworks, such that the firm's compliance position is reconstituted not through anything the firm has done but through the substitution of one architecture for another.

Structural uncertainty bears on exposure in ways that neither market nor governance uncertainty do. The firm's strategic-position vulnerability arises not from the discretionary application of existing rules but from the contingent durability of the architecture within which any rules are made. Configurations that perform well under market or governance uncertainty, including those that build local institutional standing, may be of limited use under structural uncertainty. The institutional standing accumulated under one architecture does not transfer reliably to its successor. The implications for commitment and control are demanding. Configurations may need to retain reversibility on dimensions that the diagnostic reorientation would treat as appropriately committed, while sustaining engagement of a kind that allows

the firm to remain legible across architectural change. The full specification of these implications requires further development.

The analytical category of structural uncertainty is distinct from the vocabularies through which the four bodies of literature have approached institutional concerns. The institution-based view engages with political risk and with the variability of institutional contexts. It does so, however, within an analytical structure that treats the institutional environment as a parameter to be assessed, rather than as a variable subject to architectural revision. Real options reasoning addresses volatility within an institutional environment whose persistence it presupposes.

Transaction cost reasoning and the Uppsala model do not engage with the institutional architecture as an object of analysis at all. Structural uncertainty is therefore offered as distinct terminology for uncertainty the existing approaches have not specified. It is introduced here as a conceptual contribution.

Indeed, the diagnostic set out here was developed in the course of compiling an extended study of a well-known British firm's engagement, sustained across more than two decades, in a Southeast Asian market. Structural uncertainty in particular was identified through that work rather than derived in the abstract. The host architecture governing the firm's position was alterable through executive instrument without parliamentary passage. Across the period of engagement, it was also the object of recurring legislative initiatives that were repeatedly advanced and never brought to settlement. The durability of the architecture was therefore in active question throughout, not merely alterable in principle on the statute book. The engagement is also instructive in resisting the obvious reading. Across sustained governance and structural uncertainty, the firm consolidated its position over time and generated substantial value, eventually exiting through a contested process rather than being driven out by the conditions.

The case is not offered as evidence for the reorientation; it is noted to indicate that the diagnostic, and structural uncertainty above all, answers to a concrete engagement. The durability case requires separate treatment and is reserved for fuller development.

5. Combined Uncertainty Conditions

A given engagement may involve one uncertainty or several. It may involve market uncertainty about demand alone, or it may involve market, governance, and structural uncertainty together, as when uncertainty about demand combines with uncertainty about regulatory enforcement and uncertainty about the durability of the regulatory framework within which both operate. The analytical purpose of the specification is to support the diagnostic reading of such situations: identifying which uncertainty conditions are operative, and with what salience. This allows the configurational logic that follows to be calibrated to the operative uncertainty, rather than to a scalar reading of overall uncertainty.

The next section turns to the configurational logic and to the implications it carries.

Discussion

Diagnostic Implications

The diagnostic developed in the preceding sections supports a configurational rather than mode-selection approach to cross-border engagement. Where the existing literature asks which mode is optimal under given conditions, the configurational question is how commitment, control, and exposure should be aligned given the uncertainty conditions present in a particular engagement. Full specification of the alignment logic requires further development and is the subject of subsequent work. What the diagnostic supports at this stage is a set of orientational implications that follow from the reorientation it has established.

The first implication is that uniform caution across the three dimensions is not a defensible default. The standard prescription that uncertainty calls for lower commitment

treats the dimensions as co-varying responses to a scalar magnitude. The diagnostic has shown why that treatment is inadequate. Where the operative uncertainty is market uncertainty, reduced commitment is broadly appropriate and the inherited prescription holds. Where the operative uncertainty is governance uncertainty, reduced commitment may increase rather than reduce vulnerability. Shallow engagement removes the institutional standing through which the firm sustains its position under discretionary action.

Where the operative uncertainty is structural uncertainty, the configurational implications are less determinate. Configurations that build local institutional standing under the existing architecture may not transfer to its successor. The firm's posture must therefore accommodate the possibility of architectural revision, rather than calibrate to the existing architecture alone. Fuller specification of what this requires is the subject of subsequent work. The configurational logic that follows is therefore uncertainty-specific. Prescriptions appropriate to one uncertainty condition may directly contradict prescriptions appropriate to another.

The second implication is that some configurations the existing approaches would treat as suboptimal may be the right responses under certain uncertainty conditions. A firm facing governance uncertainty may benefit from configurations that combine two things: deeper commitment than a scalar uncertainty reading would warrant, and control structures that retain a local partner whose institutional standing the firm itself cannot replicate. The inherited mode-selection logic would treat such a configuration as a compromise on control efficiency. The configurational reading would treat it as the appropriate response to the uncertainty. A firm facing structural uncertainty may need configurations that retain reversibility on dimensions the diagnostic would treat as appropriately committed, while sustaining engagement of a kind that allows the firm to remain legible across architectural change. These configurations are counterintuitive only against the inherited prescriptions; against the uncertainty, they are coherent.

The third implication is that the configurational question is processual rather than singular. The operative uncertainty in a given engagement can shift over time. Uncertainty conditions that were absent at entry may become dominant later, or the relative weight of the uncertainty conditions already present may change as the engagement matures. The configurational logic must therefore accommodate reconfiguration rather than treating the entry decision as the moment at which the engagement is settled. This is consistent with the processual view of allocation set out earlier. It also reinforces the inadequacy of static mode-selection as the analytical method.

Taken together, the practical force of the reorientation for managers is a change in the order of questions rather than a new menu of modes. As the Introduction noted, the inherited categories generate strategic confusion at the moment clarity is most needed. They calibrate commitment, control, and exposure against a single reading of how much uncertainty a market presents. The reorientation offers a diagnostic step managers can apply immediately: before calibrating commitment, establish which kind of uncertainty is operative, and with what weight. Where the operative kind is market uncertainty, the familiar default holds and reduced or staged commitment is broadly appropriate. Where it is governance uncertainty, the manager should be wary of that default: lower commitment can remove the standing the firm's position depends on, raising exposure rather than lowering it. Where it is structural uncertainty, managers should recognise that standing built under the present architecture may not survive its revision. A posture calibrated only to present rules may therefore misread the firm's actual position. This is a discipline of diagnosis rather than a prescription: it tells managers what to establish before deciding, not what to decide.

Conclusions and Implications

This paper has developed a diagnostic reorientation of how foreign market engagement is theorised. The argument has proceeded in three moves. The first established the allocation problem as the joint determination of commitment, control, and exposure. Each dimension picks out something the others do not, and the three stand in relations the existing literature has not adequately specified. The second read four approaches diagnostically against this problem structure. Each illuminates one dimension with substantial precision, but generates blind spots that follow from its foundational assumptions. The third showed that the inherited default holds where the firm's unknowns are commercial and inverts where they are institutional, with structural uncertainty the limit case, where the durability of the architecture itself is in question.

The integrating finding cuts across the four bodies of literature. Each is bounded by an analytical register that determines what counts as uncertainty within its frame. Within that register, uncertainty is treated as a quantity to be assessed in magnitude, generating prescriptions calibrated accordingly. The prior question, which kinds of uncertainty are in play in a given engagement and how they bear on commitment, control, and exposure jointly, is not asked. The reorientation is from asking how much uncertainty a market presents, to asking how far the firm's unknowns reach into the institution: the inherited default holds while they remain commercial and inverts once they become institutional. This inversion, with structural uncertainty as its limit case, is the paper's central conceptual contribution. The advance over the existing literature is therefore not the addition of a further variable, nor the integration of the four approaches into a composite, but a change in the prior question the analyst asks. That change reorders how commitment, control, and exposure are reasoned about, and brings into view the structural case, the limit of that inversion, which the inherited registers cannot represent.

The reorientation's further development requires two lines of work. One is a fuller specification of the alignment logic between uncertainty conditions and configurations, including when counterintuitive configurations are warranted and what trade-offs arise as conditions combine. Another is a longitudinal single-case study, tracing one firm's engagement over more than two decades, through which the diagnostic is itself developed. Its central task is to separate episodes in which commitment, control, and exposure move together from episodes in which they diverge. A single governance action can otherwise load onto more than one dimension at once, obscuring the trade-off the diagnostic identifies. The case is also expected to develop structural uncertainty further, because it resists the obvious reading. Under sustained, contested institutional architecture, the firm did not fail, but consolidated its position over time.

Several limitations should be stated explicitly. This paper offers a first conceptual statement of the diagnostic and the reorientation that follows from it. The three conditions are offered as a first identification of what the analyst should attend to, not as a closed set. The alignment between uncertainty conditions and the firm's posture is sketched rather than -specified. Structural uncertainty, the most novel of the three conditions, is named and bounded here, rather than given its full specification. The reorientation is developed within the international business literature on foreign market engagement. Whether it carries to other domains, in which commitment, control, and exposure interact under qualitatively distinct uncertainties, is left open. These are boundaries the paper draws deliberately, not gaps it has overlooked.

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WHY DOES GOOD LOGISTICS NOT DRIVE GROWTH? MARITIME CONNECTIVITY, TRADE OPENNESS, AND THAILAND'S CONTAINER THROUGHPUT GAP IN ASEAN

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Abstract

Thailand consistently ranks second or third among the eight Association of Southeast Asian Nations (ASEAN) economies studied on the World Bank Logistics Performance Index (LPI), yet its container throughput, measured in Twenty-foot Equivalent Units (TEU), ranks only fourth to fifth within the same group and has grown at roughly half the pace of the faster-growing economies within the ASEAN-8 sample over 2007–2023. This paper investigates the structural factors behind this paradox using an unbalanced panel of eight ASEAN economies across seven LPI release years (2007–2023). The full dataset contains 55 country-wave observations; after restricting to waves with available TEU data, the regression sample reduces to $N = 45$.

Three structural constraints emerge. First, Thailand's Liner Shipping Connectivity Index (LSCI) trails Singapore by 330–380 points without any convergence over sixteen years, placing Thailand in a feeder-port position rather than a primary hub on main shipping routes. Second, inbound Foreign Direct Investment (FDI) does not translate into additional cargo, consistent with a domestic-consumption orientation of investment rather than an export-manufacturing base. Third, Thailand's trade openness lags behind Singapore and Vietnam within the ASEAN-8 sample. Together, these three factors explain a residual efficiency gap of approximately 27%, leaving Thailand ranked sixth of eight in country fixed-effects despite its strong logistics scores.

Wild Cluster Bootstrap confirms that Thailand's sensitivity to shipping connectivity improvements and its above-average Gross Domestic Product (GDP) elasticity are both statistically significant at the 5% level — meaning structural improvements would yield outsized throughput returns. Policy simulations show that a 10% GDP increase raises TEU by 11.4% and a 50-point LSCI Improvement raises TEU by 4.1%, while further investment in LPI yields near-zero within-country gains. Closing the gap requires coordinated action across shipping-route integration, export-oriented FDI attraction, and trade facilitation — not further investment in logistics quality that is already among ASEAN's best.

Keywords: *Maritime container throughput, LPI, LSCI, Trade Openness, FDI, ASEAN, Panel Data, Wild Cluster Bootstrap*

Introduction

Laem Chabang Port alone recorded 9.46 million TEU in fiscal year 2024, up from 8.67 million TEU the previous year, making Thailand one of Southeast Asia's major maritime gateways (The Nation, 2024). Yet a persistent question confronts policymakers: why does strong logistics capability fail to translate into proportionate cargo volume, and why does the maritime sector not act as a primary driver of GDP growth? Thailand's economic performance has become heavily dependent on tourism receipts — a sector vulnerable to exogenous

shocks. If its maritime infrastructure could be more fully utilised, it would provide a more stable and scalable source of national income.

Prior literature confirms positive relationships between LPI scores and trade volumes (Sy et al., 2020; Mahpour et al., 2023) and between LSCI and port throughput (Liu et al., 2026; Noosuwan et al., 2024). However, country-specific studies that decompose the within-country efficiency gap using panel fixed effects and robust small-sample inference remain rare for ASEAN. This paper fills that gap by testing three structural hypotheses and employing Wild Cluster Bootstrap (Cameron et al., 2008) to produce reliable inference with only eight country clusters.

This paper addresses the following research questions:

1. Why does Thailand's maritime logistics sector appear active and well-ranked, yet fail to serve as a primary engine of GDP growth?
2. Which structural factors — shipping connectivity, investment composition, or trade openness — most constrain Thailand's container throughput relative to its logistics capability?
3. What targeted interventions can convert Thailand's existing logistics infrastructure into a meaningful driver of national income?

The remainder of this paper is organised as follows. Section 2 reviews the relevant literature. Section 3 states the paper's objectives. Section 4 sets out the conceptual framework. Section 5 states the research hypotheses. Section 6 describes the data and empirical strategy. Section 7 presents the empirical results. Section 8 discusses the findings in relation to the literature. Section 9 offers policy recommendations. Section 10 concludes.

Literature Review

1. Logistics Performance and Trade Volume

Existing studies confirm that logistics performance raises trade volumes, but the aggregate LPI conceals important heterogeneity across its components. Sy et al. (2020) using an augmented gravity model across ASEAN, find that operational outputs — timeliness and tracking — consistently drive trade flows, while customs effects are weaker or mixed. Lee (2022) confirms this in a Korea–RCEP study where the clearance sub-index lacked significance even as infrastructure remained a positive predictor. Katrakylidis et al. (2026), in a Mediterranean panel study using static fixed effects and system GMM, find that limited within-country variation in LPI reduces identifying variation in FE models — explaining why LPI appears significant in cross-sectional settings but not within-country estimations. Mahpour et al. (2023) estimate a 0.8% trade increase per 1% logistics improvement, but note this elasticity operates mainly through cross-sectional variation rather than within-country change over time. Seok and Soon (2024) further demonstrate that trade openness and logistics performance interact jointly, with logistics affecting trade primarily through GDP rather than through a direct one-step channel. This body of evidence is precisely the pattern observed in our data — LPI is significant in Pooled OLS but loses significance entirely under country fixed effects — confirming that further LPI improvement alone cannot close Thailand's throughput gap.

2. Shipping Connectivity and Port Throughput

The LSCI is a more direct predictor of port throughput than aggregate logistics indices, because it captures the structure of shipping route networks rather than administrative capability. Liu et al. (2026), in a panel threshold ARDL for ASEAN, find that maritime connectivity — particularly vessel-size acceptance — strongly improves national shipping performance, with a non-linear threshold effect: below a critical connectivity level, port infrastructure improvements yield limited throughput gains. Noosuwan et al. (2024) document

that higher-LSCI economies exhibit diverging throughput trajectories over time, with connectivity-rich ports pulling progressively more cargo. Chen et al. (2014) provide direct evidence that trade liberalisation events that open shipping routes are associated with measurable increases in container throughput, and that industrial GDP significantly drives port volume — reinforcing the link between economic structure and shipping connectivity. GMM estimates further suggest LSCI improvements are associated with export capacity increases of up to 2.82% per unit (Mahlous et al., 2024). These findings directly underpin H1: Thailand's persistent LSCI gap of 330–380 points below Singapore, without any convergence over sixteen years, structurally constrains throughput regardless of logistics quality.

2. FDI Composition, Trade Openness, and Export Cargo

The relationship between FDI and export cargo depends critically on investment type. Andersen et al. (2023) show in a panel of ASEAN economies — including Thailand — that FDI positively predicts manufacturing export value, but with important heterogeneity across investor origins and sectors: the effect is concentrated in export-platform FDI, not domestic-market investment. Mohamed and Liew (2023) further demonstrate that Japanese FDI historically expanded export-oriented industries in ASEAN, while diversion of FDI to China reduced manufacturing expansion in the region — illustrating that FDI composition shifts directly affect cargo generation. Jongwanich and Kohpaiboon (2008) confirm this channel for Thailand specifically, showing that export performance is driven by export-oriented ownership, not FDI in aggregate. Cole et al. (2010) add that investor origin matters independently, implying that a shift in Thailand's FDI composition toward export-manufacturing would yield meaningfully different logistics demand than the current domestic-oriented stock. On trade openness, Canbay et al. (2026) find across ASEAN that higher openness amplifies the throughput return to connectivity improvements, while low openness mutes it. Idris et al. (2017) confirm bidirectional causality between trade openness and GDP growth in panel data, and Jošić (2023) documents the openness-GDP nexus across country samples. Senquiz-Diaz (2021) confirms that transport infrastructure quality raises exports only when combined with sufficient trade openness. These results collectively support H3 and clarify H2: Thailand's domestic-oriented FDI base suppresses trade openness, which in turn limits the cargo-generating potential of its port infrastructure.

Taken together, the existing literature establishes that logistics performance, shipping connectivity, FDI composition, and trade openness all matter for port throughput — but leaves an important gap. Country-specific studies that decompose the within-country efficiency gap using panel fixed effects and robust small-sample inference remain rare for ASEAN, and none have applied Wild Cluster Bootstrap to address the small-cluster problem in this context. This paper fills that gap by focusing on Thailand as a case of persistent underperformance despite strong logistics quality, testing three structural hypotheses with exact bootstrap inference.

Objectives

This paper therefore pursues three objectives:

1. To quantify Thailand's container throughput efficiency gap relative to its logistics fundamentals and identify how large this gap is compared to ASEAN peers.
2. To identify the structural constraints — shipping connectivity, FDI composition, and trade openness — that drive this gap, using panel fixed-effects estimation and Wild Cluster Bootstrap inference.
3. To derive actionable policy recommendations for both government and private sector that would most effectively convert Thailand's existing logistics infrastructure into a primary driver of national income.

Conceptual Framework

This paper conceptualises Thailand's container throughput (ln TEU, the natural log of annual container throughput) as a function of four structural fundamentals — logistics performance (LPI), economic scale (GDP), inward investment (FDI), and shipping connectivity (LSCI) — estimated within a country- and wave-fixed-effects panel framework: $\ln TEU_{it} = \beta_0 + \beta_1 LPI_{it} + \beta_2 \ln GDP_{it} + \beta_3 \ln FDI_{it} + \beta_4 LSCI_{it} + \alpha_i + \lambda_t + \varepsilon_{it}$. The country fixed effect (α_i) captures each economy's time-invariant structural position — including whether it sits on a primary shipping trunk route or in a feeder-port role — and is the empirical device used to quantify Thailand's residual efficiency gap. Three Thailand-specific interaction terms ($\text{Thai} \times \text{LPI}$, $\text{Thai} \times \ln \text{GDP}$, $\text{Thai} \times \text{LSCI}$) are added to this baseline to test whether Thailand's throughput responds differently to each fundamental than the ASEAN average does, directly operationalising Hypotheses H1–H3 below: connectivity (H1) and trade openness (H3) are hypothesised to bind as structural constraints, while investment composition (H2) is hypothesised to be structurally disconnected from cargo generation because it is not export-oriented. Taken together, logistics quality, connectivity, FDI composition, and trade openness jointly determine throughput, but only the last three vary enough for Thailand specifically to explain its persistent underperformance relative to its strong LPI ranking.

Research Hypotheses

Drawing on the literature reviewed in Section 2, this paper tests three structural hypotheses about the determinants of Thailand's container throughput gap. Each hypothesis is directly testable using the panel data described in Section 6.

H1 — Connectivity Constraint: Thailand's TEU underperformance is driven primarily by its structural position as a feeder port rather than a primary hub on main shipping routes, as captured by a persistently low LSCI relative to regional leaders. This predicts a positive and significant Thailand-specific LSCI interaction term in the panel models.

H2 — Investment Composition Constraint: Inbound FDI does not generate additional containerised export cargo because it is disproportionately oriented toward domestic-market industries rather than export-manufacturing. This predicts that aggregate FDI will be statistically insignificant across all panel specifications.

H3 — Trade Openness Constraint: Thailand's below-average trade openness reduces the demand for containerised transport services, independently of logistics quality. This predicts that trade openness will enter as a positive and significant predictor in augmented model specifications.

All three constraints are hypothesised to be mutually reinforcing: improving any single factor in isolation will not fully close the throughput gap.

Methodology and Data

1. Data

The sample covers eight ASEAN economies — Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam — at seven LPI release years (2007, 2010, 2012, 2014, 2016, 2018, 2023). The full dataset contains 55 country-wave observations across all variables. After restricting to waves with available TEU data, the regression sample reduces to $N = 45$. TEU is unavailable for 2007 and for Cambodia/Indonesia in 2023; OPEN is unavailable for Myanmar throughout. The dependent variable is ln TEU (natural log of annual container throughput), sourced from UNCTAD (2024). Explanatory variables include: aggregate LPI; LSCI (UNCTAD); ln GDP and ln FDI (World Bank, 2024; 2023); and trade openness $OPEN = (\text{exports} + \text{imports})/\text{GDP} (\%)$. The regression sample shrinks from 55 to 45 observations because of missing TEU data (2007; Cambodia and Indonesia in 2023) and

missing OPEN data (Myanmar throughout); these gaps appear plausibly random with respect to the outcome (missing completely at random/missing at random) rather than driven by unusually high or low throughput, though this cannot be formally tested with the available panel.

2. Empirical Strategy

The baseline specification is: $\ln TEU_{it} = \beta_0 + \beta_1 LPI_{it} + \beta_2 \ln GDP_{it} + \beta_3 \ln FDI_{it} + \beta_4 LSCI_{it} (+ \beta_5 OPEN_{it}) + \alpha_i + \lambda_t + \varepsilon_{it}$, where α_i are country fixed effects, λ_t wave fixed effects, and ε_{it} the idiosyncratic error. The term $(+ \beta_5 OPEN_{it})$ in parentheses denotes the augmented specification, adding trade openness ($OPEN = (\text{exports} + \text{imports})/GDP$) to test H3 — OPEN is unavailable for Myanmar so its inclusion slightly reduces the sample. Standard errors are clustered at the country level (Arellano, 1987). Four estimators are compared: Pooled OLS, Country FE, Random Effects (Swamy-Arora FGLS), and Two-Way FE. Specification selection uses F-test, Breusch-Pagan LM test, and Hausman test. Thailand-specific interaction terms ($\text{Thai} \times LPI$, $\text{Thai} \times \ln GDP$, $\text{Thai} \times LSCI$) test H1–H3 directly. Wild Cluster Bootstrap (WCB-R) with exhaustive $2^8 = 256$ Rademacher patterns produces exact p-values under the small-cluster setting (Cameron et al., 2008). It is important to note that WCB-R corrects standard-error bias arising from the small number of country clusters (8), but it does not address a separate limitation: the Thailand-specific interaction terms ($\text{Thai} \times LSCI$, $\text{Thai} \times \ln GDP$) are identified from only 6–7 Thailand time points, so these coefficients should be interpreted with corresponding caution. Although the Hausman test does not formally reject Random Effects ($\chi^2(4) = 0.914$, $p = 0.923$), Country FE and Two-Way FE are retained as the preferred specifications because the paper's research questions concern within-country structural change rather than between-country variation, and because RE relies on a zero-correlation assumption between the country effects and regressors that is difficult to justify given the LPI/LSCI patterns documented in Section 2.1.

Empirical Results

1. Descriptive Evidence: Thailand's Trajectory

Figure 1 plots TEU volume, LPI score, LSCI, and TEU growth index (base 2010 = 100) for all eight ASEAN economies. Four observations stand out. First, Thailand's TEU CAGR of 4.71% over 2010–2018 significantly trails Vietnam (9.60%) and the Philippines (7.05%), as shown in Table 2 and panel (d). Second, Thailand's LPI has remained consistently 2nd–3rd in ASEAN. Third, the LSCI gap versus Singapore persisted at 330–380 points with no convergence — consistent with H1. Fourth, the divergence in TEU growth accelerated after 2018.

2. The Thailand Paradox

Figure 2 formalises the paradox: Thailand occupies the high-LPI band (green) throughout the sample, yet its TEU rank and TEU/GDP efficiency fall consistently in the mid-to-lower tier (red). Table 2 confirms this — Thailand's LPI rank has been 2nd or 3rd in every wave while TEU rank has been 4th–5th. Table 3 quantifies the gap directly: the LSCI distance between Thailand and Singapore has ranged from 330 to 380 points throughout the period with no sign of convergence, while Thailand's TEU represents only 25–30% of Singapore's throughput.

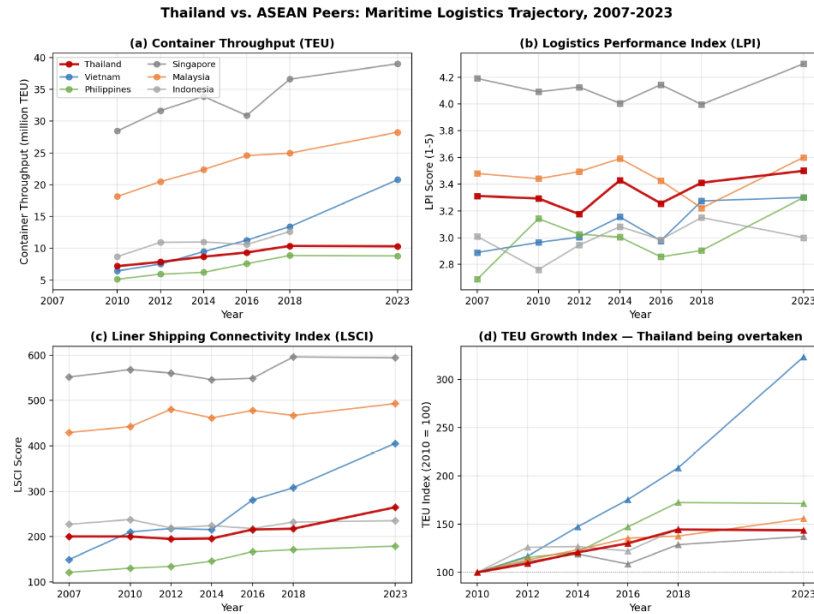


Figure 1 Maritime Logistics Trajectory 2007–2023: Thailand vs. ASEAN Peers. (a) TEU volume, (b) LPI score, (c) LSCI, (d) TEU Growth Index (2010 = 100).

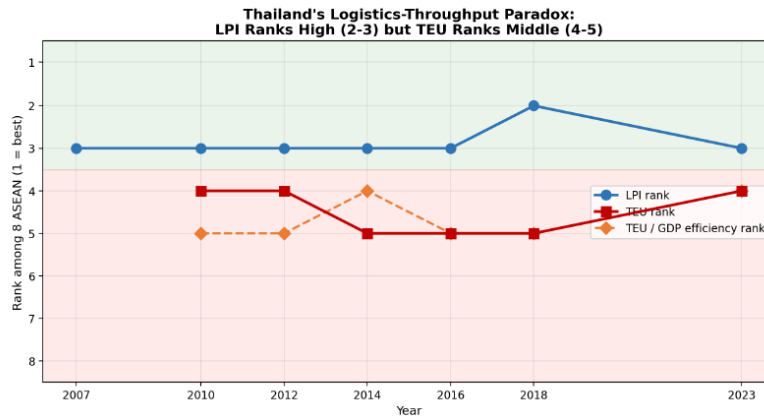


Figure 2 Thailand's Rank Paradox: High LPI, Middle-Tier TEU. Green = LPI rank band; red = TEU and TEU/GDP rank band.

Table 1 Thailand's Rankings within ASEAN-8 (1 = Best)

Year	LPI Rank	TEU Rank	LSCI Rank	TEU/GDP Rank	LPI	TEU (M)	LSCI
2007	3	—	4	—	3.31	—	200
2010	3	4	5	5	3.29	7.18	200
2012	3	4	5	5	3.18	7.85	195
2014	3	5	5	4	3.43	8.66	196
2016	3	5	5	5	3.26	9.34	216
2018	2	5	5	5	3.41	10.37	217
2023	3	4	4	4	3.50	10.31	265

Note. Rankings computed within each LPI wave across ASEAN-8. TEU/GDP = containers per USD billion of GDP.

Table 2 Growth Rates of TEU, LPI, and LSCI by Country

Country	TEU CAGR 2010–2018 (%)	Δ LPI 2007->2023	Δ LSCI 2007->2023
Thailand	4.71	+0.189	+64.4
Singapore	3.21	+0.110	+42.5
Vietnam	9.60	+0.411	+256.4

Malaysia	4.07	+0.120	+63.6
Indonesia	4.78	-0.010	+7.7
Philippines	7.05	+0.611	+57.9
Cambodia	11.62	-0.098	+21.3

Note. TEU CAGR computed over 2010–2018 for comparability. Thailand highlighted. Vietnam and Cambodia grew significantly faster despite weaker LPI scores.

Table 3 Thailand vs. Singapore: Persistent Gap, 2007–2023

Year	Gap LPI (SG – TH)	Gap LSCI (SG – TH)	TEU Thailand / TEU Singapore
2007	0.879	351.7	—
2010	0.798	367.9	25.3%
2012	0.950	365.8	24.8%
2014	0.575	350.3	25.6%
2016	0.889	333.5	30.2%
2018	0.585	378.6	28.3%
2023	0.800	329.8	26.4%

Note. Positive values = Singapore higher than Thailand. LSCI gap of approximately 330–380 points persists throughout the entire period with no convergence trend, directly supporting H1.

3. Baseline Regression Results

The F-test strongly rejects pooled OLS in favour of country fixed effects ($F(7,33) = 22.919$, $p < 0.001$). The Breusch-Pagan LM test rejects pooled vs. random effects ($\chi^2(1) = 40.146$, $p < 0.001$). The Hausman test does not reject random effects ($\chi^2(4) = 0.914$, $p = 0.923$), but Country FE and Two-Way FE are preferred given the research focus on within-country dynamics. Key findings: $\ln$ GDP is the most robust driver across all specifications. LPI is insignificant in all fixed-effects models — confirming it captures between-country differences absorbed by country dummies, consistent with the literature (Section 2.1). FDI is insignificant throughout, supporting H2. LSCI is significant in Pooled OLS and RE but not under FE, indicating its main effect also operates between countries.

Table 4 Baseline Results: $\ln$ TEU

Variable	(1) Pooled OLS	(2) Country FE	(3) RE (FGLS)	(4) Two-Way FE
Constant	-6.0951* (2.8064)	—	-10.1923* (5.0627)	—
LPI	0.2728 (0.2383)	-0.0454 (0.1043)	0.1018 (0.0598)	0.0625 (0.1428)
$\ln$ GDP	0.8042*** (0.0961)	1.1344*** (0.3000)	0.8995*** (0.1786)	1.6809** (0.6951)
$\ln$ FDI	-0.0505 (0.0727)	0.0500 (0.0671)	0.0602 (0.0571)	0.0276 (0.0592)
LSCI	0.0042*** (0.0004)	0.0008 (0.0010)	0.0026** (0.0008)	0.0016 (0.0010)
N	45	45	45	45
Clusters (countries)	8	8	8	8
R ² (within)	—	0.846	—	0.608
R ² (overall)	0.973	0.995	0.949	0.996
Country FE	No	Yes	Yes	Yes
Wave FE	No	No	No	Yes
F-test [p]	F(7,33)=22.919 [0.000]			
BP-LM [p]	$\chi^2(1)=40.146$ [0.000]			
Hausman [p]	$\chi^2(4)=0.914$ [0.923]			

Note. Dependent variable: $\ln$ TEU. Cluster-robust SE (country) in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

4. Thailand-Specific Interaction Models

Table 5 reports four Thailand interaction models under Two-Way FE. Model I2 finds $\text{Thai} \times \ln \text{GDP} = +1.796^{**}$ ($p = 0.025$): Thailand's TEU elasticity with respect to GDP is

significantly higher than the ASEAN average — 4.4% per 1% GDP growth versus 2.6% for peers — representing both an opportunity and a vulnerability. Model I3 finds $\text{Thai} \times \text{LSCI} = +0.0068^*$ ($p = 0.058$ conventional; upgraded to $p_{\text{WCB}} = 0.035$ under Wild Cluster Bootstrap). This confirms H1 directly: every unit of LSCI improvement yields proportionally more TEU for Thailand than for the average ASEAN country. LPI interaction (I1) is positive but not significant. The joint model (I4) confirms both GDP and LSCI interactions remain positive, though joint estimation reduces individual precision. These Thailand-specific coefficients should be read with the sample size in mind: because Thailand contributes only 6–7 country-wave observations to the panel, the interaction terms carry less identifying variation than the pooled cross-country coefficients, even where WCB-R confirms their statistical significance.

Table 5 Thailand-Interaction Models (Two-Way FE)

Variable	(I1) Thai×LPI	(I2) Thai×GDP	(I3) Thai×LSCI	(I4) Joint
LPI	-0.0291 (0.1614)	-0.0031 (0.1230)	0.0303 (0.1446)	-0.0337 (0.1458)
Thai × LPI	0.9748 (0.5782)	—	—	0.4085 (0.2607)
ln GDP	2.1470** (0.7809)	2.5948*** (0.6920)	2.5074** (0.7443)	2.8731** (0.8389)
Thai × ln GDP	—	1.7960** (0.6331)	—	1.1382** (0.3581)
ln FDI	0.0227 (0.0641)	0.0318 (0.0590)	0.0150 (0.0608)	0.0218 (0.0664)
LSCI	0.0012 (0.0011)	0.0008 (0.0010)	0.0009 (0.0010)	0.0006 (0.0011)
Thai × LSCI	—	—	0.0068* (0.0030)	0.0035 (0.0026)
N	45	45	45	45
R ² (within)	0.649	0.692	0.683	0.716

Note. Two-Way FE (country + wave). Cluster-robust SE in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Thai dummy absorbed by country FE. Highlighted rows = key Thailand-specific effects.

Table 6 Variance Inflation Factors (VIF), Model I4 (Joint Interaction Model)

Variable	VIF
LPI	8.58
Thai × LPI	1,420.56
ln GDP	1.93
Thai × ln GDP	1,049.56
ln FDI	4.29
LSCI	8.21
Thai × LSCI	115.16

Note. VIF computed on the Model I4 regressors (LPI, Thai×LPI, ln GDP, Thai×ln GDP, ln FDI, LSCI, Thai×LSCI) via an equivalent least-squares-dummy-variable specification with country and wave fixed effects. $\text{VIF} > 10$ is conventionally taken to indicate problematic multicollinearity.

Table 6 reports variance inflation factors for the joint interaction model (I4). The three Thailand-specific interaction terms carry very high VIF (Thai×LPI = 1,420.6; Thai×ln GDP = 1,049.6; Thai×LSCI = 115.2), reflecting pairwise correlations above 0.99 among the interaction terms themselves — because all three are constructed as the Thailand dummy multiplied by a regressor with limited within-country variation, they move almost together across Thailand’s six to seven waves. This confirms, with a formal diagnostic, the precision loss noted qualitatively in Section 7.4: the joint model (I4) should be read as a robustness check on the sign and presence of the Thailand effects rather than as a source of precise individual point estimates, and the single-interaction models (I1–I3) reported alongside it in Table 5 remain the primary basis for interpreting each hypothesis individually. Non-interaction regressors are not problematic (ln GDP VIF = 1.9; ln FDI VIF = 4.3), and LPI and LSCI show moderate VIF (8.6 and 8.2 respectively) consistent with the two indices sharing common variation across countries.

Table 7 Thailand-Interaction Coefficients, Two-Way FE vs. Random Effects (Robustness Check)

Interaction term	Two-Way FE (Table 5)	Random Effects
Thai $\times$ LPI (I1)	+0.974* (0.086)	−0.061 (0.353)
Thai $\times$ ln GDP (I2)	+1.797*** (0.006)	−0.007 (0.441)
Thai $\times$ LSCI (I3)	+0.0068** (0.024)	−0.0012** (0.035)
Thai $\times$ all three (I4, joint)	reported in Table 5	not estimable†

Note. Random Effects (Swamy-Arora FGLS) estimates for models I1–I3, each re-estimated with the same regressors as the corresponding Two-Way FE specification in Table 5; p-values in parentheses, cluster-robust by country. Dagger: Model I4 (all three interactions jointly) could not be estimated under Random Effects: with 8 country clusters and 8 parameters (including the constant), the between-country variance component is not identified.

Table 7 reports the Thailand-interaction coefficients under Random Effects as a robustness check requested alongside the Hausman result in Section 6.2. The comparison does not support Random Effects as an alternative to the preferred Two-Way FE specification: the Thai LPI and Thai ln GDP interactions lose statistical significance entirely under RE, and the Thai LSCI interaction, the paper’s key H1 result, reverses sign, turning significantly negative rather than positive. This divergence is informative rather than merely a nuisance: it illustrates precisely why RE is unsuitable here despite the Hausman test’s failure to reject it. RE assumes the country effects are uncorrelated with the regressors, but the Thailand dummy is, by construction, highly correlated with the Thailand-specific interaction terms; when that assumption is violated, RE’s between-country variation dominates the estimates and produces coefficients that do not reflect Thailand’s within-country dynamics. The Two-Way FE results in Table 5, which are robust to this source of bias, therefore remain the basis for the paper’s conclusions regarding H1 through H3.

5. Policy Counterfactual Simulations

Figure 3 presents seven counterfactual scenarios using 2018 as the base year (Thailand TEU = 10.37M). Group A scenarios benchmark Thailand against Singapore's parameter values; Group B simulates realistic within-country policy changes. Group B results: GDP +10% raises TEU by 11.4% (amplified by Thailand's above-average GDP elasticity); LSCI +50 points raises TEU by 4.1%; LPI +0.5 points actually yields a small negative effect (−2.25%) under Fixed Effects, confirming the policy irrelevance of further logistics quality investment for within-country throughput growth. Group A's benchmark scenarios (A1–A3) should be interpreted more cautiously than Group B: because they apply Pooled OLS coefficients, which this paper's own specification tests reject in favour of Country FE (Section 7.3), they capture between-country substitution rather than a within-country policy path, and are best read as an illustrative upper bound rather than an achievable target.

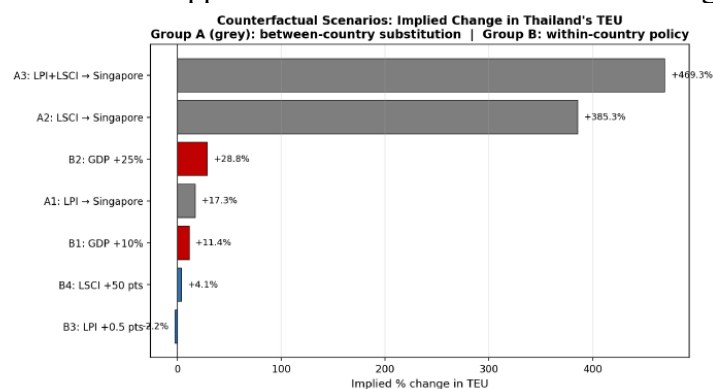


Figure 3 Policy Counterfactual Simulations (Base: Thailand 2018 = 10.37M TEU). Group A = Singapore benchmark; Group B = realistic within-country scenarios.

Table 8 Policy Counterfactual Simulations (Base Year: Thailand 2018 = 10.37M TEU)

Scenario	$\Delta \ln \text{TEU}$	TEU Change (%)
(A1) If Thailand LPI = Singapore (Pooled)	0.1596	+17.30%
(A2) If Thailand LSCI = Singapore (Pooled)	1.5797	+385.33%
(A3) If Thailand LPI+LSCI = Singapore (Pooled)	1.7393	+469.31%
(B1) GDP +10% (FE)	0.1081	+11.42%
(B2) GDP +25% (FE)	0.2531	+28.81%
(B3) LPI +0.5 points (FE)	-0.0227	-2.25%
(B4) LSCI +50 points (FE)	0.0402	+4.10%

Note. Group A uses Pooled OLS coefficients (between-country benchmark). Group B uses Fixed Effects coefficients (within-country policy). B1 is the most policy-realistic scenario: GDP +10% $\rightarrow$ TEU +11.4%.

6. Country Fixed Effects Ranking

Figure 4 plots country fixed effects from the Country FE model, measuring how much each country's TEU deviates from its fundamentals-predicted level. Thailand ranks 6th of 8 with $\alpha = -0.312$, implying TEU approximately 27% below the level predicted by LPI, GDP, FDI, and LSCI. Table 9 shows the full ranking: Singapore, Malaysia, and Vietnam all over-perform their fundamentals, reflecting superior hub positioning and export-manufacturing integration.

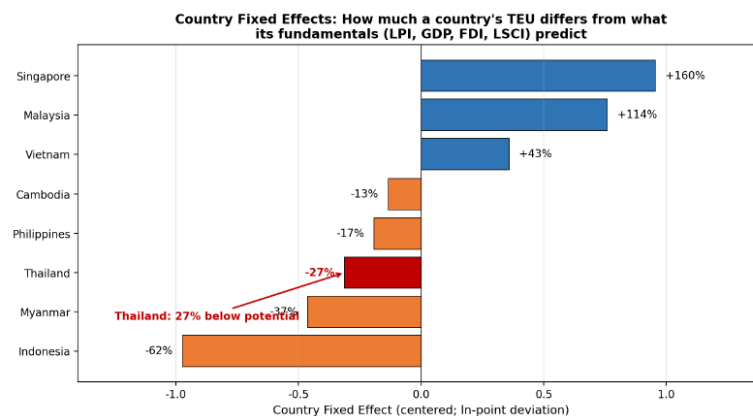


Figure 4 Country Fixed Effects Ranking. Positive = over-performance; negative = under-performance relative to fundamentals.

Table 9 Country Fixed Effects Ranking

Rank	Country	α_i (centered)	Interpretation
1	Singapore	+0.956	Over-performs fundamentals by +160.1%
2	Malaysia	+0.760	Over-performs fundamentals by +113.8%
3	Vietnam	+0.359	Over-performs fundamentals by +43.2%
4	Cambodia	-0.134	Under-performs fundamentals by 12.5%
5	Philippines	-0.192	Under-performs fundamentals by 17.5%
6	Thailand	-0.312	Under-performs fundamentals by 26.8% (rounded to ~27% elsewhere for consistency)
7	Myanmar	-0.463	Under-performs fundamentals by 37.1%
8	Indonesia	-0.973	Under-performs fundamentals by 62.2%

Note. α_i centered (sum = 0). % deviation = $\exp(\alpha_i) - 1$. Thailand highlighted (rank 6/8, -27% efficiency gap).

7. Model Fit: Thailand Actual vs. Fitted

Table 10 reports actual versus model-fitted $\ln \text{TEU}$ for Thailand under the Country FE specification. Residuals are consistently small (within $\pm 7\%$), confirming that the model captures within-country TEU dynamics well. The 27% efficiency gap reflects the country fixed effect — a time-invariant structural gap — not within-period misfit.

Table 10 Thailand: Actual vs. Fitted ln TEU (Country FE Model)

Year	ln TEU (Actual)	ln TEU (Fitted)	Residual	TEU Ratio exp(residual)
2010	15.787	15.842	-0.055	-5.36%
2012	15.875	15.925	-0.049	-4.83%
2014	15.975	15.908	+0.067	+6.92%
2016	16.050	15.987	+0.063	+6.47%
2018	16.155	16.144	+0.011	+1.11%
2023	16.149	16.185	-0.036	-3.54%

Note. Data from Country FE model (Spec A). Residual = ln TEU (actual) – ln TEU (fitted). Small residuals confirm good within-country model fit.

8. Wild Cluster Bootstrap Robustness

With only eight country clusters, conventional cluster-robust standard errors may under-estimate variance. Table 11 applies WCB-R with exhaustive $2^8 = 256$ Rademacher patterns for exact inference. Key results: ln GDP in Two-Way FE strengthens from $p_{\text{conv}} = 0.046$ to $p_{\text{WCB}} = 0.004$. Thai $\times$ ln GDP remains significant at 5% ($p_{\text{WCB}} = 0.039$). Crucially, Thai $\times$ LSCI is upgraded from marginal significance ($p_{\text{conv}} = 0.058$) to statistically significant at 5% ($p_{\text{WCB}} = 0.035$), directly supporting H1. LPI remains insignificant under both methods.

Table 11 Wild Cluster Bootstrap Inference (Key Coefficients)

Coefficient	Estimate	t-stat	p_conv	p_WCB	95% CI (WCB)
FE: LPI	-0.0454	-0.436	0.676	0.551	[-0.263, +0.172]
FE: ln GDP	+1.1344	3.781	0.007	0.008***	[+0.294, +1.975]
FE: ln FDI	0.050	0.745	0.481	0.496	[-0.106, +0.206]
FE: LSCI	0.0008	0.803	0.448	0.504	[-0.002, +0.003]
2W-FE: LPI	0.0625	0.438	0.675	0.656	[-0.270, +0.395]
2W-FE: ln GDP	+1.6809	2.418	0.046	0.004***	[+0.257, +3.105]
2W-FE: ln FDI	0.0276	0.466	0.655	0.633	[-0.110, +0.165]
2W-FE: LSCI	0.0016	1.596	0.155	0.117	[-0.001, +0.004]
I2: ln GDP	2.5948	3.749	0.007	0.012**	[+0.505, +4.684]
I2: Thai x ln GDP	+1.796	2.837	0.025	0.039**	[+0.154, +3.439]
I3: LSCI	0.0009	0.867	0.415	0.348	[-0.001, +0.003]
I3: Thai x LSCI	+0.0068	2.268	0.058	0.035**	[+0.000, +0.013]

Note. WCB-R exhaustive $2^8 = 256$ Rademacher patterns (exact). 95% CI = percentile-t.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Highlighted rows = key Thailand-specific findings.

Discussion

Read together, the empirical results connect back to the literature reviewed in Section 2 in three ways. First, the finding that LPI loses significance under country fixed effects while remaining significant in Pooled OLS directly reproduces the pattern reported by Katrakylidis et al. (2026) for the Mediterranean panel and is consistent with Seok and Soon (2024) argument that logistics performance affects trade mainly indirectly, through GDP, rather than as a direct one-step channel — this study's Thailand-specific results add a country-level illustration of that same mechanism. Second, the significant and disproportionately large Thai $\times$ LSCI interaction is consistent with the non-linear, threshold-style connectivity effects documented by Liu et al. (2026): Thailand's persistent 330–380 point LSCI gap below Singapore places it in the range where, per Liu et al. (2026) findings, connectivity improvements yield outsized rather than marginal throughput gains. Third, the insignificance of aggregate FDI, combined with the qualitative pattern in Thailand's investment composition, mirrors Andersen et al. (2023) finding that the FDI–export link in ASEAN operates through

export-platform investment specifically rather than FDI in aggregate, and echoes Jongwanich and Kohpaiboon (2008) Thailand-specific conclusion that export performance depends on ownership orientation rather than FDI volume. Taken together, these three points of contact with the literature suggest that Thailand's throughput gap is not an anomaly but a case that fits an emerging cross-country pattern — logistics quality, connectivity, and investment composition operate through different channels, and only connectivity and investment composition appear to bind for Thailand specifically.

Policy Recommendations

The empirical results point to three mutually reinforcing structural constraints. Addressing only one in isolation will not close the 27% efficiency gap.

1. Closing the Connectivity Gap (H1 — LSCI)

Thailand's LSCI trails Singapore by 330–380 points for sixteen years without convergence. Main East–West shipping lanes call at Singapore and Port Klang as primary hubs; Thailand receives feeder services rather than direct trunk calls. $\text{Thai} \times \text{LSCI} = +0.0068$ ($p_WCB = 0.035$) confirms that LSCI improvements yield disproportionately large TEU gains for Thailand specifically.

Government actions:

- Negotiate port-calling incentives with major shipping alliances to add Laem Chabang as a direct trunk call on at least one East–West string.
- Develop the Southern Economic Corridor and cross-peninsula land-bridge as a transshipment enabler — a geographic advantage no competitor can replicate.
- Offer competitive port dues and fast-turnaround guarantees to incentivise larger vessel calls.

Port operator / private sector actions:

- Invest in berth deepening and crane upgrades at Laem Chabang Phase 3 for 18,000+ TEU vessels.
- Develop bonded warehouse and free-trade zone capacity to attract transshipment cargo currently bypassing Thailand.

2. Reshaping the FDI Base (H2 — Investment Composition)

FDI's insignificance across all specifications signals that Thailand's investment stock is not generating export cargo. Unlike Vietnam — which attracted large-scale export-manufacturing FDI through China+1 relocation — Thailand's FDI skews toward domestic-market industries whose output largely circulates within the country. This composition partly reflects Thailand's Board of Investment (BOI) incentive structure, which has historically promoted a broad mix of sectors — including automotive assembly, real estate, and services aimed at the domestic and regional consumer market — rather than concentrating incentives on export-platform manufacturing. This contrasts with Vietnam, where BOI-equivalent incentives and China+1 supply-chain relocation have been more deliberately targeted at export-oriented electronics and garment manufacturing, generating a tighter link between inbound FDI and containerised export cargo.

Government actions:

- Redirect BOI incentives to prioritise export-intensity thresholds in targeted sectors (electronics, EV components, precision machinery).
- Establish an Export-Linked Industrial Zone adjacent to Laem Chabang with pre-cleared customs, single-window services, and road-rail connectivity.
- Negotiate supply-chain agreements with Japan, South Korea, and Taiwan to position Thai plants as regional export hubs.

Port operator / private sector actions:

- Partner with industrial estates to bundle factory-to-port transport, customs clearance, and slot booking to reduce SME export friction.

3. Improving Trade Openness (H3 — OPEN)

Thailand's trade openness lags Singapore and Vietnam, partly due to the domestic-oriented FDI base. Higher openness amplifies the throughput return to every connectivity improvement and directly raises demand for containerised services.

Government actions:

- Accelerate FTA negotiations — particularly with the EU and GCC — to expand preferential market access for Thai exporters.
- Implement a National Single Window integrating Customs, Revenue Department, and port operators to reduce compliance costs.
- Reduce non-tariff barriers for intermediate goods used in export manufacturing.

Port operator / private sector actions:

- Digitalise end-to-end documentation (e-B/L, electronic certificates) to lower transaction costs for SME exporters.

4. Sequencing

1. Short term (0–2 years): Reorient BOI toward export-manufacturing FDI; fast-track National Single Window; negotiate alliance port-calling incentives.
2. Medium term (2–5 years): Complete Laem Chabang Phase 3; establish Export-Linked Industrial Zone; conclude at least one major FTA.
3. Long term (5+ years): Land-bridge infrastructure targeting LSCI +50 points (estimated TEU impact: +4.1% from baseline).

Conclusion

Thailand's container ports look busy — yet maritime logistics does not drive GDP. This paper confirms the paradox quantitatively: Thailand ranks 2nd–3rd in ASEAN on logistics quality but 4th–5th on throughput, growing at barely half the rate of faster-rising neighbours. The country fixed-effects model places Thailand 6th of 8, with TEU roughly 27% below the level its fundamentals predict.

The results are unambiguous about what the problem is not: it is not logistics quality — LPI is insignificant in all fixed-effects specifications, and the counterfactual simulation shows LPI improvement yields near-zero within-country gains. The problem is structural: Thailand is not positioned on main shipping routes (LSCI gap, H1), its FDI base does not generate export cargo (H2), and its trade openness trails more open regional economies (H3). All three constraints are mutually reinforcing and must be addressed together.

The good news is that Thailand's unusually high GDP elasticity ($\text{Thai} \times \ln \text{GDP} = +1.80^{**}$) and LSCI sensitivity ($\text{Thai} \times \text{LSCI} = +0.0068^{**}$) mean structural improvements would yield outsized returns. A 50-point LSCI improvement raises TEU by 4.1%; reorienting FDI toward export manufacturing activates cargo demand that the port infrastructure already stands ready to serve. Closing the 27% gap is achievable — but it requires coordinated policy across investment promotion, trade facilitation, and port connectivity, not further investment in logistics quality that is already among ASEAN's best.

This study has four limitations that future research should address. First, with only eight country clusters, cluster-robust standard errors may over-reject; this study mitigates this through Wild Cluster Bootstrap with exhaustive $2^8 = 256$ Rademacher patterns, but extending the panel to a broader set of economies would further improve inference. Second, the uneven LPI collection schedule — including a five-year gap between 2018 and 2023 — precludes effective serial correlation testing. Third, reverse causality between LPI and TEU cannot be fully ruled out: countries with high throughput may receive better LPI scores from survey

respondents, biasing Pooled OLS and RE coefficients; leave-one-out regional LPI as an instrument represents a viable extension. A complementary approach worth pursuing is a lagged-LPI specification (regressing current TEU on LPI measured one wave earlier), which would help separate the effect of logistics quality on subsequent throughput from any reverse influence of throughput on how favourably a country's logistics performance is perceived by LPI survey respondents. Fourth, country-level data mask within-Thailand heterogeneity across Laem Chabang, Bangkok Port, and Songkhla; port-level panel analysis would add important analytical depth.

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MICROINSURANCE COVERAGE AND FINANCIAL RESILIENCE AMONG FILIPINO POLICYHOLDERS: THE ROLE OF COVERAGE TYPE AND SOCIOECONOMIC CHARACTERISTICS

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Abstract

Frequent natural disasters and economic disruptions in the Philippines have increased the need for effective financial protection for vulnerable populations. Microinsurance products are widely promoted as risk management instruments that cater to such groups, yet evidence remains limited regarding their contribution to financial resilience. This study examined the roles of microinsurance coverage type and socioeconomic characteristics on financial resilience of individuals residing in Antique, Philippines.

A quantitative, cross-sectional survey design was used with data from 400 microinsurance policyholders, analyzed through descriptive statistics and multiple linear regression. Policyholders reported generally good financial resilience ($M = 4.11$, $SD = 0.48$). Holding both accidental and calamity microinsurance was significantly associated with higher financial resilience than holding accidental coverage alone ($\beta = 0.138$, $p = 0.007$). Monthly household income, being separated from a partner, and working as a farmer, fisherfolk, or government employee were also significantly associated with financial resilience.

The findings support promoting comprehensive microinsurance products and financial education initiatives, particularly for underprivileged and livelihood-vulnerable groups, while pointing to the need for further research on the behavioral and psychological determinants of financial resilience in disaster-prone contexts.

Keywords: *Microinsurance, Financial Resilience, Disaster Risk, Household Finance, Philippines*

Introduction

The Philippines remains highly vulnerable to climate-related disasters (Organisation for Economic Co-operation and Development, 2026), which disproportionately erode the financial stability of low-income households already exposed to erratic incomes and limited savings. Microinsurance—low-coverage, low-premium policies designed for low-income populations (Nzembela & Mazambani, 2019)—has been promoted as a way to transfer risk and support recovery from shocks (Medrano, 2022). While these products help in enhancing financial resilience (Oppong et al., 2024), the latter extends beyond merely possessing

insurance coverage. Financial resilience is a broader capacity to anticipate, withstand, and recover from financial shocks (Salignac et al., 2019). Existing studies have largely treated microinsurance as a single construct and focused on financial inclusion outcomes, leaving its association with financial resilience — and whether that association varies by coverage type — underexplored, particularly in disaster-prone contexts such as the Philippines.

This study addresses this gap by examining the association between microinsurance coverage type, selected socioeconomic characteristics, and financial resilience among Filipino microinsurance policyholders in Antique, Philippines. The findings are intended to inform insurers, policymakers, and financial inclusion advocates in designing microinsurance products better aligned with the needs of financially vulnerable populations.

Literature Review

Microinsurance extends the risk-protection function of microfinance, providing a safety net that helps prevent unexpected shocks from eroding the economic gains generated by credit and savings (Cohen & Sebstad, 2005). The Philippine microinsurance sector is well developed, encompassing more than 6,000 institutions (Rapisura, 2023), with products spanning life, calamity, and accident coverage that reflect the varied risks facing low-income Filipinos — from typhoons and floods to occupational hazards (Llanto, 2007). Yet access alone does not guarantee protection: low financial literacy and mistrust in institutional payouts still push many households toward informal coping strategies such as high-interest loans or asset sales (Sayyad & Mission, 2025).

Financial resilience is commonly defined as the capacity to anticipate, withstand, and recover from financial shocks (Salignac et al., 2019), encompassing both objective resources (i.e., income, savings) and behavioral capabilities such as financial control and planning (Hamid et al., 2023). While microinsurance uptake has been positively linked to financial resilience (Oppong et al., 2024), most studies treat microinsurance as a single construct, implicitly assuming that all coverage types contribute equally. This overlooks the possibility that resilience benefits depend on whether coverage matches the risks households actually face. We therefore hypothesize:

H₁: The type of microinsurance coverage is significantly associated with financial resilience of microinsurance policyholders.

Socio-demographic characteristics are also well-established, if individually modest, correlates of financial resilience. Age and income are generally positively associated with resilience, though their effects can weaken once other socioeconomic factors are controlled for (Hamid et al., 2023; Salignac et al., 2019); resilience differs between men and women due to gendered roles in the household (Mundi & Vashisht, 2023); education improves resilience through financial literacy (Bottazzi & Oggero, 2023); married individuals tend to report higher financial well-being, partly through shared household resources and mutual support (Geng, 2021); larger households may face greater financial demands that strain their capacity to absorb shocks (He & Zhou, 2022); chronic health conditions can erode financial resilience through medical costs and reduced earning capacity (Davis et al., 2025); and unstable income associated with certain livelihoods, particularly farming, has been linked to lower financial resilience (Sun, 2025). Accordingly, the following hypotheses were tested:

H₂: Age is significantly associated with the financial resilience of microinsurance policyholders.

H₃: Sex is significantly associated with the financial resilience of microinsurance policyholders.

H₄: Income is significantly associated with the financial resilience of microinsurance policyholders.

- H₅: Educational attainment is significantly associated with the financial resilience of microinsurance policyholders.
- H₆: Marital status is significantly associated with the financial resilience of microinsurance policyholders.
- H₇: Household size is significantly associated with the financial resilience of microinsurance policyholders.
- H₈: Health status is significantly associated with the financial resilience of microinsurance policyholders.
- H₉: The type of livelihood is significantly associated with the financial resilience of microinsurance policyholders.

Objectives

This study aims:

1. To determine the demographic and socioeconomic characteristics of microinsurance policyholders in Antique, Philippines in terms of (a) age, (b) sex, (c) income, (d) educational attainment, (e) marital status, (f) household size, (g), health status, and (h) type of livelihood.
2. To determine the distribution of microinsurance policyholders in Antique, Philippines according to their type of microinsurance coverage.
3. To determine the level of financial resilience of the respondents in terms of (a) keeping control of their money, (b) taking care of expenditures, (c) having financial inclusion, (d) handling financial shortfall or stress, and (e) having financial planning.
4. To determine whether microinsurance coverage type and demographic and socioeconomic characteristics are significantly associated with the financial resilience of microinsurance policyholders in Antique, Philippines.

Theoretical and Conceptual Framework

The study draws on Expected Utility Theory, advanced by John von Neumann and Oskar Morgenstern (1944), which posits that individuals make decisions under uncertainty by selecting alternatives that maximize their expected utility rather than expected monetary value. Because most individuals are risk averse, they are willing to incur a certain cost, such as an insurance premium, to reduce the financial consequences of uncertain future losses. In the context of microinsurance, policyholders choose insurance products that provide protection against potential risks, thereby reducing the variability of future financial outcomes. Broader insurance coverage, such as protection against both calamity and accidental risks, may further reduce exposure to multiple sources of financial loss and strengthen a household's capacity to withstand and recover from adverse events. Figure 1 presents the conceptual framework of the study.

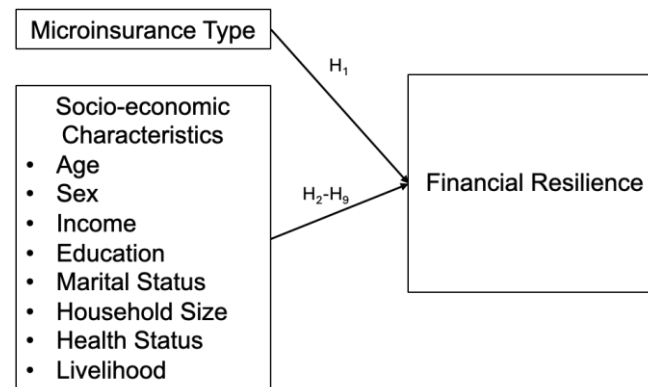


Figure 1 Conceptual Framework of the Study

Methodology

The study employed a quantitative, cross-sectional survey design to examine the association between microinsurance coverage type, socioeconomic characteristics, and financial resilience among Filipino microinsurance policyholders. The province of Antique in the Philippines was selected as the study locale given its rural, disaster-exposed context and high concentration of low-to-middle income households engaged in agricultural work.

The sampling frame consisted of 643,173 individuals, based on Philippine Statistics Authority data as of July 1, 2024 (Tacogdoy, 2025), from which a target sample of 400 was determined using Slovin's formula. A researcher-developed questionnaire captured their demographic and socioeconomic characteristics alongside financial resilience statements adapted from Hamid et al. (2023). Following ethics clearance from the UP Visayas Research Ethics Board, data were collected from 430 respondents through purposive sampling between March and April 2026; respondents were recruited with the help of local village (*barangay*) officials and researcher contacts in Antique, with eligibility limited to individuals holding at least one active microinsurance policy. The first 30 responses served as pre-test data, leaving 400 in the primary dataset. The financial resilience scale (5-point Likert) showed acceptable internal consistency (Cronbach's $\alpha = 0.711$).

The baseline empirical model was specified as:

$$FR_i = \beta_0 + \beta_1 MT_i + \beta_2 \ln(Age)_i + \beta_3 SEX_i + \beta_4 \ln(Inc)_i + \beta_5 EDU_i + \beta_6 MAR_i + \beta_7 HHS_1 + \beta_8 HEA_1 + \beta_9 LIV_1 + \varepsilon_i$$

Financial resilience (FR) is the composite score computed as the average of scores across the five resilience dimensions adapted from Hamid et al. (2023). MT is the vector of dummy variables for microinsurance type (reference: Accidental), $\ln(Age)$ and $\ln(Inc)$ are the natural logarithms of age and monthly household income (in Philippine pesos), respectively; SEX is a dummy for sex (reference: Female); EDU, MAR, and LIV are vectors of dummy variables for educational attainment (reference: no formal education), marital status (reference: single), and livelihood (reference: unemployed), respectively; HHS is household size in persons; HEA is a dummy for the presence of a chronic health condition (reference: none); and ε represents the stochastic error term. The data were statistically analyzed using Microsoft Excel and Jamovi.

Results

Table 1 presents the demographic and socioeconomic profile of the respondents. The sample was predominantly of working age ($M = 48.4$, $SD = 14.1$), with relatively low income ($M = \text{₱}12,926$, $SD = \text{₱}12,153$) and mid-sized households ($M = 4.67$, $SD = 1.71$). Table 2 presents the financial resilience scores of the respondents.

Table 1 Profile of the respondents

Variable		f	%
Microinsurance Type	Both	201	50.2%
	Accidental	151	37.8%
	Calamity	48	12.0%
Age	Less than working age (< 15 years)	0	0.0%
	Working age (15–64 years)	348	87.0%
	Senior citizen (> 64 years)	52	13.0%
Sex	Female	328	82.0%
	Male	72	18.0%
Monthly household Income	Less than ₱12,030	260	65.0%
	Between ₱12,030 and ₱24,060	96	24.0%
	Between ₱24,060 and ₱48,120	30	7.5%
	Between ₱48,120 and ₱84,210	13	3.3%
	Between ₱84,210 and ₱144,360	1	0.2%
	Between ₱144,360 and ₱240,600	0	0.0%
	At least ₱240,600	0	0.0%
Educational Level	No formal education	3	0.8%
	Basic education undergraduate	20	5.0%
	Basic education graduate	60	15.0%
	High school undergraduate	73	18.2%
	High school graduate	124	31.0%
	College undergraduate	48	12.0%
	College graduate	52	13.0%
	Postgraduate	2	0.5%
	Vocational education	18	4.5%
Marital Status	Married	246	61.5%
	Single	98	24.5%
	Widowed	55	13.8%
	Separated	1	0.2%
Household size	1 to 2 persons only	31	7.8%
	3 to 4 persons only	168	42.0%
	5 to 6 persons only	154	38.5%
	7 to 8 persons only	36	9.0%
	At least 9 persons	11	2.7%
Health Status	No chronic health condition	216	54.0%
	Diagnosed with at least one chronic condition	184	46.0%
Livelihood	Informal worker	127	31.8%
	Unemployed	86	21.5%
	Self-employed / Business owner	71	17.7%
	Fisherfolk	57	14.3%
	Government employment	31	7.7%
	Salaried Employment (Private)	21	5.2%
	Farmer	7	1.8%

Table 2 Financial Resilience Scores of the Sample

Dimension	No. of Questions	Mean	SD
Keeping control of money	3	4.13	0.93
Taking care of expenditures	2	4.79	0.46
Having financial inclusion	2	3.29	1.03
Handling financial shortfall or stress	2	3.91	1.10
Having financial planning	3	4.41	0.86
Composite financial resilience score	12	4.11	0.48

Note. The composite financial resilience score is computed by averaging the scores for the five dimensions.

Prior to regression analysis, variance inflation factors (VIF) were examined for multicollinearity (Table 3). All values were well below common thresholds, indicating no problematic multicollinearity.

Table 3 Collinearity statistics

Variable	VIF	Variable	VIF
ln(Age)	1.35	Livelihood	1.06
ln(Income)	1.13	Education	1.05
Health Status	1.10	Household Size	1.04
Marital Status	1.09	Microinsurance Type	1.03
Gender	1.07		

The overall model was statistically significant, $F(24, 375) = 2.18$, $p = .001$, with an adjusted R^2 of .066, indicating that the model explained approximately 6.6% of the variance in financial resilience. Table 4 presents the full results.

Table 4 Regression Results

Independent Variable	β	SE	t-value	p-value
Intercept	3.314	0.545	6.083	< 0.001***
Microinsurance Type				
Both – Accidental	0.138	0.051	2.708	0.007***
Calamity – Accidental	0.116	0.078	1.474	0.141
ln(Age)	0.023	0.098	0.231	0.817
Sex				
Male – Female	-0.063	0.064	-0.978	0.329
ln(Income)	0.063	0.030	2.058	0.040**
Education				
Basic Education Undergraduate – No Formal Education	-0.145	0.292	-0.500	0.621
Basic Education Graduate – No Formal Education	-0.260	0.278	-0.933	0.351
High School Undergraduate – No Formal Education	-0.083	0.278	-0.298	0.766
High School Graduate – No Formal Education	-0.115	0.277	-0.417	0.677
College Undergraduate – No Formal Education	-0.068	0.282	-0.240	0.810
College Graduate – No Formal Education	-0.117	0.284	-0.410	0.682
Postgraduate – No Formal Education	-0.487	0.439	-1.108	0.268
Vocational Education – No Formal Education	-0.233	0.295	-0.792	0.429
Marital Status				
Married – Single	0.069	0.062	1.103	0.271
Separated – Single	0.976	0.472	2.069	0.039**
Widowed – Single	0.060	0.095	0.625	0.532
Household Size	0.012	0.014	0.841	0.401
Health Status				
Yes – No	0.034	0.051	0.672	0.502
Livelihood				
Informal worker – Unemployed	0.055	0.067	0.833	0.405
Self-employed / Business owner – Unemployed	0.094	0.077	1.218	0.224
Fisherfolk – Unemployed	0.194	0.082	2.369	0.018**
Government employment – Unemployed	0.241	0.111	2.179	0.030**
Salaried employment – Unemployed	0.022	0.118	0.189	0.850
Farmer – Unemployed	-0.420	0.189	-2.225	0.027**

Note. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. Reference categories: Microinsurance type - Accidental; Sex - Female; Education - No formal education; Marital status - Single; Health status - No chronic condition; Livelihood - Unemployed.

In addition, if the “Calamity” category was designated as the reference category for the MT variable, neither “Accidental” ($\beta = -0.116$, $p = .141$) nor “Both” category ($\beta = 0.023$, $p = .766$) has significant association with financial resilience.

Post-estimation diagnostics indicated that the regression assumptions were adequately met. The Breusch–Pagan test showed no evidence of heteroscedasticity ($BP = 23.20$, $p = .510$). The Durbin–Watson statistic ($DW = 1.80$) indicated no meaningful autocorrelation; although its associated significance test was statistically significant ($p = .044$), this is not interpreted as a violation given the cross-sectional (rather than time-series) nature of the data. The Shapiro–Wilk test indicated a statistically significant deviation from normality ($W = .96$, $p < .001$); however, visual inspection of the Q–Q plot showed only minor departures, which is not considered problematic given the relatively large sample size.

Discussion

Consistent with H1, policyholders holding both accidental and calamity microinsurance exhibited significantly higher financial resilience than those with accidental coverage alone ($\beta = .138$, $p = .007$); no significant differences were observed between the accidental-only and calamity-only groups, or between calamity-only and combined coverage. This pattern broadly aligns with Oppong et al. (2024) and with Expected Utility Theory: comprehensive protection against multiple risks appears to support resilience better than coverage limited to a single risk, though the added value of accidental coverage specifically remains unclear. One plausible explanation for the null effect of single-risk coverage is that protective benefits are only realized once claims are filed and paid — a mechanism this study did not measure directly and which future research should test explicitly rather than assume.

Among socioeconomic characteristics, income, marital status, and livelihood were significantly associated with financial resilience, consistent with H₄, H₆, and H₉. Higher household income was positively associated with resilience, consistent with income's established role in enabling savings and financial flexibility (Salignac et al., 2019). Respondents who were separated reported higher resilience than single respondents, though this estimate rests on a single observation and should be interpreted with caution. Relative to unemployed respondents, government employees and fisherfolk reported significantly higher resilience. One possible explanation is that it reflects income stability and access to livelihood support programs. On the other hand, farmers reported significantly lower resilience, which can be attributed to their income volatility and the production risk characteristic of agricultural livelihoods.

Age, sex, educational attainment, health status, and household size were not significantly associated with financial resilience (H₂, H₃, H₅, H₇, and H₈ not supported), suggesting that once income and livelihood are accounted for, demographic and human-capital characteristics carry comparatively little independent explanatory weight. Collectively, these results indicate that a household's economic capacity and livelihood stability matter more for financial resilience than demographic background.

Conclusion and Implications

This study finds that microinsurance coverage type, income, marital status, and livelihood are significantly associated with the financial resilience of Filipino policyholders in Antique. Policyholders with both accidental and calamity coverage reported greater resilience than those with accidental coverage alone, and income and livelihood emerged as more important determinants of resilience than demographic characteristics. These findings support promoting comprehensive microinsurance products alongside interventions that strengthen households' broader economic capacity.

These findings nonetheless suggest several directions for practice and policy. Microinsurance providers could design and promote integrated products that cover multiple risk sources while remaining affordable, paired with financial education and claims-awareness

programs to strengthen understanding of policy benefits. Policymakers and regulators may consider expanding access to affordable, inclusive microinsurance through public-private partnerships and financial literacy initiatives targeted at vulnerable, disaster-exposed sectors. Future research should prioritize longitudinal or quasi-experimental designs and examine the roles of financial literacy, savings behavior, and claims experience as potential mechanisms linking microinsurance to financial resilience.

Limitations

Several limitations qualify these conclusions. The cross-sectional design does not support causal inference, and because policyholders self-select into coverage types, observed differences may partly reflect underlying differences in income, risk exposure, or financial literacy rather than a protective effect of coverage itself; future work could apply propensity-score matching or instrumental-variable approaches to address this. The reliance on self-reported data introduces possible recall and response bias, and the use of purposive rather than probability sampling limits the generalizability of these findings and should be borne in mind when interpreting the inferential statistics. Some subgroups — most notably the single-respondent “separated” category — were too small for stable estimation. Finally, the model excludes other plausible determinants of resilience, such as financial literacy, asset ownership, debt burden, and access to formal financial services, which future longitudinal or quasi-experimental research with larger, more representative samples should incorporate.

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HIGH STAKES IN THE DIGITAL AGE: DETERMINANTS OF ONLINE GAMBLING INTENTION AND BEHAVIOR AMONG YOUNG GAMBLERS IN ILOILO CITY

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Abstract

The COVID-19 pandemic accelerated the shift from traditional to online gambling platforms, and continued growth in online gambling across the Philippines has outpaced the local evidence needed to guide policy, particularly outside Metro Manila. This study examined the determinants of online gambling intention and behavior among online gamblers in Iloilo City using the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2), with age, gender, and experience tested as moderators. Data from 204 respondents, predominantly young (72.5% aged 18–24) and students (60.3%), were obtained through purposive sampling and analyzed using descriptive statistics and partial least squares structural equation modeling (PLS-SEM). The model explained substantial variance in behavioral intention ($R^2 = 0.699$) and actual behavior ($R^2 = 0.713$). Social influence ($\beta = 0.272, p < 0.001$), price value ($\beta = 0.273, p = 0.005$), and habit ($\beta = 0.262, p < 0.001$) significantly predicted intention, while intention ($\beta = 0.488, p < 0.0001$) and habit ($\beta = 0.423, p < 0.0001$) significantly predicted actual behavior; performance expectancy, effort expectancy, facilitating conditions, hedonic motivation, and all three moderators were non-significant. Notably, social influence exerted a strong effect despite low descriptive ratings, suggesting peer influence operates implicitly rather than consciously. These findings indicate that habitual use and perceived financial value, more than functional utility or entertainment appeal, sustain engagement among young online gamblers, with implications for targeted financial literacy programs, peer-based interventions, and regulatory attention to habit-forming platform design. Given the young, purposively drawn sample, findings are best generalized to similar young online gamblers rather than to Iloilo City's population as a whole.

Keywords: Online gambling, Behavioral intention, UTAUT2, Iloilo City, Young adults

Introduction

Advancements in digital technology have transformed gambling from a primarily land-based activity into a widely accessible, globalized, and highly lucrative online industry. What once required visiting casinos, betting outlets, or gaming halls can now be done in seconds through mobile applications, websites, and e-wallet platforms. Online gambling generally refers to all forms of wagering or betting on games of chance or uncertain events for monetary stakes, including casino games, lotteries, poker, sports betting, and other forms of wagering conducted through digital channels (Gainsbury et al., 2015; Lombardi, 2024). As convenience

and accessibility continue to increase, participation in online gambling has grown rapidly worldwide, with recent evidence showing that around 46% of adults and 18% of adolescents across 68 countries engaged in online gambling within the past year (Tran et al., 2024).

In the Philippines, this phenomenon has become impossible to ignore. Online gambling has become a significant revenue driver, reporting ₱155 billion from online operations between 2021 and mid-2025, according to the Philippine Amusement and Gaming Corporation (PAGCOR). Authorities further projected that online gambling alone could contribute ₱62 billion by the end of 2025—equivalent to 62% of PAGCOR's projected annual income, surpassing the expected contribution of land-based casinos at 38% (Panti, 2025). Participation has surged alongside this growth, with an estimated 32 million Filipinos now engaging in online gambling, a sharp increase from 8.2 million reported in 2024, driven by affordable internet access, the normalization of gambling as a recreation, and the proliferation of e-wallet platforms, such as GCash and Maya, which allow users to place bets instantly.

The COVID-19 pandemic further accelerated this shift, as closures of casinos and recreational venues pushed many individuals toward digital platforms. Stress, anxiety, boredom, and isolation during this period significantly increased gambling participation (Håkansson, 2020). In many ways, the pandemic did not create online gambling—it normalized it. Motivations, such as the hope of “easy” money, the thrill of winning, peer influence, social media exposure, entertainment, escape, and financial pressure, all shape users' intentions, which often lead to repeated gambling behavior (Wardle et al., 2018). While these psychosocial and financial motivations are well documented, the present study focuses specifically on the technology-adoption-related determinants captured by the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2)—that is, the extent to which platform-related perceptions, rather than psychological or addictive tendencies, shape gambling intention and behavior; broader motivational and risk factors outside this scope are addressed later as a limitation of the study.

Despite the issue's growing relevance, few studies examine the behavioral and technological factors behind online gambling participation, particularly in local Philippine communities, and no known study has explored these drivers in Iloilo City—a rapidly modernizing urban province with rising digital adoption. This study therefore applies the UTAUT2 framework to examine the determinants of online gambling intention and behavior among young online gamblers in Iloilo City, with findings intended to inform policymakers, guide financial literacy efforts in schools, help families recognize behavioral risks, and provide local evidence for future research.

Literature Review

Online gambling has expanded alongside broader technological adoption, including computer and Internet use (Gainsbury, 2015; Hing et al., 2022; Malik et al., 2024). The online gambling environment has amplified the risks on psychological, social, and financial risks, particularly among younger, more exposed individuals (Wardle et al., 2018; Lombardi et al., 2024).

While most of the empirical literature on online gambling determinants originates from international settings, a small but growing body of Philippine-focused research is emerging. Antonio et al. (2025) applied an extended UTAUT3 framework to online gambling intention among Filipino Gen Z and Millennial users, and Lamoste and Prasetyawati (2019) examined consumer attitudes and government regulation of online gambling in the Philippines. Superio and Aranas (2026) documented the exposure, behavior, and risks of online gambling among Filipino youth in Iloilo itself. These studies help contextualize the present findings but remain limited in number relative to the scale of the issue locally, underscoring the continued need for additional evidence.

UTAUT2 distinguishes behavioral intention—an individual's willingness to continue gambling online—from actual behavior, the extent to which that intention is enacted, treating intention as the behavior's proximal predictor despite the two remaining conceptually distinct (Venkatesh et al., 2012). Its determinants include: performance expectancy, the perceived financial or outcome benefit of gambling that motivates sustained participation (Konietzny & Caruana, 2021); effort expectancy, the perceived ease of use that matters most for new users and declines with experience (Konietzny & Caruana, 2019; Venkatesh et al., 2012); social influence, the shaping of behavior through peers and online communities that normalize gambling (Hing et al., 2014; Neighbors et al., 2007); facilitating conditions, the access and resources without which users are discouraged from playing (Gainsbury et al., 2015); hedonic motivation, the entertainment and excitement that sustains continued use (Tamilmani et al., 2021); price value, the perceived trade-off between costs and benefits that increases intention when benefits outweigh costs (Hing et al., 2014), and habit, the automatic usage pattern formed through repeated engagement that reduces conscious decision-making (Hew et al., 2015; Konietzny & Caruana, 2019). We therefore hypothesize:

- H₁:** Performance expectancy has a significant positive effect on the behavioral intention to engage in online gambling.
- H₂:** Effort expectancy has a significant positive effect on the behavioral intention to engage in online gambling.
- H₃:** Social influence has a significant positive effect on the behavioral intention to engage in online gambling.
- H₄:** Facilitating conditions have significant positive effects on the behavioral intention to engage in online gambling.
- H₅:** Facilitating conditions have significant positive effects on actual online gambling behavior.
- H₆:** Hedonic motivation has a significant positive effect on the behavioral intention to engage in online gambling.
- H₇:** Price value has a significant positive effect on the behavioral intention to engage in online gambling.
- H₈:** Habit has a significant positive effect on the behavioral intention to engage in online gambling.
- H₉:** Habit has a significant positive effect on actual online gambling behavior.
- H₁₀:** Behavioral intention positively influences actual online gambling behavior.

Age, gender, and experience further moderate these relationships: younger users are driven more by entertainment and impulsivity while older users prioritize control and utility (Gainsbury, 2015); gender differences in gambling behavior are narrowing online (Kairouz et al., 2022); and experience shifts engagement from effort-based evaluation toward habit-driven use (Antonio et al., 2025). Behavioral intention thus remains a key predictor of actual behavior, though its predictive power is shaped by habitual, contextual, and technological factors. We therefore hypothesize:

- H₁₁:** Gender moderates the relationship between habit and actual behavior.
- H₁₂:** Gender moderates the relationship between habit and behavioral intention.
- H₁₃:** Gender moderates the relationship between price value and behavioral intention.
- H₁₄:** Gender moderates the relationship between hedonic motivation and behavioral intention.
- H₁₅:** Gender moderates the relationship between facilitating conditions and behavioral intention.
- H₁₆:** Age moderates the relationship between habit and actual behavior.
- H₁₇:** Age moderates the relationship between habit and behavioral intention.

- H₁₈:** Age moderates the relationship between price value and behavioral intention.
- H₁₉:** Age moderates the relationship between hedonic motivation and behavioral intention.
- H₂₀:** Experience moderates the relationship between habit and behavioral intention.
- H₂₁:** Experience moderates the relationship between facilitating conditions and behavioral intention.
- H₂₂:** Experience moderates the relationship between habit and actual behavior.
- H₂₃:** Experience moderates the relationship between behavioral intention and actual behavior.

Finally, it is also worth noting that UTAUT2 approaches online gambling primarily as a technology-adoption process. Gambling, however, is also a financial and risk-taking behavior with a recognized potential for addiction, and constructs such as impulsivity, self-control, risk tolerance, financial stress, and gambling-related symptoms fall outside the model's scope. Complementary frameworks such as the Theory of Planned Behavior, Social Learning Theory, and behavioral addiction models offer perspectives on these dimensions and could enrich future theoretical treatments of this topic; this scope restriction is revisited in the Limitations section.

Objectives

This study aimed to identify and evaluate the determinants of individuals' intentions and behavior toward engaging in online gambling in Iloilo City using Partial Least Squares Structural Equation Modeling (PLS-SEM), providing insights to guide responsible policies and interventions.

Specifically, the study examined the influence of key determinants adapted from the UTAUT2 as well as the moderating variables, particularly age, gender, and experience, on the intention of individuals in Iloilo City to engage in online gambling. Furthermore, the study sought to provide practical insights that can inform local policymakers, academic institutions, and community stakeholders in designing policies, educational initiatives, and preventive strategies that promote responsible gambling behavior.

Conceptual Framework

The study is grounded in the Unified Theory of Acceptance and Use of Technology, explaining online gambling as a form of technology adoption (Venkatesh et al., 2012). The theory asserts that behavioral intention is an antecedent of use behavior—that is, actual engagement is driven by formed intention. This theory is consistent with the Theory of Reasoned Action, Theory of Planned Behavior, and Technology Acceptance Model, which similarly treat behavior as the result of deliberate, reasoned intention. In this framework, behavioral intention is a mediating variable influenced by seven key constructs: performance expectancy (PE), effort expectancy (EE), social influence (SI), facilitating conditions (FC), hedonic motivation (HM), price value (PV), and habit (HB), which serve as independent variables and use behavior as the dependent variable. Age, gender, and experience are further hypothesized to moderate the relationships between these constructs and behavioral intention (BI) or actual behavior (AB). Figure 1 presents the conceptual framework for this study.

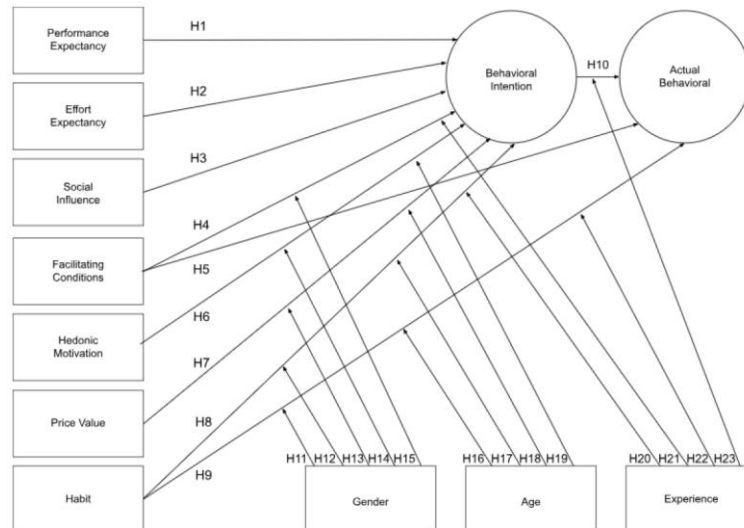


Figure 1 Conceptual framework used for this study

Methodology

This study employed a quantitative, non-experimental survey research design to examine the determinants of online gambling intention and behavior among online gamblers in Iloilo City. Iloilo City was selected as the research locale for two reasons: convenience, since the researchers reside in the city and could leverage local access and familiarity in reaching respondents; and relevance, as Iloilo City has been identified as a research gap in the existing literature on online gambling determinants. Data were gathered using a structured, seven-point Likert-scale questionnaire adapted from the UTAUT2 framework (Venkatesh et al., 2012), with item wording contextualized to online gambling—for instance, facilitating conditions and effort expectancy items were reframed around access to and ease of using online gambling platforms specifically, rather than technology use in general. The questionnaire measured the seven UTAUT2 determinants together with behavioral intention and actual behavior.

Data were collected over a two-month period, from March to April 2026, through a combination of online and face-to-face surveys from 204 respondents aged 18 to 44 who were residents of Iloilo City and had engaged in online gambling within the past twelve months. Prior to data collection, the study obtained ethics clearance from the University of the Philippines Visayas Research Ethics Board (UPV REB), which granted the study exempted status on the basis of its classification as a student research output involving minimal risk to participants; respondents were informed of the study's purpose, assured of confidentiality and voluntary participation, and provided consent before completing the questionnaire. The collected data were analyzed using descriptive statistics and Partial Least Squares–Structural Equation Modeling (PLS-SEM), performed using SmartPLS.

Results

Table 1 presents the demographic and socioeconomic profile of the survey respondents.

Table 1 Demographic profile of the sample

Characteristics	Category	f	%
Sex	Male	126	61.8%
	Female	73	35.8%
	Prefer not to say	5	2.5%
Age	18–24 years old	148	72.5%

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Characteristics	Category	f	%
	25–34 years old	40	19.6%
	35–44 years old	16	7.8%
Highest educational attainment	Primary Education	3	1.5%
	Junior High School	5	2.5%
	Senior High School	145	71.1%
	College	47	23.0%
	Post-Graduate	4	2.5%
Occupational status	Student	123	60.3%
	Employed	56	27.5%
	Self-employed	18	8.8%
	Unemployed	7	3.4%
Monthly household income	Less than 12,030 PHP	79	38.7%
	12,030–24,060 PHP	41	20.1%
	24,061–48,120 PHP	39	19.1%
	48,121–84,210 PHP	19	9.3%
	84,211–144,360 PHP	9	4.4%
	144,361–240,600 PHP	3	1.5%
	At least 240,601 PHP	14	6.9%
Source of income	Allowance	116	56.9%
	Business Income	24	11.8%
	Salary	95	46.6%
	Remittances	23	11.3%
Source of online gambling awareness	Social Media	92	45.1%
	Family Members	54	26.5%
	Friends or Peers	153	75.0%
	Online Advertisements	56	27.5%
	Influencers or Streamers	21	10.3%
	Gambling Sites/Mobile Apps	28	13.7%
Types of online gambling activities engaged in	Online Bingo	14	6.9%
	Online Color Game or E-Games	150	73.5%
	Online Card Games	61	29.9%
	Online Sports Betting	62	30.4%
	Online Cockfighting	17	8.3%
	Online Lotteries	12	5.9%
	Others	4	2.0%
Duration of online gambling engagement	Less than 6 months	103	50.5%
	6–12 months	43	21.1%
	1–2 years	32	15.7%
	More than 2 years	26	12.7%
No. of hours (daily) spent on online gambling	Less than 4 hours	178	87.3%
	4–6 hours	22	10.8%
	7–10 hours	4	2.0%

Descriptive statistics for all UTAUT2 constructs are presented in Table 2. HM and FC recorded the highest mean scores, while PE and SI recorded the lowest. Figure 2 shows the mean scores per construct.

Table 2 Descriptive statistical analysis of constructs

ID	Item/Construct	Mean	Median	SD
Performance Expectancy (PE)				
PE1	I find online gambling valuable to my daily life.	2.75	3	1.46
PE2	Online gambling increases my chances of achieving things that are important to me.	2.65	2	1.52
PE3	Online gambling helps me accomplish things more quickly.	2.50	2	1.55
PE4	Online gambling makes my life better.	2.44	2	1.54
PE5	Online gambling increases my productivity.	2.27	2	1.47
PE6	Online gambling increases my flexibility in my daily life.	2.26	2	1.40
PE7	Online gambling enhances the effectiveness of my interactions online.	2.54	2	1.62
Effort Expectancy (EE)				
EE1	My interaction with a gambling site or platform should be clear and understandable.	4.30	5	1.86
EE2	It should be easy for me to become skillful at online gambling.	3.54	4	1.75
EE3	Online gambling sites or platforms should be effortless to use.	4.09	4	1.97
EE4	Learning to use an online gambling platform should be easy.	3.96	4	2.04
EE5	It would be comfortable for me to gamble online.	3.68	4	1.81
EE6	The use of smartphones for online gambling should not be stressful.	4.23	4	2.00
Social Influence (SI)				
SI1	I get involved with other people a lot when I gamble online.	3.37	3	1.82
SI2	People who are important to me think that I should gamble online.	2.20	2	1.48
SI3	People who influence my behavior think that I should gamble online.	2.59	2	1.67
SI4	People whose opinions I value prefer that I gamble online.	2.29	2	1.57
SI5	People who are important to me think that online gambling is a good idea to get involved in daily life.	2.05	2	1.36
SI6	People who are important to me support me in online gambling.	2.46	2	1.64
SI7	Online gambling is a status symbol in my environment.	2.45	2	1.58
Facilitating Conditions (FC)				
FC1	I have the resources necessary to gamble online.	4.08	4	2.00
FC2	I have the knowledge necessary to use online gambling sites.	4.65	5	1.92
FC3	Online gambling is compatible with other technologies I use.	4.67	5	2.00
FC4	I can get help from others when I have difficulties with online gambling.	3.79	4	2.04
FC5	I feel comfortable gambling online.	3.40	3	1.83

ID	Item/Construct	Mean	Median	SD
FC6	I have no problems gambling online.	3.83	4	1.94
Hedonic Motivation (HM)				
HM1	Online gambling is fun.	4.38	5	1.95
HM2	Online gambling is enjoyable.	4.33	5	1.89
HM3	Online gambling is very entertaining.	4.46	5	1.93
HM4	Online gambling gives me pleasure.	3.89	4	1.85
HM5	Online gambling gets me excited.	4.28	4	2.00
HM6	Online gambling amuses me.	4.23	4	1.85
Price Value (PV)				
PV1	The price of online gambling is reasonable.	3.81	4	1.80
PV2	Gambling online provides me with good value for the money I play.	3.41	3	1.74
PV3	At my current spending, online gambling provides good value.	3.18	3	1.62
Habit (HB)				
HB1	Online gambling has become a habit for me.	2.90	3	1.80
HB2	I am enthusiastic about online gambling.	3.09	3	1.69
HB3	I must gamble online.	2.39	2	1.66
HB4	Online gambling has become natural to me.	2.83	2.5	1.83
Behavioral Intention (BI)				
BI1	I intend to continue gambling online in the future.	2.98	2.5	1.83
BI2	I will always try to gamble online in my daily life.	2.55	2	1.72
BI3	I plan to continue to gamble online frequently.	2.74	2	1.79
BI4	Given the opportunity, I will gamble online.	3.35	3	2.00
BI5	I will never get tired of online gambling.	2.74	2	1.72
BI6	I will recommend other people to gamble online.	2.23	2	1.59
Actual Behavior (AB)				
AB1	I tend to gamble online frequently.	2.89	2.5	1.77
AB2	I spend a lot of time online gambling.	2.65	2	1.80
AB3	I get involved a lot in online gambling.	2.84	2	1.87

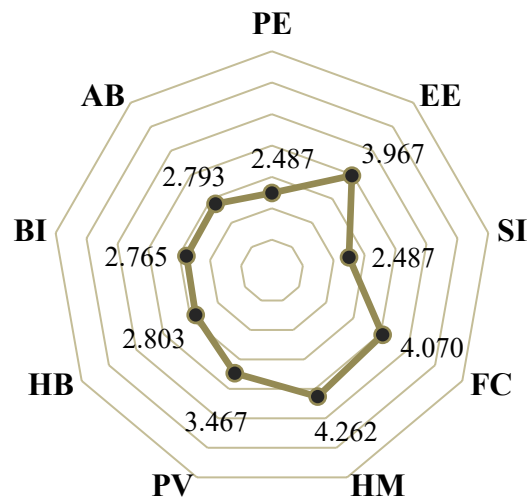


Figure 2 Mean scores per construct

The measurement model met standard thresholds for reliability and validity: outer loadings exceeded 0.70, Cronbach's alpha and composite reliability exceeded recommended levels, and AVE exceeded 0.50 for all constructs (Table 3). Discriminant validity via HTMT was below 0.85 for all construct pairs except Behavioral Intention–Actual Behavior (0.863).

Table 3 Measures of construct reliability and convergent validity

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
AB	0.882	0.882	0.944	0.895
BI	0.931	0.936	0.946	0.746
EE	0.896	0.898	0.92	0.658
FC	0.901	0.908	0.924	0.669
HM	0.93	0.932	0.947	0.781
PE	0.925	0.93	0.941	0.729
PV	0.86	0.892	0.914	0.78
SI	0.906	0.912	0.93	0.727

Table 4 presents the path coefficients for the hypothesized relationships. BI ($\beta = 0.488$, $p < .001$) and HB ($\beta = 0.423$, $p < .001$) significantly predicted AB. PV ($\beta = 0.273$, $p = .005$), SI ($\beta = 0.272$, $p < .001$), and HB ($\beta = 0.262$, $p < .0001$) significantly predicted BI. PE, EE, FC, and HM were not significant predictors of BI, nor were the moderating effects of Age, Gender, or Experience significant for any path. The structural model is illustrated in Figure 3.

Additional measures were taken to confirm the model's explanatory power and predictive relevance and its ability to accurately forecast gambling intentions and behavior within the same population, as reflected in the following values: $R^2 = 0.699$ and $Q^2_{\text{predict}} = 0.626$ for Behavioral Intention, and $R^2 = 0.713$ and $Q^2_{\text{predict}} = 0.597$ for Actual Behavior.

Table 4 Evaluation of path coefficients and their significance

	Coefficient	SD	t-value	p-value
PE → BI	0.051	0.073	0.693	0.488
EE → BI	-0.044	0.076	-0.583	0.560
SI → BI	0.272	0.071	3.857	< 0.001***
FC → BI	-0.009	0.082	-0.110	0.912
FC → AB	-0.015	0.040	-0.369	0.712
HM → BI	0.171	0.1	1.701	0.089*
PV → BI	0.273	0.098	2.792	0.005***
HB → BI	0.262	0.075	3.514	< 0.001***
HB → AB	0.423	0.054	7.809	< 0.001***
BI → AB	0.488	0.075	6.495	< 0.001***
Gender → BI	0.017	0.09	0.188	0.851
Age → BI	0.062	0.054	1.137	0.256
Age → AB	-0.023	0.041	-0.564	0.573
Experience → BI	0.076	0.053	1.436	0.151
Experience → AB	0.067	0.046	1.465	0.143
Gender x FC → BI	0.122	0.149	0.818	0.414
Gender x HB → BI	0.027	0.119	0.229	0.819
Gender x HM → BI	-0.143	0.154	-0.931	0.352
Gender x PV → BI	0	0.147	0.001	0.999
Age x HB → BI	-0.011	0.072	-0.155	0.877

	Coefficient	SD	t-value	p-value
Age x HB → AB	-0.029	0.038	-0.776	0.438
Age x HM → BI	0.048	0.065	0.732	0.464
Age x PV → BI	-0.013	0.072	-0.187	0.852
Experience x BI → AB	-0.037	0.061	-0.605	0.545
Experience x FC → BI	0.068	0.046	1.472	0.141
Experience x HB → AB	0.094	0.072	1.302	0.193
Experience x HB → BI	-0.038	0.055	-0.688	0.492

Note. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

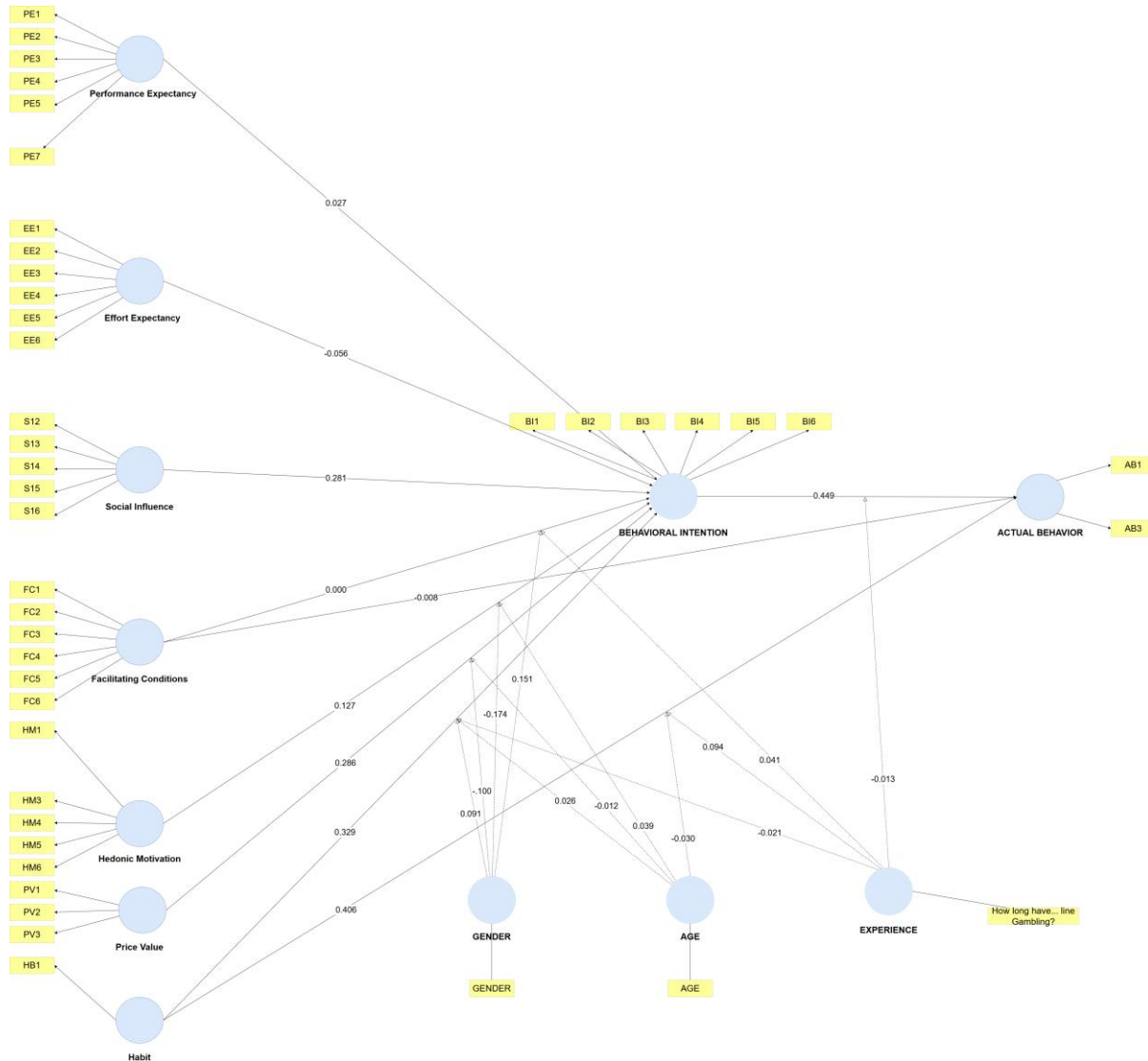


Figure 3 Structural Equation Model of Online Gambling Behavior and Intention

Discussion

The study aimed to identify and analyze the drivers of online gambling behavior using the UTAUT2 framework, adapted to the context of online gambling. The results indicate that the model is suitable for analyzing and predicting online gambling behavior, with R^2 values near 0.70 and Q^2 values well above 0. First, three main drivers of the intention to engage in online gambling were identified: habit, price value, and social influence, supporting H_8 , H_7 , and H_3 , respectively. Second, the primary antecedents of actual online gambling behavior were found to be habit and behavioral intention, supporting H_9 and H_{10} . Third, the remaining

variables—including the moderating variables of gender, age, and experience—showed no significant influence on either intention or behavior, such that the remaining hypotheses were not supported. The following paragraphs discuss these findings in greater detail.

The findings show that habit has a statistically significant positive effect on both behavioral intention and actual behavior, supporting H₈ and H₉. The significant coefficient suggests that habit matters statistically, but respondents do not report strong habitual gambling. One possible explanation is that the more users repeatedly interact with such platforms, their behavior becomes routinized, reducing reliance on conscious decision-making and reflecting the formation of habitual use over time (Hew et al., 2015; Konietzny & Caruana, 2019). Over time, such repeated exposure supports the development of habitual usage patterns, which in turn strengthen both behavioral intention and actual behavior. Additionally, cultural familiarity and localized social environments among Ilonggo users may reinforce consistent platform use, which can further contribute to the formation and persistence of habit.

Meanwhile, price value exerts a significant positive effect on the intention to engage in online gambling, supporting H₇ and confirming that the perceived monetary worth of the activity is a primary motivator for users. In the unique context of gambling, where both costs and potential returns are essentially financial, this result aligns with the assertions of Antonio et al. (2025) that individuals are inclined to maximize net profit and utility. Since the study's demographic is predominantly students and young adults, respondents view online gambling not as a purely emotional impulse but as a calculated transaction in which the entertainment or pleasure derived from each peso bet is carefully weighed. In other words, they tend to conduct a cost-benefit analysis before engaging.

Social influence was also found to be a significant predictor of behavioral intention, supporting H₃ and aligning with the UTAUT2 premise that the expectations and behaviors of "important others" shape technology-adoption decisions—in this context, the decision to engage in online gambling. This is consistent with Neighbors et al. (2007), who found that individuals who perceive gambling as common among their peers are more likely to engage in it themselves. Notably, this significant path contrasts with the construct's low descriptive mean ($M = 2.487$): respondents do not consciously report social factors as a strong influence, yet the statistical relationship indicates social influence still plays a dominant role in shaping intention. A plausible explanation is that respondents underreport the influence of peers because such influence often operates indirectly and below conscious awareness: gambling behavior may be normalized within friend groups without being explicitly framed as "pressure" or "encouragement," and social desirability bias may lead respondents to downplay the extent to which others shape their choices.

Behavioral intention itself was the strongest driver of actual behavior, supporting H₁₀ and reinforcing UTAUT2's premise that a stronger conscious decision to engage with a system predicts actual usage (Venkatesh et al., 2012). This relationship is likely amplified by the sample's demographic profile: as a predominantly young, tech-savvy group for whom awareness of online gambling comes chiefly through friends, peers, and social media, respondents face few practical barriers to acting on their intentions once formed (Gainsbury et al., 2015; Hing et al., 2022; Antonio et al., 2025; Neighbors et al., 2007). Consistent with this, most respondents reported short engagement durations—less than six months for the majority, and less than four hours daily—suggesting that their behavior remains largely intention-driven rather than habitual. Taken together, these findings suggest that once individuals form a clear intention, whether driven by curiosity, perceived ease of use, perceived reward, or social influence, they are highly likely to act on it in environments that are easily accessible and engaging, particularly among younger and relatively new users whose actions are still largely guided by conscious decision-making rather than established habits.

Effort expectancy and performance expectancy were both found to have a weak, non-significant influence on behavioral intention, such that H_1 and H_2 were not supported. This may be explained by the fact that most respondents are students, who are likely to perceive online gambling as a form of entertainment rather than an activity they are required to engage in; as a result, considerations of usefulness and ease of use become less relevant to their behavioral intention. This interpretation is offered as a plausible explanation consistent with the sample's demographic profile rather than as a claim directly tested by the data, and future studies should examine it explicitly.

Facilitating conditions were likewise found not to significantly drive behavioral intention or actual behavior, such that H_4 and H_5 were not supported. These conditions are relatively easy to satisfy, as owning a mobile phone is now widely regarded as a necessity; given that most respondents are students for whom access to technology is already routine, the availability of resources or technical support did not meaningfully shift their intention or usage.

While hedonic motivation recorded the highest construct mean score, it did not significantly predict behavioral intention, such that H_3 was not supported. This may be because, although students perceive these platforms as interactive and entertaining (Tamilmani et al., 2021), their actual decision to engage appears to be driven more by social and economic factors than by pleasure and excitement alone. To be precise, hedonic motivation was perceived highly by respondents on average, but it did not significantly predict behavioral intention in the structural model; the descriptive appeal of entertainment should therefore not be read as a statistically confirmed driver of intention.

Lastly, the non-significant moderating effects of age, gender, and experience, such that H_{11} to H_{23} were not supported, may be attributable to limited variability within the sample rather than a genuine absence of moderating influence. The sample skewed heavily toward a single age band and toward male respondents, leaving little demographic spread for age or gender to meaningfully differentiate response patterns. Similarly, most respondents reported relatively short engagement durations, limiting the range of experience levels available to detect a moderating effect. Beyond sample composition, moderation effects are also typically smaller in magnitude than main effects and require larger samples to detect reliably (Aguinis et al., 2005); with 204 respondents distributed across numerous interaction terms, the analysis may simply have been underpowered to detect effects that exist but are modest in size. Taken together, these findings should be interpreted as an absence of evidence for moderation within this sample rather than confirmation that age, gender, and experience play no role in online gambling behavior more broadly.

Limitations

Several limitations should be considered when interpreting these findings. First, the sample is overwhelmingly composed of young respondents (72.5% aged 18–24), senior high school graduates (71.1%), and students (60.3%), obtained through purposive sampling. The results therefore describe predominantly young online gamblers in Iloilo City rather than the city's online-gambling population as a whole; thus, the inferences derived from the statistical analysis cannot be generalized to the entire population. Future studies should pursue more diverse and, where possible, probability-based samples across a wider range of ages, occupations, and income levels.

Second, because UTAUT2 frames online gambling as a technology-adoption process, the model excludes constructs central to gambling specifically, such as impulsivity, self-control, risk tolerance, financial stress, and symptoms of gambling-related harm; these may explain variance beyond what the current model captures. Future research could draw on the Theory of Planned Behavior, Social Learning Theory, or behavioral addiction frameworks to

complement UTAUT2 and more directly assess risk and harm, which the present model was not designed to measure.

Third, all constructs were measured using a single self-report questionnaire administered to the same respondents at the same point in time, creating a risk of common method bias that this study did not formally test (e.g., through Harman's single-factor test, full collinearity VIF, or a marker-variable analysis). Related to this, the HTMT value between Behavioral Intention and Actual Behavior (0.863) exceeded the conventional 0.85 threshold. While this was interpreted as reflecting theoretical proximity between the two constructs, it is also possible that the Actual Behavior items—being self-reported perceptions rather than objective measures such as gambling frequency, expenditure, transaction records, or platform logs—capture an attitudinal construct similar to intention rather than observed behavior. Future studies are encouraged to incorporate behavioral or transaction-based indicators where feasible.

Lastly, the moderation analysis tested several interaction effects (e.g., age, gender, and experience interacting with the UTAUT2 constructs) with a limited sample size (i.e., 204 respondents). This sample size may be underpowered to detect moderation effects, which are typically smaller than main effects. The non-significant moderation results reported in this study may reflect limited statistical power rather than a genuine absence of moderating influence.

Conclusions and Implications

The results of the study revealed that, for this sample of predominantly young online gamblers in Iloilo City, social influence, price value, and habit are the most significant predictors of behavioral intention, and that habit and behavioral intention are the primary drivers of actual behavior. This suggests that continued engagement is shaped less by the platform's functional usefulness or ease of use than by repeated exposure that turns gambling into routine behavior, by peer influence that often operates below conscious awareness, and by the perception that potential financial returns outweigh the cost of participation. Performance expectancy, effort expectancy, facilitating conditions, hedonic motivation, and the moderating variables of age, gender, and experience were not significant predictors within this sample.

These findings carry direct implications for responsible gambling, consumer protection, and public policy. Because habit was the strongest driver of both intention and behavior, responsible gambling measures should target the mechanisms that turn occasional play into routine use—such as mandatory reality checks, session-time reminders, self-exclusion options, and limits on features that reward frequent, uninterrupted engagement—rather than relying on access restrictions or general awareness campaigns alone. Because price value significantly shaped intention, consumer protection efforts should prioritize mandatory disclosure of the true costs and odds of online gambling, alongside financial literacy programs that help young users evaluate the expected cost of repeated wagering rather than its perceived value in the moment. Because social influence shaped intention despite low self-reported awareness of its effect, public policy and community-based interventions should be delivered through the peer networks and social media channels where this influence actually occurs, rather than through individually targeted messaging alone. Taken together, these results support continued strengthening of digital-gambling regulation—including stricter licensing, monitoring of illegal operators, identity verification, and spending controls—as part of a coordinated public policy response, working alongside financial literacy and community-level engagement rather than substituting for them.

Future research is encouraged to build on these findings in several directions: including more diverse respondents beyond students and a single age band, expanding coverage beyond Iloilo City to enable regional comparisons, and applying qualitative methods such as interviews

or focus groups to explore why the significant constructs (habit, price value, social influence) exert influence and why the non-significant constructs do not. Testing complementary frameworks—the Theory of Planned Behavior, Social Learning Theory, or behavioral addiction models—alongside UTAUT2 would help capture the risk- and harm-related dimensions this study's model was not designed to assess. Segmentation-based analysis comparing casual and frequent users, and the use of objective or transaction-based behavioral measures where feasible, are likewise recommended to strengthen the evidence base this study contributes to.

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FACTORS INFLUENCING GRABCAR USAGE INTENTIONS AMONG CONSUMERS IN ILOILO CITY

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Abstract

Over the past decade, ride-hailing platforms have transformed urban transportation, reshaping mobility patterns worldwide. While prior Philippine studies have focused on highly urbanized areas such as Metro Manila, limited research has examined ride-hailing adoption in emerging cities like Iloilo City, Philippines. Addressing this gap, the present study investigated the factors influencing consumers' intention to use GrabCar using the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2). Specifically, it analyzed the effects of performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value, and habit on behavioral intention, while also examining the moderating roles of age, gender, and awareness. A structured survey was administered to 407 respondents aged 18 and above with prior experience using GrabCar in Iloilo City, recruited through non-probability sampling techniques, and analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). Findings revealed that performance expectancy and habit were the only significant predictors of usage intention, with habit emerging as the strongest factor, indicating routine and automatic usage behavior. Other UTAUT2 variables showed minimal to no influence. Facilitating conditions declined in importance as awareness increased, while age and gender had no significant effects. These findings suggest that ride-hailing operators should prioritize reliability and habit-forming engagement over experiential appeals, while policymakers may consider integrating ride-hailing into broader urban transport planning. The study contributes to UTAUT2 literature by showing how determinants shift once a technology moves beyond early diffusion into routine use.

Keywords: *GrabCar, Intention to Use, Ride-hailing Application, UTAUT2, PLS-SEM*

Introduction

Over the past decade, ride-hailing platforms transformed urban transportation by reshaping commuting patterns and expanding mobility options, particularly for individuals lacking private vehicles or reliable public transit (Wadud, 2020). Companies such as Uber, Lyft, and Grab drove this shift by offering convenient, app-based services that integrated real-time tracking, cashless payments, and user-centered design (Chalermpong et al., 2025). These innovations helped address persistent challenges such as congestion, inefficiencies in traditional taxi systems, and the growing demand for flexible and cost-efficient transportation. In Southeast Asia, Grab emerged as a dominant platform by adapting to local market conditions and expanding beyond transport into delivery, logistics, and financial services. Its rapid growth in the Philippines since 2013, supported by early regulatory frameworks for transport network

vehicle services (TNVS), highlighted the increasing reliance on digitally mediated mobility solutions (Dela Cruz, 2019).

Despite extensive research on ride-hailing in highly urbanized areas such as Metro Manila, few studies examined emerging markets such as Iloilo City, where distinct economic conditions, transport systems, and consumer behaviors shaped adoption patterns (Gumasing et al., 2023). As a mid-sized city with moderate purchasing power and evolving digital adoption, Iloilo presented a unique context for analyzing ride-hailing demand. While GrabCar continued to grow, it faced ongoing issues including regulatory concerns, driver misconduct, and opposition from traditional taxi operators (Teo et al., 2018). Moreover, consumer intentions to use the service remained divided, influenced by factors such as perceived usefulness, ease of use, social influence, and cost. Given the lack of localized research, it remained unclear which of these factors most significantly affected usage intention in Iloilo City, underscoring the need for this study to inform targeted strategies, policies, and service improvements.

Focusing on Iloilo City, the study examined the influence of performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value, and habit on behavioral intention to use GrabCar, along with the moderating roles of age, gender, and awareness, combining survey data with PLS-SEM analysis. However, the study was limited to commuters aged 18 and above who had used GrabCar at least once, excluded driver perspectives, may not be generalizable beyond this sample, and was constrained by a two-month data collection period.

Literature Review

Recent studies on ride-hailing adoption commonly draw on extended technology acceptance frameworks, particularly UTAUT2, to explain how users form behavioral intentions. Rather than acting independently, constructs such as performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value, and habit interact to shape how individuals evaluate and adopt digital transport services (Baeshen, 2025). In ride-hailing contexts, these factors collectively reflect both the functional value of the service and the user's overall experience.

Among these, performance expectancy remains a central consideration. Users tend to gravitate toward platforms that improve travel efficiency, reliability, and convenience. Evidence from ride-hailing studies shows that when services are perceived to deliver consistent and practical benefits, intention to use becomes significantly stronger (Prasetyo & Vallespin, 2021). This reinforces the idea that utility-driven perceptions anchor adoption decisions.

Ease of use further conditions this relationship. Systems that minimize effort through intuitive interfaces and streamlined booking processes reduce cognitive barriers and make adoption more accessible. As demonstrated by Alalwan et al. (2019), lower complexity not only encourages initial use but also supports continued engagement, particularly in mobile-based services such as ride-hailing.

At the same time, adoption decisions are not formed in isolation. Social influence plays a reinforcing role, especially in environments where users rely on peer experiences to assess unfamiliar services. Wulandari (2022) highlights how recommendations and shared feedback shape perceptions of safety and reliability, allowing social validation to complement individual evaluation.

Beyond perception and influence, the availability of enabling resources determines whether adoption can occur in practice. Facilitating conditions such as stable internet access, device compatibility, and payment integration serve as the operational backbone of ride-hailing platforms. Without these, even strong behavioral intention may not translate into actual usage (Almaiah et al., 2020).

While functionality and access are critical, experiential factors also contribute to sustained use. Hedonic motivation, reflected in the enjoyment and satisfaction derived from the platform, enhances user engagement. Findings from Isradila and Indrawati (2017) suggest that positive interaction with the application itself can reinforce continued usage, even when the service is primarily utilitarian.

Economic considerations further shape user decisions, particularly in price-sensitive contexts. Users continuously evaluate whether the benefits of ride-hailing justify the associated costs. Wang et al. (2020) emphasize that perceived affordability and pricing transparency significantly influence both satisfaction and usage, underscoring the importance of value-based decision-making.

Over time, repeated interaction with ride-hailing services can shift behavior from deliberate choice to routine practice. Habit emerges as a key driver of continued use, as frequent exposure reduces the need for active evaluation. As noted by Almunawar et al. (2021), this automaticity strengthens long-term engagement and stabilizes usage patterns.

The influence of these factors is not uniform across all users. Demographic characteristics and user awareness introduce variability in the interpretation of adoption determinants. For instance, age has been shown to shape sensitivity to social and technological factors, with differing responses across user groups (Iqbal et al., 2024). Awareness also plays a role by enabling users to understand better and evaluate digital services, thereby strengthening the link between perception and intention.

Taken together, existing literature positions ride-hailing adoption as the result of an interplay between functional benefits, ease of use, social context, enabling conditions, experiential value, and behavioral reinforcement. However, much of this evidence is drawn from highly urbanized settings. As a result, less is known about how these relationships manifest in emerging cities with different infrastructure and mobility patterns. Addressing this gap, the present study examines the determinants of GrabCar usage intention in Iloilo City, offering insights into ride-hailing adoption in a developing urban context.

Objectives

1. To determine the influence of performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value, and habit on the behavioral intention to use GrabCar in Iloilo City.
2. To examine the moderating effects of age, gender, and awareness between the constructs and the behavioral intention to use GrabCar in Iloilo City.

Conceptual Framework

This study was anchored on the UTAUT2 model developed by Venkatesh et al. (2012), an extension of the original UTAUT model which integrated key constructs from eight prominent models of technology acceptance, including the Technology Acceptance Model, Theory of Reasoned Action, and Theory of Planned Behavior. Figure 1 shows the conceptual framework for this study.

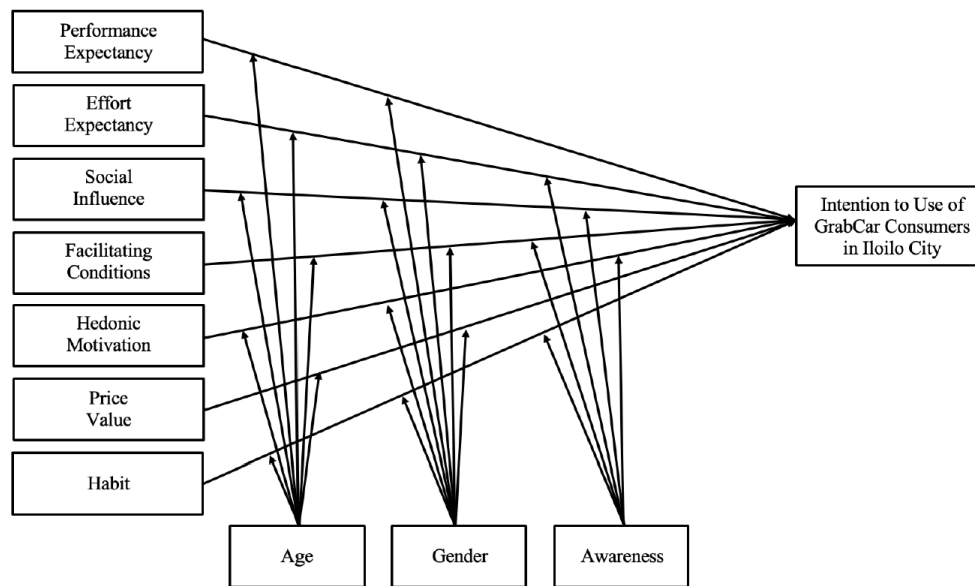


Figure 1 Conceptual framework for this study

Methodology

This study employed a quantitative, non-experimental survey research design to examine the determinants of GrabCar usage intention among consumers in Iloilo City. Iloilo City was selected as the research locale for two reasons: convenience, since the researchers reside in the city and could leverage local access and familiarity in reaching respondents; and relevance, as Iloilo City has been identified as a research gap in the existing literature on ride-hailing adoption determinants. Data were gathered using a structured, five-point Likert-scale questionnaire adapted from the UTAUT2 framework (Venkatesh et al., 2012), with item wording contextualized to GrabCar usage.

Data were collected over a two-month period, from March to April 2026, through a combination of online and face-to-face surveys from 407 respondents aged 18 and above who were residents of Iloilo City and had personally used GrabCar at least once. Prior to data collection, the study obtained ethics clearance from the University of the Philippines Visayas Research Ethics Board (UPV REB), which granted the study exempted status on the basis of its classification as a student research output involving minimal risk to participants; respondents were informed of the study's purpose, assured of confidentiality and voluntary participation, and provided consent before completing the questionnaire. The collected data were analyzed using descriptive statistics and Partial Least Squares–Structural Equation Modeling (PLS-SEM), performed using Jamovi.

Age was measured as a continuous variable based on the respondent's age in years, while gender was measured as a binary variable (male or female). Awareness was operationalized as respondents' exposure to and engagement with Grab-related content on social media — encompassing their exposure to Grab advertisements and promotions, their use of social media to gather reviews and information about the service, their level of engagement with Grab-related posts, and the extent to which this exposure increased their interest in using the service. Awareness was measured using four items (A1–A4) capturing frequency of exposure to Grab-related advertisements, use of social media to seek information about the service, engagement with Grab-related content, and the influence of such exposure on interest in using GrabCar.

Results

Table 1 shows the demographic profile of the respondents. and Table 2 shows the mean scores per UTAUT2 construct, as well as for the Awareness variable.

Table 1 Profile of the respondents

Variable		f	%
Age	Generation Z (18–29 years old)	333	81.8%
	Millennials (30–45 years old)	39	9.6%
	Generation X (46–61 years old)	34	8.4%
	Baby Boomers (62–80 years old)	1	0.2%
Gender	Female	267	65.6%
	Male	140	34.4%
Monthly household income	Less than ₱12,030	264	64.9%
	Between ₱12,030 and ₱24,060	79	19.4%
	Between ₱24,060 and ₱48,120	40	9.8%
	Between ₱48,120 and ₱84,210	10	2.4%
	Between ₱84,210 and ₱144,360	6	1.5%
	Between ₱144,360 and ₱240,600	1	0.3%
Frequency of Using GrabCar	At least ₱240,600	7	1.7%
	Daily	8	2.0%
	Several times a week	60	14.7%
	Once a week	22	5.4%
	Several times a month	142	34.9%
	Once a month	36	8.9%
	Rarely	139	34.1%

Table 2 Mean scores per variable

Variable			Mean	SD	Overall Mean
Awareness (A)	A1	I frequently encounter Grab-related advertisements and promotions on social media.	3.717	1.093	3.186
	A2	I use social media to gather reviews and information about transportation services like Grab.	3.378	1.189	
	A3	I engage with Grab-related social media content, such as watching, reacting, commenting or sharing.	2.565	1.175	
	A4	Seeing Grab-related advertisements and promotions on social media makes me more interested in using the service.	3.081	1.131	
Performance Expectancy (PE)	PE1	I find GrabCar useful in my transportation needs.	4.388	0.893	4.355
	PE2	Using GrabCar enables me to reach my destination more quickly.	4.418	0.804	
	PE3	Using GrabCar increases my productivity by reducing travel-related effort and time.	4.229	0.900	
	PE4	If I use GrabCar, it will improve my chances of having a smooth, timely, and reliable trip.	4.386	0.778	
Effort Expectancy (EE)	EE1	My interaction with the GrabCar system would be clear and understandable.	4.403	0.771	4.448
	EE2	It would be easy for me to become skillful in using the GrabCar system.	4.405	0.812	
	EE3	I would find the GrabCar system easy to use.	4.482	0.780	
	EE4	Learning to use GrabCar is easy for me.	4.501	0.799	

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Variable			Mean	SD	Overall Mean
Social Influence (SI)	SI1	People who influence my behavior think that I should use GrabCar.	3.479	1.032	3.802
	SI2	People who are important to me think that I should use GrabCar.	3.474	1.072	
	SI3	I would recommend GrabCar to others or I know other people who use GrabCar.	4.241	0.868	
	SI4	My friends, family, or peers support my use of GrabCar.	4.012	0.990	
Facilitating Conditions (FC)	FC1	I have the resources necessary to use GrabCar (e.g., Smartphone, Grab app, Internet connection).	4.597	0.728	4.385
	FC2	I have the knowledge necessary to use GrabCar.	4.592	0.762	
	FC3	GrabCar is compatible with other applications I use (e.g., e-wallets, maps, or messaging apps)	4.499	0.764	
	FC4	A specific person or support service is available to assist me if I experience difficulties using GrabCar.	3.850	1.030	
Hedonic Motivation (HM)	HM1	I think using GrabCar is fun.	3.597	1.016	3.507
	HM2	I think using GrabCar is entertaining.	3.314	1.044	
	HM3	I think using Grabcar is enjoyable.	3.609	1.022	
Price Value (PV)	PV1	GrabCar services are reasonably priced.	3.737	0.955	3.788
	PV2	GrabCar services are a good value for the money.	3.850	0.914	
	PV3	At the current price, GrabCar services provide a good value.	3.776	0.962	
Habit (H)	H1	Using GrabCar services has become a habit for me.	2.946	1.331	2.860
	H2	I feel compelled to use GrabCar services.	2.860	1.295	
	H3	I must use GrabCar services.	2.572	1.277	
	H4	Using GrabCar services has become natural to me.	3.061	1.328	
Intention to Use (IU)	IU1	I intend to use GrabCar for my travel needs in the future.	4.238	0.870	3.959
	IU2	I predict that I will use GrabCar regularly for transportation.	3.074	1.214	
	IU3	I plan to use GrabCar whenever I need convenient transportation.	4.229	0.971	
	IU4	I would recommend GrabCar to a friend.	4.295	0.871	

Table 3 presents the collinearity statistics for each path. Notably, several predictors exhibited elevated variance inflation factors (VIFs), particularly interaction terms involving facilitating conditions. These findings must therefore be treated with caution, as interaction constructs are mathematically correlated with their constituent variables and may not indicate multicollinearity.

Table 3 Collinearity statistics

Path	VIF	Path	VIF
FC → IU	9.920	Awareness × FC → IU	5.745
Gender × FC → IU	8.881	Gender × H → IU	5.263
Age × PE → IU	8.775	PV → IU	5.087
Age × FC → IU	8.731	Awareness × EE → IU	5.064
PE → IU	7.994	Gender × PV → IU	4.687

Age × SI → IU	7.756	Age × HM → IU	4.062
SI → IU	7.742	Awareness × SI → IU	3.724
Gender × SI → IU	7.664	Age × PV → IU	3.323
EE → IU	7.600	Age × H → IU	2.923
Gender × EE → IU	7.270	Awareness × HM → IU	2.748
HM → IU	7.261	Awareness × H → IU	2.488
Gender × PE → IU	7.135	Awareness → IU	1.816
Gender × HM → IU	6.597	Age → IU	1.598
Age × EE → IU	6.349	Gender → IU	1.146
H → IU	5.929		

Table 4 presents the results of the path analysis, which show that Habit ($p = 0.001$) and Performance Expectancy ($p = 0.002$) are the only significant direct predictors of Intention to Use. Among the moderating variables, only the interaction between Awareness and Facilitating Conditions ($p = 0.014$) reached statistical significance. All other direct and moderating effects showed no significant influence. Figure 2 presents these results graphically.

Table 4. Path Analysis

Paths		Coefficients	SD	t-value	p-value
Direct effects	PE → IU	0.281	0.091	3.073	0.002***
	EE → IU	-0.043	0.100	-0.433	0.665
	SI → IU	0.073	0.082	0.895	0.371
	FC → IU	-0.001	0.110	-0.010	0.992
	HM → IU	0.096	0.101	0.945	0.345
	PV → IU	0.140	0.075	1.872	0.061*
	H → IU	0.285	0.086	3.332	0.001***
	Age → IU	-0.004	0.039	-0.090	0.928
	Gender → IU	0.094	0.069	1.363	0.173
	Awareness → IU	0.068	0.038	1.771	0.077*
Moderation effects	Age × PE → IU	-0.010	0.059	-0.179	0.858
	Age × EE → IU	-0.017	0.064	-0.272	0.786
	Age × SI → IU	-0.064	0.058	-1.093	0.274
	Age × FC → IU	0.018	0.069	0.262	0.794
	Age × HM → IU	0.037	0.057	0.652	0.514
	Age × PV → IU	0.012	0.044	0.263	0.792
	Age × H → IU	-0.023	0.051	-0.455	0.649
	Gender × PE → IU	-0.066	0.123	-0.539	0.590
	Gender × EE → IU	0.050	0.126	0.396	0.692
	Gender × SI → IU	0.152	0.115	1.316	0.188
	Gender × FC → IU	0.183	0.139	1.319	0.187
	Gender × HM → IU	-0.047	0.117	-0.406	0.685
	Gender × PV → IU	-0.143	0.093	-1.545	0.122
	Gender × H → IU	-0.021	0.100	-0.208	0.835
	Awareness × EE → IU	0.000	0.067	0.001	0.999
	Awareness × SI → IU	-0.043	0.059	-0.724	0.469
	Awareness × FC → IU	-0.150	0.061	-2.447	0.014**
	Awareness × HM → IU	0.062	0.047	1.330	0.184
	Awareness × H → IU	0.013	0.046	0.293	0.770

Note. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

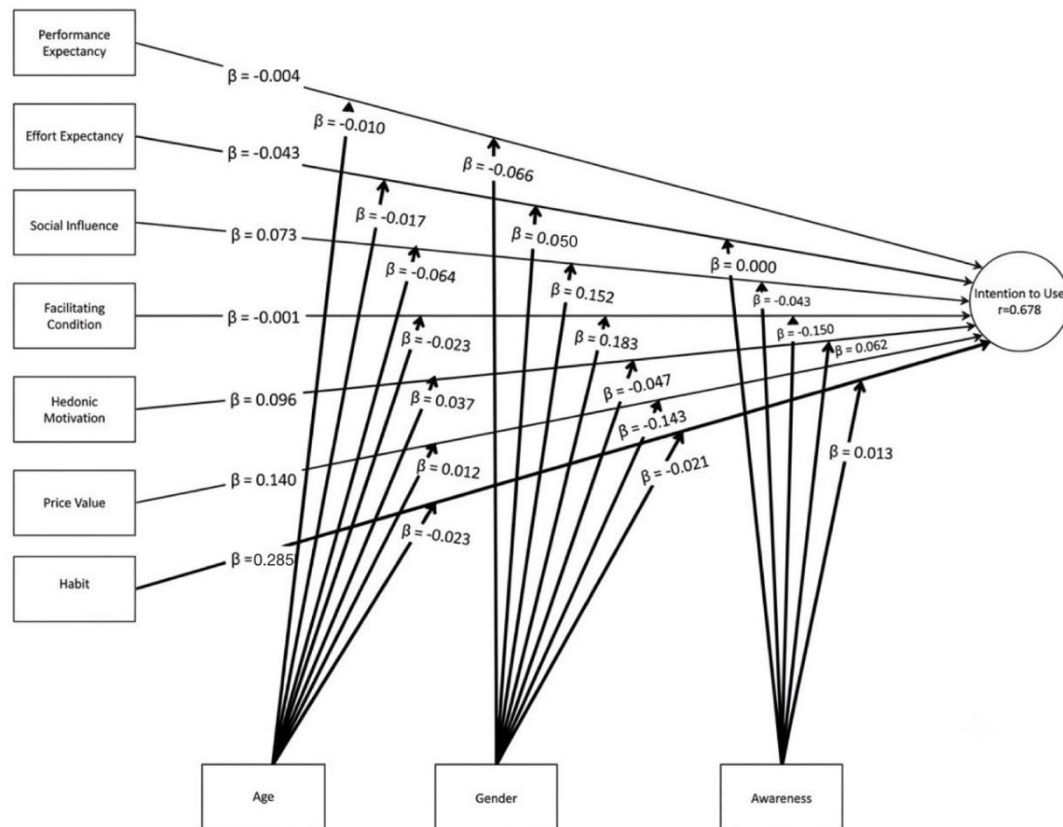


Figure 2 Results of Final SEM

As shown in Figure 2, several factors influence users' intention to use GrabCar, with habit ($\beta = 0.285$) and performance expectancy ($\beta = 0.281$) showing the strongest positive effects, followed by price value ($\beta = 0.140$) and hedonic motivation ($\beta = 0.096$), while social influence ($\beta = 0.073$) and effort expectancy ($\beta = -0.043$) have weak effects and facilitating conditions show a negligible effect ($\beta = -0.001$). Overall, moderating variables such as age, gender, and awareness exhibited minimal influence, as most interaction effects were weak and close to zero, indicating limited moderating impact on the relationships between predictors and intention to use.

All constructs shown in Table 5 demonstrated strong reliability and validity, evidenced by Cronbach's alpha values and composite reliability scores, all exceeding recommended thresholds. In addition, all constructs achieved average variance extracted (AVE) values above 0.50, indicating adequate convergent validity and confirming that the indicators sufficiently explain their respective constructs.

Table 5 Reliability and Convergent Validity of the Constructs

	Cronbach's alpha	Composite reliability (rho _a)	Composite reliability (rho _c)	AVE
Awareness	0.815	0.839	0.878	0.643
Effort Expectancy	0.930	0.932	0.950	0.827
Facilitating Condition	0.821	0.836	0.886	0.667
Habit	0.919	0.923	0.943	0.804
Hedonic Motivation	0.920	0.926	0.949	0.862
Intention to Use	0.838	0.842	0.892	0.676
Performance Expectancy	0.881	0.885	0.918	0.737
Price Value	0.906	0.909	0.941	0.842
Social Influence	0.852	0.866	0.899	0.690

The results from both the Heterotrait-Monotrait Test (HTMT) and Fornell-Larcker Criterion (FLC) tests in Tables 6 and 7 confirm strong discriminant validity among the constructs, indicating that the constructs are sufficiently distinct both conceptually and statistically.

Table 6 Discriminant Validity Using HTMT

Factors	Age	A	EE	FC	Gender	H	HM	IU	PE	PV	SI
Age											
A	0.090										
EE	0.254	0.325									
FC	0.259	0.412	0.866								
Gender	0.025	0.138	0.107	0.058							
H	0.030	0.527	0.339	0.381	0.077						
HM	0.070	0.601	0.463	0.550	0.043	0.649					
IU	0.097	0.517	0.617	0.713	0.173	0.706	0.668				
PE	0.110	0.402	0.740	0.753	0.165	0.491	0.585	0.793			
PV	0.049	0.472	0.454	0.548	0.084	0.508	0.593	0.630	0.595		
SI	0.092	0.525	0.656	0.701	0.172	0.640	0.644	0.799	0.779	0.658	

Table 7 Discriminant Validity Using FLC

Factors	Age	A	EE	FC	Gender	H	HM	IU	PE	PV	SI
Age	1.000										
A	-0.031	0.802									
EE	-0.244	0.295	0.909								
FC	-0.179	0.341	0.764	0.817							
Gender	-0.025	0.125	0.103	0.051	1.000						
H	0.020	0.462	0.316	0.328	0.074	0.897					
HM	-0.069	0.526	0.432	0.477	0.033	0.597	0.929				
IU	-0.091	0.438	0.550	0.594	0.159	0.613	0.587	0.822			
PE	-0.104	0.355	0.676	0.644	0.156	0.444	0.531	0.688	0.858		
PV	-0.048	0.414	0.420	0.467	0.081	0.465	0.543	0.553	0.534	0.917	
SI	-0.091	0.446	0.596	0.598	0.159	0.564	0.574	0.693	0.687	0.589	0.830

Moreover, the model explains 67.8% of the variance in Intention to Use ($R^2 = 0.678$), which is considered robust and falls between moderate and substantial levels in behavioral research. The Adjusted R^2 of 65.4% further supports the model's strong predictive relevance, indicating that it effectively explains users' intention while accounting for potential overfitting.

Finally, Table 8 showed that most indicators have loadings above 0.70, indicating strong indicator reliability across all constructs. However, FC4 recorded a lower loading of 0.578, which falls below the recommended threshold but may still be retained if it does not negatively affect overall construct reliability and validity, suggesting it contributes less strongly but still provides relevant information.

Table 8 Indicator Reliability

Indicator	Indicator Loadings	Indicator	Indicator Loadings
EE1 ← Effort Expectancy	0.899	IU1 ← Intention to Use	0.867
EE2 ← Effort Expectancy	0.869	IU2 ← Intention to Use	0.716
EE3 ← Effort Expectancy	0.939	IU3 ← Intention to Use	0.852
EE4 ← Effort Expectancy	0.929	IU4 ← Intention to Use	0.844
FC1 ← Facilitating Condition	0.856	PE1 ← Performance Expectancy	0.866
FC2 ← Facilitating Condition	0.901	PE2 ← Performance Expectancy	0.853
FC3 ← Facilitating Condition	0.889	PE3 ← Performance Expectancy	0.852
FC4 ← Facilitating Condition	0.578	PE4 ← Performance Expectancy	0.862

H1 ← Habit	0.890	PV1 ← Price Value	0.906
H2 ← Habit	0.902	PV2 ← Price Value	0.921
H3 ← Habit	0.891	PV3 ← Price Value	0.925
H4 ← Habit	0.904	SI1 ← Social Influence	0.786
HM1 ← Hedonic Motivation	0.937	SI2 ← Social Influence	0.853
HM2 ← Hedonic Motivation	0.922	SI3 ← Social Influence	0.823
HM3 ← Hedonic Motivation	0.926	SI4 ← Social Influence	0.858

Discussion

The results showed that performance expectancy and habit are significant predictors of intention to use GrabCar, both exhibiting moderate positive effects. This indicates that users are more likely to adopt and continue using the platform when they perceive it as useful, efficient, and reliable, and when usage becomes routine or automatic. These findings are consistent with UTAUT2, which identifies performance expectancy as a key determinant of behavioral intention, and are generally supported by prior literature emphasizing the role of perceived usefulness and habitual behavior in technology adoption. However, the moderate magnitude of these effects suggests that, while both factors are important, neither is overwhelmingly dominant. In this context, where users are largely price-sensitive and may be occasional riders, other practical considerations, such as cost and accessibility, may still play a complementary role.

In contrast, effort expectancy, social influence, hedonic motivation, price value, and facilitating conditions were found to have no statistically significant direct effect on intention to use. Within this sample, efficiency and established routines were the only factors with statistically significant effects on intention, while ease of use, social influence, enjoyment, and price did not reach significance — a pattern that should not be read as evidence that these factors are unimportant to users generally. These non-significant results may instead reflect the maturity of the ride-hailing market in the Philippines and the digital literacy of a predominantly Generation Z sample. As smartphone-based services become deeply embedded in daily life for digitally native users, factors that matter most during early-stage technology diffusion — effort expectancy, hedonic motivation, and social influence — may lose explanatory power once a service is normalized. Similarly, as ride-hailing platforms increasingly resemble commoditized utilities rather than novel technologies, users may evaluate them primarily on functional outcomes (performance expectancy) and ingrained routines (habit) rather than experiential or social dimensions. This pattern is consistent with technology life-cycle perspectives, in which the relative salience of UTAUT2 predictors shifts as a technology moves from novelty toward mainstream, everyday use.

With respect to moderating effects, awareness demonstrated a negative but weak moderating influence on the relationship between facilitating conditions and intention to use, indicating that as users are more exposed to and engaged with Grab-related content on social media, the importance of basic enabling resources (e.g., internet access, device availability) in shaping their intention diminishes. This suggests that users with greater social media exposure to Grab's advertising and content may already form favorable intentions through marketing-driven interest and social validation, making practical enabling conditions less decisive in their decision-making relative to users with lower exposure. However, given the small effect size, this moderation has limited practical significance. Moreover, awareness did not significantly moderate the other relationships, suggesting that exposure to and engagement with Grab-related social media content primarily influences how much weight users place on practical enabling conditions, without similarly altering the relevance of performance expectancy, effort expectancy, social influence, hedonic motivation, price value, or habit in shaping usage intention.

Furthermore, age and gender were found to have no significant moderating effects, indicating that the determinants of intention to use are consistent across demographic groups. This supports the notion that as digital platforms become more standardized and widely adopted, differences in technology adoption behavior across age and gender groups become less pronounced.

Overall, the findings reinforce that functional value (performance expectancy) and habitual behavior are the primary drivers of GrabCar adoption in this context. At the same time, other factors play a more limited or context-specific role. The study contributes to the literature by showing that the strength and significance of UTAUT-related constructs may vary with user characteristics and the maturity of the technological environment, highlighting the importance of contextual dynamics in understanding technology adoption.

Conclusions and Implications

The study concluded that Performance Expectancy and Habit were the only significant predictors of GrabCar usage intention in Iloilo City, with habit emerging as the strongest driver, indicating that usage had become routine and automatic for many users, while perceived utility reinforced adoption. In contrast, other UTAUT2 constructs — such as effort expectancy, social influence, hedonic motivation, price value, and facilitating conditions — did not demonstrate statistically significant effects within this sample, while price value approached significance as a secondary consideration. Facilitating conditions further diminished in importance as user awareness increased, reflecting a shift toward more experience-based evaluations. Additionally, demographic factors like age and gender did not significantly affect usage, pointing to a standardized, necessity-driven adoption across groups. Overall, the model demonstrated strong explanatory power and reliability, highlighting that GrabCar usage in Iloilo City was primarily shaped by practical benefits and established behavioral patterns rather than demographic or peripheral factors.

The study suggested that Grab Holdings Inc. should prioritize habit-forming and retention strategies by positioning GrabCar as a default transportation choice through personalized prompts, loyalty rewards, and a seamless user experience, while also enhancing service functionality, efficiency, and reliability to reinforce perceived usefulness. Strengthening trust and local relevance through consistent service, transparent pricing, and community-based engagement was also essential, particularly for experienced users. For policymakers, the findings highlighted the need to integrate TNVS into urban transport planning, ensure fair competition and pricing oversight, promote digital inclusivity, and support the modernization of traditional transport systems. Meanwhile, future research was encouraged to adopt more diverse sampling, incorporate qualitative approaches, and explore additional variables such as safety, trust, and service quality, while emphasizing localized and context-sensitive analyses to capture better capture the complexity of ride-hailing adoption across different settings. Finally, it is recommended that predictive assessment be considered in further studies, i.e., necessitating tools for prediction-oriented research such as but not limited to checking for Stone-Geisser Predictive Relevance and PLSpredict.

Limitations

This study has several limitations that should be considered when interpreting its findings. First, respondents were recruited through purposive, convenience, and snowball sampling rather than probability-based methods. Snowball recruitment in particular tends to draw respondents from overlapping social and digital networks, introducing selection bias and limiting the external validity of the findings relative to what a random sample of the population would show. Future studies should consider probability-based sampling methods, such as

stratified random sampling, to improve the representativeness of findings across the broader commuting population.

Second, the resulting sample was heavily skewed toward Generation Z (81.82%), female (65.60%), and lower-income (64.86%) respondents. As such, the findings are best interpreted as reflecting the usage intentions of predominantly young, female, lower-income GrabCar users in Iloilo City, rather than the full commuting population of the city, and caution should be exercised in extending these conclusions to older, higher-income, or male-dominated user segments. Subsequent research should deliberately recruit a more demographically balanced sample to test whether these findings hold across older, higher-income, and male respondent groups.

Third, the study was restricted to commuters aged 18 and above who had personally used GrabCar at least once; it excluded driver perspectives and non-users, and data collection was confined to a two-month period. Because eligibility required prior use, the behavioral intention measured here more accurately reflects continuance (continued-usage) intention rather than initial adoption intention — a distinction relevant to the strong effect of habit, which is conceptually more salient among existing users than it would be for prospective first-time adopters. The cross-sectional design also means the findings capture intention at a single point in time and cannot establish causal or longitudinal relationships. Future studies could separately sample non-users to disentangle initial adoption intention from continuance intention, and extend data collection across a longer or multi-wave period to capture seasonal variation and allow for longitudinal or causal inference, which the present cross-sectional design cannot support.

Fourth, all constructs were measured through a single self-administered questionnaire completed by the same respondents at the same point in time, raising the possibility of common method variance. Future studies could reduce this risk by collecting predictor and outcome data at different points in time, or from different sources (e.g., self-reports paired with independently observed usage data), rather than relying on a single questionnaire completed by the same respondents at the same time; alternatively, researchers could test for common method bias statistically using approaches such as Harman's single-factor test. In addition, awareness was included as a moderator despite not being part of the original UTAUT2 model. It was operationalized in this study as exposure to and engagement with Grab-related content on social media, measured using items developed specifically for this research rather than drawn from an extensively validated prior scale. Future studies should test and refine this measure of social media-driven awareness, including applying it across other technology-adoption settings, to build stronger evidence that it captures what it is intended to measure.

Fifth, several interaction terms used to test moderation effects — particularly those involving facilitating conditions — exhibited elevated VIFs, which, while remaining below the conventional threshold of 10, approached levels that some scholars consider indicative of multicollinearity concerns. This is a common byproduct of the product-indicator approach used to model interaction effects, since interaction terms are inherently correlated with their constituent main-effect variables. Future studies may consider alternative approaches, such as orthogonalization or other procedures for modeling interaction effects, to further reduce multicollinearity among interaction terms and strengthen confidence in the precision of moderation estimates.

Finally, this study did not assess the model's out-of-sample predictive performance using Stone–Geisser's Q^2 or PLSpredict, both of which offer useful information for prediction-oriented research. The analyses were conducted using Jamovi, which does not currently provide a native implementation of the blindfolding procedure for Q^2 or the PLSpredict algorithm; in addition, the primary objective of this study was to examine and explain the hypothesized relationships among the UTAUT2 constructs rather than to develop a predictive

model, and the evaluation therefore focused on explanatory measures such as construct reliability, convergent and discriminant validity, path coefficients, effect sizes, and the coefficient of determination (R^2). Future studies employing software with predictive assessment capabilities, such as SmartPLS, could incorporate Q^2 and PLSpredict analyses to evaluate the model's out-of-sample predictive performance.

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DOES ESG ENHANCE FIRM VALUE? EVIDENCE FROM THE THAI SERVICE SECTOR WITH A FOCUS ON HEALTHCARE AND COVID-19 EFFECTS

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Abstract

The purpose of this paper is to investigate the influence of environmental, social, and governance (ESG) performance on firm value in the Thai service sector, especially in the healthcare industry, with the impact of the COVID-19 pandemic serving as a moderator. The dataset used consists of firm-level data extracted from the SETSMART database from 2018 to 2023, and it comprises firms from six different sectors within the service industry: communications, healthcare, media, professional services, tourism, and transportations. To investigate the association between ESG performance and firm value, the method used in this paper is pooled OLS regression.

The findings show that ESG performance has a positive and significant effect on firm value, confirming the assumption that ESG improves corporate reputation and lowers information asymmetry. Nevertheless, the results also demonstrate considerable differences among various industries. It is evident that healthcare companies have higher firm values than other service companies. Still, the marginal contribution of ESG to firm value is lower for healthcare companies than for other companies. This means that the effects of ESG are decreasing in business sectors with high performance and demand. Moreover, the findings also demonstrate that the positive effects of ESG decreased during the COVID-19 pandemic.

In summary, the paper presents novel findings related to emerging markets, paying attention to the importance of industry and macroeconomic factors for ESG impacts.

Keywords: *ESG Performance, Firm Value, Healthcare Sector, Emerging Markets, COVID-19*

Introduction

In recent times, environmental, social, and governance (ESG) practices have been an important subject matter in corporate finance and strategic management as investors continue to prioritize sustainability and responsibility in business operations. Numerous studies have found that ESG performance is positively correlated with the creation of value for organizations by promoting greater transparency, minimizing information asymmetry, and increasing stakeholder confidence (Fatemi et al., 2018; Friede et al., 2015; Orlitzky et al., 2003).

For emerging economies like Thailand, the adoption of ESG practices has gained momentum through regulation and the evolution of capital markets. The Thai Stock Exchange (SET) has developed ESG practices through frameworks such as SET ESG Ratings and sustainability indexes to promote the integration of ESG practices among listed firms. Listed companies under such frameworks are supposed to strengthen governance, environmental

performance, and stakeholder engagement, leading to increased competitiveness and capital formation (Moolkham, 2025; Stock Exchange of Thailand, 2023).

More empirical evidence suggests that ESG reporting practices in Thailand have grown over time, despite the heterogeneity in implementation practices across different firms and sectors (Pimpa, 2025; World Bank, 2024).

Practical illustrations from real-life experiences provide examples of growing relevance and practice of implementing ESG in Thailand. Many well-known Thai listed firms in the energy and health care sectors frequently publish sustainability reports and disclose relevant information on ESGs to their stakeholders (Thailand Sustainability Reports, 2024). Some examples include health care organizations like Bangkok Dusit Medical Services (BDMS) and Bumrungrad Hospital that have been providing relevant information on governance, environment management, and patient services in their sustainability reports (Bangkok Dusit Medical Services, 2024; Bumrungrad International Hospital, 2024).

But the effect of ESG does not influence each industrial sector equally. In the services industry, for example, the healthcare sector constitutes a special case since it is very much vital, reliable, and valuable. Healthcare services are mainly determined by intrinsic drivers such as demographics and are therefore immune to economic influences (Santana et al., 2023).

The emergence of the coronavirus pandemic presents a relevant setting in which to assess the above-discussed phenomenon. Research suggests that ESG could improve company resilience against crises by mitigating downside risks and maintaining investors' confidence (Broadstock et al., 2021; Gao & Geng, 2024). On the other hand, it should be pointed out that the impact of ESG might differ between different times because of exogenous shocks overshadowing firm performance (Mounir & Ali, 2023).

Though ESG is gaining its significance, there is still some ambiguity when empirical evidence is taken into consideration. This paper seeks to examine the association between ESG and firm value by exploring the heterogeneity of different industries in Thailand's services sector and the moderating effect of the pandemic.

The contributions of this paper to the literature relate to extending stakeholder theory and RBV in understanding the link between ESG and firm value. Specifically, consistent with stakeholder theory (Freeman, 2015), ESG activities improve firm value through stakeholder relations and corporate legitimacy. Moreover, the study makes new contributions to resource-based view (RBV) (Barney, 1991), which indicate that ESG is indeed an intangible strategic resource. However, the value creation through ESG depends on industry properties since ESG is found to be less effective in the healthcare industry, which indicates diminishing returns for ESG activities. This contribution to the literature highlights the importance of the industry context for ESG value creation because ESG is a context-dependent resource whose value is conditional on other firm resources such as trust and demand for vital services. Additionally, the influence of COVID-19 is an important contribution since it expands the ESG literature by highlighting the role of exogenous factors influencing the performance of ESG activities.

These results bring implications to various stakeholders including managers, investors, and policymakers. Firstly, for managers, engaging in ESG investing will serve as an appropriate method for creating value, especially for firms that have underdeveloped ESG practices. For instance, firms operating in the tourism and communication sectors can boost their market value through ESG practices such as energy conservation, digital governance, and corporate transparency. On the other hand, for firms in the healthcare sector such as BDMS and Bumrungrad Hospital in Thailand, the results indicate that the adoption of ESG practices needs to be strategic rather than expansive. This means that due to the existing high level of demand and trust in these businesses, the returns from the ESG practices will not be proportional to the level of investment. For investors, ESG is an excellent indicator for the evaluation of business performance, especially when dealing with companies based in emerging markets

characterized by information asymmetry. Investors can focus on ESG investment strategies in sectors characterized by more potential for differentiation.

This research brings many contributions to existing literature. Firstly, it provides novel empirical insight into the effect of ESG on firm value in an emerging country – Thailand, where there is still little research conducted. Secondly, it emphasizes the role of sectoral heterogeneity and indicates that the effects of ESG may differ by sectors, with the healthcare sector being exceptional. Thirdly, this research contributes to the existing body of literature on ESG and resilience by considering an external crisis as a moderator – namely, COVID-19, which can lower the efficiency of ESG. Fourthly, this research makes a contribution by providing a multifaceted view on ESG through combining the micro-, meso-, and macro-level perspectives on sustainability.

Literature Review

This research builds on stakeholder theory and resource-based view (RBV) which have been extensively employed in studies investigating the link between ESG performance and firm value. According to stakeholder theory, firms that manage their relationships with different stakeholders, including shareholders, customers, and government agencies, can perform well over time (Freeman, 2015). ESG initiatives represent a means by which companies can integrate their strategies with the demands of their stakeholders, leading to increased firm legitimacy and value. In addition, RBV theory indicates that unique resources and capabilities are fundamental for achieving competitive advantages that can be sustained (Barney, 1991). ESG performance represents one such intangible strategic resource that helps create positive reputations, mitigate risks, and secure funding.

ESG in Thailand

In the last few years, the issue of ESG has attracted more and more attention in the emerging market countries, including Thailand. The promotion of ESG disclosure and sustainability reporting is among the measures taken by the Stock Exchange of Thailand (SET) to increase corporate sustainability. Studies confirm a positive correlation between the performance of firms in ESG and firm value since it enhances transparency and information symmetry between firms and investors (Fatemi et al., 2018). According to the results of the meta-analysis conducted by Friede et al. (2015), the majority of studies reveal a positive or neutral relationship between ESG and financial performance. Nevertheless, the adoption of ESG is inconsistent among firms, particularly those operating in developing countries, as they are relatively new to sustainability.

Importance of the Healthcare Sector

Indeed, healthcare companies play a vital role in economic and social progress, especially within the service industry. Some of the attributes associated with the sector include stable demand, provision of essential goods and services, high levels of regulation, and the ability to generate greater firm value than other types of firms. In addition to having valuable intangibles such as reputation and quality of services, healthcare companies exhibit several unique attributes that according to RBV result in higher performance. Nevertheless, due to relatively high levels of trust and essential demand among the population, the incremental contribution from ESG in this sector might be lower than in others.

ESG and COVID-19

The COVID-19 pandemic offers an ideal framework within which to investigate the impact of ESG on firm performance. Under periods of crises, ESG can act as a way to communicate resilience and risk management capacity within organizations. Past literature reveals that strong ESG performance leads to better firm performance in financial crises since ESG reduces risks for firms and investors (Broadstock et al., 2021). However, ESG performance

may be different at different points in time, with evidence revealing that ESG performance diminishes under extended periods of uncertainties. Further, sectoral impacts become more evident when there is a crisis, especially in sectors like healthcare.

Based on the theoretical and empirical literature, ESG performance is expected to positively influence firm value, as it enhances stakeholder relations and provides strategic resources that contribute to competitive advantage. Therefore, the first hypothesis is formulated as follows:

H1: ESG performance has a positive effect on firm value.

Given the distinct characteristics of the healthcare sector, which exhibits higher baseline firm value due to essential demand and strong intangible assets, it is also expected that healthcare firms outperform other service sectors:

H2: Firms in the healthcare sector have higher firm value than firms in other service sectors.

However, as healthcare firms already possess strong reputational and operational advantages, the marginal benefit of ESG may be lower compared to other industries. Thus, the moderating effect of the healthcare sector is expected to weaken the ESG–firm value relationship:

H3: The positive effect of ESG on firm value is weaker for healthcare firms compared to other service firms

Objectives

The objectives of this study are to examine the effect of ESG performance on firm value, to compare firm value between healthcare and other service sector firms, and to investigate the moderating role of the healthcare sector in the relationship between ESG performance and firm value.

Research Questions

This study addresses three main research questions. First, whether ESG performance has a positive effect on firm value. Second, whether firms in the healthcare sector have higher firm value compared to other service sectors. Third, whether the healthcare sector moderates the relationship between ESG performance and firm value.

Data and Methodology

Data

Data for the study were sourced from the SETSMART dataset, with a time range of 2018 to 2023. The selected firms are those in the services industry that are listed on the Stock Exchange of Thailand (SET), including firms from the following six sub-sectors: Communication (COMM), Healthcare (HEALTH), Media (MEDIA), Professional Services (PROF), Tourism and Leisure (TOURISM), and Transportation and Logistics (TRANS). Upon elimination of firms with missing values, the resulting firms constitute a total of 573 firm-years.

Research Method

In order to study the impact of the ESG performance on the firm value, the current paper uses the pooled ordinary least squares (OLS) regression model. Pooled OLS is a simple and widely used estimation method that combines all cross-sectional and time-series observations into a single regression framework, ignoring individual-specific effects. Its main advantage is ease of implementation and interpretation, as it provides straightforward estimates of the

average relationship between variables. However, pooled OLS has important limitations, particularly in panel data settings, as it assumes homogeneity across entities and time and ignores unobserved heterogeneity. If firm-specific or time-invariant factors are correlated with explanatory variables, pooled OLS estimates may be biased and inconsistent, making it less reliable compared to fixed or random effects models. To mitigate these issues, we include year effects and standard error clustered at the firm level in our analysis. This model estimates Tobin's Q based on such variables as ESG score, dummy variable indicating that the firms operate within the Healthcare industry, an interaction of the two variables mentioned above, size of the firm as the logarithm of its total assets, and annual dummy variables. The purpose of using the interaction variable in the model is to analyze if there are any differences in the influence of ESG on the firm value across industries of service nature (Healthcare and others). To account for possible heteroskedasticity, robust standard errors are calculated for each observation in the sample and are clustered according to the firm.

Results

Table 1 Descriptive statistics

Variable	Mean	SD	Min	Max	N
Q	6.87	0.90	4.07	9.31	573
ESG	0.77	1.29	0	4	573
SIZE	15.83	1.56	13.09	20.65	573

From Table 1, it can be seen that the sample is comprised of services firms which are listed at the Stock Exchange of Thailand (SET). The mean Q ratio (Tobin's Q) is 6.87 (SD = 0.90), which ranges between 4.07 and 9.31, indicating moderate variance among the sampled firms. Firm size (SIZE) which is measured through the natural log of assets of the firm has a mean of 15.83 (SD = 1.56), suggesting diversity in size among the sampled firms. Finally, the ESG score (0 to 4) has a mean of 0.77 (SD = 1.29), indicating low but highly dispersed ESG performance among firms.

Table 2 ANOVA

Source	SS	df	MS	F
Sector	80.68	5	16.136	23.72***
Residual	385.761	567	0.68	
Total	466.441	572	0.815	
Observations	573			
R-squared	0.173			
Adjusted R-squared	0.166			
Root Mean Square Error	0.825			
Number of sectors	6			

Note. *** denotes significance at the 1%, 5%, and 10% levels, respectively.

Results from Table 2 provide evidence of differences in Tobin's Q ratios for six sectors of the services firm such as Communications (COMM), Healthcare (HEALTH), Media (MEDIA), Professional Services (PROF), Tourism (TOURISM) and Transportation (TRANS). It

is shown that there is a significant difference in the Q ratios among sectors ($F = 23.72$, $p < 0.01$). Therefore, the null hypothesis is rejected since it suggests equal means of Tobin's Q for each sector. The findings suggest that sectors have a great impact on determining the value of a firm. Furthermore, the explained variation is 17.3%.

Table 3 Comparison

Sector	Contrast	SE	t-stat	p-value
COMM vs TOURISM	0.51	0.11	4.47***	0
HEALTH vs TOURISM	1.08	0.12	9.34***	0
MEDIA vs TOURISM	0.43	0.12	3.57**	0.005
PROF vs TOURISM	0.13	0.20	0.64	0.988
TRANS vs TOURISM	0.12	0.12	0.98	0.924
HEALTH vs COMM	0.58	0.10	5.67***	0
MEDIA vs COMM	-0.08	0.11	-0.72	0.98
PROF vs COMM	-0.38	0.19	-2.02	0.334
TRANS vs COMM	-0.39	0.11	-3.57**	0.005
MEDIA vs HEALTH	-0.65	0.11	-5.97***	0
PROF vs HEALTH	-0.96	0.19	-5.03***	0
TRANS vs HEALTH	-0.96	0.11	-8.68***	0
PROF vs MEDIA	-0.30	0.19	-1.57	0.616
TRANS vs MEDIA	-0.31	0.12	-2.68*	0.08
TRANS vs PROF	-0.01	0.19	-0.03	1

Note. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Based on the ANOVA results from Table 2, Table 3 illustrates the comparison of Tobin's Q in each of the six service sectors, adjusted for multiple comparisons using the Bonferroni method. According to the outcomes, there is an evident heterogeneity in firm values across the six sectors. Particularly, HEALTH sector is characterized by relatively high Tobin's Q compared to the others. The HEALTH sector exhibits the highest Tobin's Q relative to the Tourism sector ($\beta = 1.08$). Other sectors also show positive differences compared with Tourism, including Professional Services ($\beta = 0.96$), Transportation ($\beta = 0.96$), Media ($\beta = 0.65$), and Communication ($\beta = 0.58$). In addition, Communication ($\beta = 0.51$) and Media ($\beta = 0.43$) also demonstrate positive but smaller differences relative to Tourism. Overall, these results indicate that firms in the HEALTH sector have a substantially higher firm value compared to Tourism, while other sectors also exhibit varying degrees of positive deviation

Table 4 Pooled OLS estimation

Variable	Coef.	Robust SE
Constant	10.716***	(0.772)
ESG	0.376***	(0.069)
HEALTH	0.987***	(0.170)
ESG x HEALTH	-0.344**	(0.172)
SIZE	-0.270***	(0.050)
Year 2019	-0.090**	(0.036)
Year 2020	-0.146**	(0.055)
Year 2021	0.075	(0.068)
Year 2022	0.104*	(0.062)
Year 2023	-0.103	(0.065)
Observations	573	
R-squared	0.326	
F-statistic	13.57***	
Clusters	110	

Note. $Q_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 HEALTH_{it} + \beta_3 (ESG_{it} \times HEALTH_{it}) + \beta_4 SIZE_{it} + YR + \varepsilon_{it}$

***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 4 presents the pooled OLS regression analysis evaluating the influence of ESG on firm value (measured by Tobin's Q) in the service industries, particularly the Healthcare sector.

According to Table 4, there is a statistically significant positive relationship between ESG and firm value ($\beta = 0.376$, $p < 0.01$), implying that there is a likelihood that service firms having higher ESG performance would be valued higher in the market, which reinforces the hypothesis that sustainability is highly regarded by investors.

Similar to the findings from ANOVA and the test of equality between groups (Tables 2-3), it is observed that Healthcare firms have significantly higher firm values than those in other service industries ($\beta = 0.987$, $p < 0.01$), which implies that the Healthcare industry firms outperform other service firms based on Tobin's Q measure.

However, it appears that the effect of ESG on firm value is moderated negatively and significantly by Healthcare industry affiliation ($\beta = -0.344$, $p < 0.05$), suggesting that the positive impact of ESG on firm value is less pronounced in the Healthcare industry compared to other sectors.

For the control variables, firm size (SIZE) has a negative and statistically significant coefficient value ($\beta = -0.270$, $p < 0.01$). The year variable results are mixed with previous years (2019 and 2020) having statistically lower firm values than the base year. On the whole, the regression results reveal an R-square of 32.6% ($R^2 = 0.326$), which means the explanatory power of the independent variables towards explaining firm value is 32.6%. Additionally, the F-value of 13.57 is statistically significant, implying that the regression model as a whole is statistically significant. It should be noted that the distribution of ESG and healthcare observations is uneven, with limited overlap in certain ESG categories for healthcare firms. Therefore, results involving interaction effects should be interpreted with caution.

Additional tests

In Table 5, the robustness test results have been presented by considering lagged ESG. The findings from the table below are also in line with the previous regression results. Lagged ESG maintains a significantly positive relationship with firm value ($\beta = 0.380$, $p < 0.01$). The positive effect of ESG on firm value suggests that ESG performance plays a major role in

increasing firm value even when lag is taken into account. It is also found that the Healthcare industry has a significantly positive association with firm value ($\beta = 1.019$, $p < 0.01$).

Table 5 Pooled OLS estimation lag ESG

Variable	Coef.	Robust SE
Constant	10.524***	(0.775)
ESG _{it-1}	0.380***	(0.071)
HEALTH	1.019***	(0.174)
ESG _{it-1} X HEALTH	-0.348*	(0.175)
SIZE	-0.266***	(0.050)
Year 2020	-0.031	(0.050)
Year 2021	0.182***	(0.068)
Year 2022	0.181***	(0.063)
Year 2023	-0.002	(0.068)
Observations	464	
R-squared	0.332	
F-statistic	12.93***	
Clusters (firms)	106	

Note. $Q_{it} = \beta_0 + \beta_1 \text{ESG}_{it-1} + \beta_2 \text{HEALTH}_i + \beta_3 (\text{ESG}_{it-1} \times \text{HEALTH}_i) + \beta_4 \text{SIZE}_{it} + \text{YR} + \varepsilon_{it}$

***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively

It is important to note that the coefficient for the interaction effect between lagged ESG and Healthcare is negative and statistically insignificant ($\beta = -0.348$, $p < 0.10$). This indicates that even though ESG contributes positively to firm value, its contribution is relatively lower among firms in the healthcare industry. The control variable is still negative and statistically significant like in the base model. It is interesting to note that the goodness of fit measures also remain unchanged at an R^2 of 0.332 with a statistically significant F-value. These findings therefore re-affirm the results of the main findings that ESG positively influences firm value in the services industry while healthcare industries have high firm value and low ESG impact.

The results of robustness analysis for the impact of ESG, Healthcare, and firm value in periods pre-COVID-19 (2018-2019: COVID0), during COVID-19 (2020-2021: COVID1), and post-COVID-19 (2022-2023: COVID3) are provided in Table 6. These results also support our findings, suggesting that the impact of ESG, and Healthcare on the firm value remains unchanged before and after the coronavirus. ESG still exerts a positive influence on firm value at a statistically significant level ($\beta = 0.438$, $p < 0.01$). The Healthcare sector exhibits a positive link with firm value ($\beta = 1.150$, $p < 0.01$).

Table 6 COVID

Variable	Coef.	Robust SE
Constant	10.579***	(0.788)
ESG	0.438***	(0.075)
HEALTH	1.150***	(0.180)
ESG x HEALTH	-0.413*	(0.229)
COVID = 1	0.187**	(0.094)
COVID = 2	0.008	(0.100)
ESG × COVID = 1	-0.078*	(0.044)
ESG × COVID = 2	-0.110**	(0.049)
HEALTH × COVID = 1	-0.256**	(0.117)
HEALTH × COVID = 2	-0.219*	(0.131)
ESG x HEALTH × COVID = 1	0.043	(0.088)
ESG x HEALTH × COVID = 2	0.167	(0.102)
SIZE	-0.267***	(0.050)
Year 2019	-0.087**	(0.037)
Year 2020	-0.217***	(0.048)
Year 2021	Omitted ¹	
Year 2022	0.207***	(0.034)
Year 2023	Omitted ¹	
Observations	573	
R-squared	0.332	
F-statistic	43.94***	
Clusters (firms)	110	

Note. $Q_{it} = \beta_0 + \beta_1 \text{ESG}_{it} + \beta_2 \text{HEALTH}_i + \beta_3 (\text{ESG}_{it} \times \text{HEALTH}_i) + \beta_4 \text{Covid1}_i + \beta_5 \text{Covid2}_i + \beta_6 (\text{ESG}_{it} \times \text{Covid1}_i) + \beta_7 (\text{ESG}_{it} \times \text{Covid2}_i) + \beta_8 (\text{HEALTH}_i \times \text{Covid1}_i) + \beta_9 (\text{HEALTH}_i \times \text{Covid2}_i) + \beta_{10} (\text{ESG}_{it} \times \text{HEALTH}_i \times \text{Covid1}_i) + \beta_{11} (\text{ESG}_{it} \times \text{HEALTH}_i \times \text{Covid2}_i) + \beta_{12} \text{SIZE}_{it} + \text{YR} + \epsilon_{it}$

***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

¹ Variable omitted due to multicollinearity.

Yet, the interaction effect of ESG with Healthcare is negative ($\beta = -0.413$, $p < 0.10$) just like in the first two models, implying that ESG does have a less margin in Healthcare. In terms of COVID-19, there was an increase in firm value during the early stages of the pandemic (COVID1: $\beta = 0.187$, $p < 0.05$) while there was no significant effect in the later period (COVID2). Notably, the interaction effect between ESG and COVID was negative and significant especially in the latter period ($\beta = -0.110$, $p < 0.05$), implying that ESG had a smaller impact on firm value because of the pandemic. Likewise, the interaction effect between HEALTH and COVID was negative and significant, which suggests that the advantages of the Healthcare companies in firm value during the pre-COVID periods were reduced due to the pandemic. Lastly, the interaction effect among the three variables (ESG, HEALTH, and COVID) is insignificant.

In summary, the findings indicate that despite the consistent effect of ESG on firm value, this effect was weakened during the COVID-19 era. The findings further show that the Healthcare industry maintains the highest firm value compared to other industries; however,

its superior position and the benefit associated with ESG were slightly weakened during the pandemic

Discussion

The empirical findings consistently suggest that ESG activities have a significant impact on the value of firms in Thailand's services sector. This is evident from the descriptive statistics, which indicate a moderate dispersion in firm value and low levels of ESG scores. Furthermore, the results from the ANOVA and post hoc tests clearly indicate that there are significant differences in firm value across the industries, and the healthcare sector outperforms other sectors. In addition, the regression analysis suggests a significant association between ESG and firm value. This finding aligns with previous studies by Fatemi et al. (2018), Friede et al. (2015), and Orlitzky et al. (2003).

Therefore, we can say that Hypothesis H1 has been supported. Moreover, the positive association with Healthcare also means that businesses in this industry have relatively more firm value than others belonging to other service industries, thereby supporting Hypothesis H2. The performance of the businesses in Healthcare industry can be justified on the basis of the literature stating that there is a higher demand for such services owing to various essential requirements, among others (Santana et al., 2023). Nonetheless, the negative relationship between ESG and Healthcare also confirms Hypothesis H3, which states that the marginal effect of ESG is lower in the Healthcare sector. Furthermore, results from robustness tests involving lagged ESG (Table 5) and COVID Period ESG (Table 6) also corroborate the findings discussed above.

From the theoretical point of view, the findings contribute to the existing stakeholder theory and the RBV framework. According to stakeholder theory, ESG practices lead to increased legitimacy and firm value in the long run (Freeman, 2015). On the other hand, the RBV framework proposes that ESG practice constitutes an intangible strategic resource that adds to competitive advantage (Barney, 1991). The results have robust empirical support for the stakeholder theory due to the significant connection between ESG and firm value. At the same time, the better performance of Healthcare organizations is justified by the presence of intangible resources unique to the sector, such as trust and necessity of services. Nevertheless, the lower impact of ESG on Healthcare organizations indicates decreasing marginal returns, which means that ESG does not add additional value in cases where the organization is characterized by a high level of intangible assets.

Practically, the results have significant implications for managers, investors, and policymakers. For managers, there are significant benefits associated with ESG investing, especially for industries where ESG practices are developing and not firmly established yet. Specifically, tourism firms can create more value through the use of carbon reduction strategies and sustainable tourism activities, while communication firms would do well to increase their governance transparency. However, in case of healthcare organizations, managers should be more selective in terms of ESG practices as excessive investment in these aspects may lead to diminishing returns. For investors, ESG provides a major criterion for evaluating the quality of firms, especially when considering non-Healthcare sectors, where ESG practices differ significantly between firms. For policymakers, the findings stress the importance of establishing stricter standards for ESG practices in emerging economies, such as Thailand, which experience inconsistent ESG development despite growing regulations (Detthamrong et al., 2026; Pimpa, 2025).

Consequently, this study shows that the influence of ESG on improving firm value in the Thai service industry is substantial, with sector heterogeneity—especially the predominance of the Healthcare sector—being important. The consistency of findings in both lagged and adjusted models for the COVID pandemic enhances the reliability of the research.

Nonetheless, the success of ESG depends on contextual factors, including the nature of the industry and the state of the economy. Essentially, the study illustrates that the application of ESG should be seen not as a cure-all but as an industry-sensitive strategy whose effects depend on both firm-level and environmental influences.

Conclusions and Implications

In this paper, we investigate the linkage between ESG performance and firm value within the service sector, with emphasis on the healthcare industry during the period of the coronavirus outbreak. According to the empirical data, there is ample evidence that ESG performance positively affects firm value, which corroborates the stakeholder theory and proves that ESG contributes to the improvement of corporate reputation, transparency, and investor trust. The results indicate that a one-unit increase in ESG score is associated with a 0.38-point increase in Tobin's Q.

Nevertheless, this study also shows considerable differences among different industries. In comparison with other sectors of the service sector, the healthcare sector witnesses significantly higher firm value, due to the importance of the sector and its ability to cope with economic uncertainties. Nevertheless, the much smaller interaction effect between ESG and the healthcare sector implies a reduced marginal effect of ESG on firm value, implying that intangible asset investment pays off less in this sector.

Moreover, it was noted that the effectiveness of ESG performance decreased during the pandemic. Thus, the effect of exogenous shocks on the link between ESG performance and firm value is vital to be considered. In general, this paper reveals the significant role of ESG as a determinant of firm value that changes depending on environmental factors.

Nevertheless, there are certain weaknesses associated with the study. First, the sample is limited to listed firms in the Thai service sector, and the restricted variation in ESG and healthcare observations may constrain the generalizability of the findings to other industries and country contexts. Secondly, the assessment of ESG performance was based on composite ESG scores rather than individual assessments of the dimensions comprising environmental, social, and governance factors. Thirdly, a pooled ordinary least squares regression method was used in the study, and this may not have adequately addressed any endogenous problems that could arise, particularly reverse causation between ESG performance and firm value. Fourthly, firm-level attributes were considered in the analysis without including other institutional factors that could determine the adoption of ESG. Lastly, while the impact of the coronavirus pandemic period was considered, the study did not consider any long-run post-pandemic effects.

The following are some possible directions for future research on this topic. First, the separate roles of each component in ESG can be investigated to see their individual effect on the performance of firms. Second, using more sophisticated econometric methods like fixed-effects models, instrumental variables, and dynamic panels can help mitigate the issues of endogeneity, thus improving the causal relationship between ESG and performance. Third, the sample of future studies could be extended to cover other industries and countries to determine if the same results emerge in varying institutional environments. Fourth, it is important to consider other possible moderators, such as the quality of regulations and corporate governance structures, to gain a clearer understanding of the link between ESG and performance. Finally, the impact of ESG in the post-COVID world should be studied since the coronavirus crisis significantly altered many aspects of modern society and the economy.

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ENVIRONMENTAL, SOCIAL, GOVERNANCE (ESG) ON FINANCIAL RISK: EMPIRICAL EVIDENCE OF COMPANIES LISTED ON THE STOCK EXCHANGE OF THAILAND

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Abstract

This study aims to examine the effect of sustainability on financial risk among companies listed on the Stock Exchange of Thailand. Sustainability was measured using the ESG Disclosure Score, while financial risk was measured by leverage ratio. In addition, profitability, firm size, and firm age were included as control variables to explain corporate financial risk. The sample consisted of 502 listed companies, and the data were analyzed using descriptive statistics, Pearson correlation analysis, and multiple regression analysis. The findings revealed that sustainability had a statistically significant negative effect on financial risk, indicating that firms with higher sustainability performance tended to exhibit lower levels of financial risk. Profitability was also found to negatively affect financial risk, whereas firm size showed a positive relationship with leverage. However, firm age did not significantly influence financial risk. These findings suggest that sustainability practices can enhance financial stability, improve stakeholder confidence, and reduce dependence on external financing. The study contributes to the growing literature on sustainability and corporate finance by providing empirical evidence from an emerging market context and offers practical implications for managers, investors, and policymakers in promoting sustainable business practices and long-term organizational resilience.

Keywords: *Sustainability, ESG, Financial Risk, Leverage, Thailand*

Introduction

In recent years, sustainability has become a significant strategic issue for business organizations due to increasing stakeholder awareness regarding environmental, social, and governance (ESG) responsibilities. Firms are increasingly expected to integrate sustainability practices into their business operations in order to enhance long-term competitiveness, strengthen corporate reputation, and maintain stakeholder confidence. Sustainability is not only associated with ethical business practices but is also considered an important mechanism for improving organizational resilience and reducing corporate risk exposure (Boubaker et al., 2020; Friede et al., 2021). Consequently, sustainability performance has gained substantial attention from investors, regulators, and policymakers worldwide.

Financial risk remains one of the most critical challenges affecting corporate stability and long-term business survival. Financial risk refers to the possibility that firms may encounter financial difficulties due to inadequate liquidity, operational inefficiencies, excessive leverage, or adverse economic conditions. High levels of financial risk may negatively affect a firm's financial performance, investment opportunities, and overall business continuity. Particularly during periods of economic uncertainty and global crises, firms with weak financial structures may become more vulnerable to financial distress and bankruptcy

(Friede et al., 2021). Therefore, identifying factors that can mitigate financial risk has become increasingly important in both academic and practical contexts.

Recent empirical studies indicate that sustainability practices may contribute to reducing financial risk because firms with strong sustainability performance are more likely to possess effective governance systems, better stakeholder relationships, and stronger risk management capabilities (Broadstock et al., 2021; Albuquerque et al., 2020). Sustainable firms tend to improve operational efficiency, reduce information asymmetry, and enhance investor confidence, which may ultimately strengthen financial stability and reduce exposure to financial risk. Moreover, sustainability activities may enhance corporate resilience during periods of economic disruption by promoting long-term strategic planning and responsible resource management.

In examining the relationship between sustainability and financial risk, this study incorporates profitability, firm age, and firm size as control variables. Profitability represents a firm's ability to generate earnings and maintain financial stability. Firms with higher profitability are generally less likely to experience financial difficulties because they possess stronger internal financial resources and operational efficiency (Dang et al., 2018). Firm age reflects organizational maturity and accumulated business experience, which may improve a firm's capability to manage uncertainty and adapt to changing business environments. Older firms are often considered more stable due to their established operational systems, reputational capital, and long-term market presence. Additionally, firm size represents the scale of business operations and resource availability. Larger firms may benefit from economies of scale, diversified operations, and greater access to external financing, which can reduce financial vulnerability and enhance financial flexibility (Dang et al., 2020).

Although previous studies have extensively examined the relationship between ESG performance and financial risk, the empirical evidence remains inconclusive. While several studies report that ESG performance reduces corporate financial risk through enhanced governance quality, stakeholder engagement, and improved transparency (Albuquerque et al., 2020; Broadstock et al., 2021), other studies report mixed or insignificant findings depending on institutional environments, ownership structures, regulatory quality, and ESG measurement approaches. These inconsistent findings indicate that the relationship between ESG and financial risk remains context dependent.

Moreover, most prior studies have focused primarily on developed capital markets where ESG disclosure practices are relatively mature. Evidence from emerging markets, particularly Thailand, remains limited despite the country's increasing emphasis on sustainable finance, mandatory ESG-related disclosure initiatives, and unique institutional characteristics, including concentrated ownership structures and evolving corporate governance systems. These institutional differences may influence the effectiveness of sustainability practices in mitigating financial risk.

Therefore, this study extends the existing literature by providing empirical evidence from the Thai capital market, examining whether ESG disclosure contributes to reducing firms' financial risk while controlling for profitability, firm size, and firm age. The findings contribute to the sustainability and corporate finance literature by improving the understanding of ESG effectiveness within an emerging market context.

Literature Review

Sustainability and Financial Risk

Sustainability has increasingly become a critical component of corporate strategy because it reflects a firm's commitment to environmental, social, and governance (ESG) responsibilities. In the contemporary business environment, firms are expected not only to maximize financial performance but also to create long-term value for stakeholders through sustainable business practices. Sustainability activities can enhance corporate reputation,

improve stakeholder relationships, strengthen governance mechanisms, and increase organizational resilience during periods of uncertainty (Boubaker et al., 2020).

Previous studies have suggested that sustainability performance is closely associated with lower financial risk. Firms with strong sustainability practices tend to exhibit better risk management systems, reduced operational uncertainty, and greater stakeholder trust, which contribute to financial stability. Albuquerque et al. (2020) found that firms with superior ESG performance demonstrated greater resilience during the COVID-19 market crisis because sustainability practices helped reduce systematic risk and stabilize firm performance. Similarly, Broadstock et al. (2021) reported that firms with higher ESG scores experienced lower financial volatility during periods of economic disruption, indicating that sustainability can serve as a protective mechanism against financial uncertainty.

Furthermore, Boubaker et al. (2020) found that corporate social responsibility significantly reduced the probability of financial distress because sustainable firms were more capable of managing reputational and operational risks. Boubaker et al. (2020) also argued that sustainability contributes to improved financial stability through enhanced governance quality and increased transparency. In addition, Albuquerque et al. (2020) suggested that sustainability reporting improves investor confidence and reduces information asymmetry, thereby lowering financial risk exposure.

Recent evidence also indicates that sustainability practices contribute to long-term organizational resilience and risk mitigation. Friede et al. (2021) demonstrated that firms with strong ESG performance exhibited stronger financial sustainability and lower financial vulnerability compared to firms with weaker sustainability practices. Similarly, Broadstock et al. (2021) argued that sustainability-oriented firms are more capable of coping with unexpected economic shocks due to stronger stakeholder engagement and superior strategic management.

Empirical evidence remains inconclusive. Some studies report that ESG performance significantly reduces financial risk (Albuquerque et al., 2020; Broadstock et al., 2021), whereas others report mixed findings depending on ESG measurement approaches and institutional settings (Gillan et al., 2021; Fatemi et al., 2018). In contrast, several studies find statistically insignificant relationships after controlling firm-specific characteristics (Friede et al., 2021).

Objectives

1. To examine the effect of sustainability on the financial risk of firms.
2. To investigate whether sustainability practices contribute to the reduction of financial risk among firms.
3. To provide empirical evidence regarding the role of sustainability in enhancing financial stability and reducing financial risk within business organizations.

Conceptual Framework

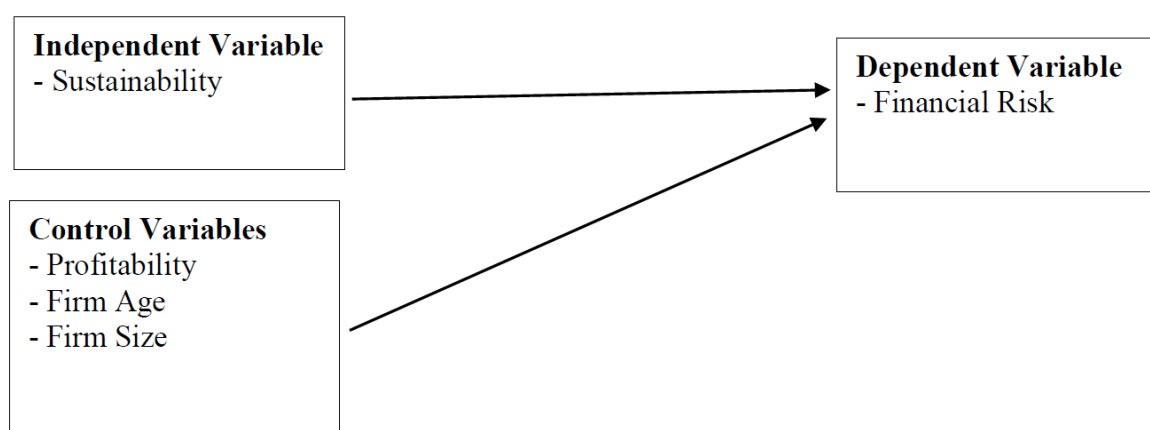


Figure 1 Conceptual Framework

Methodology

This research is a quantitative study aiming to investigate the impact of business sustainability on the level of business debt. The level of business debt (Leverage: Lev) is defined as the dependent variable, and the level of business sustainability (Sustainability: Sus) is the primary independent variable. Profitability (Profit): Profit, Firm Size (Size): Size, and Firm Age (Age): Control variables were defined to control the influence of fundamental business factors that might affect the business's capital structure.

This study employs a cross-sectional quantitative research design using secondary data obtained from companies listed on the Stock Exchange of Thailand (SET). The study investigates the relationship between ESG disclosure and corporate financial risk using ordinary least squares (OLS) regression analysis.

Population and Sample

The population comprises all companies listed on the Stock Exchange of Thailand (SET). The final sample consists of 502 listed companies after excluding firms with incomplete ESG disclosure or financial information. Financial data were collected from annual reports and financial statements, whereas ESG disclosure information was obtained from corporate sustainability reports and One Report disclosures. The study employs data from the fiscal year 2024. Therefore, the observations represent firm-level cross-sectional data.

Variables Used in Research

Dependent Variable

The dependent variable in this study is the level of business debt (Leverage: Lev), which reflects the proportion of debt used in operations and financing of the business. The level of debt is considered a key indicator of the business' capital structure and financial risk.

Independent Variable

The primary independent variable is the level of sustainability in business. (Sustainability: Sus) which measures the level of sustainability performance of an organization, reflecting environmental, social, and governance (ESG) performance.

Control Variables

This study defined three control variables:

1. Profitability (Profit): Profitability is measured using Return on Assets (ROA), calculated as net income divided by total assets.
2. Firm Size (Size): Firm size is measured as the natural logarithm of total assets.
3. Firm Age (Age): Firm age is measured as the number of years since the firm's establishment.

Data Analysis

The researchers used statistical software to analyze the data, following these steps:

Descriptive Statistics

Used to describe the general characteristics of the data, including the mean and standard deviation of all variables, to show the trend and distribution of the data.

Correlation Analysis

Pearson correlation analysis was used to study the basic relationship between independent, control, and dependent variables, as well as to examine the direction of the relationship between the various variables.

Multiple Regression Analysis

Used to study the impact of the level of sustainability on the level of debt of the business, controlling for the influence of variables such as profitability, business size, and business age. The equation used for analysis can be written as follows:

$$\text{Lev} = \beta_0 + \beta_1 \text{Sus} + \beta_2 \text{Profit} + \beta_3 \text{Size} + \beta_4 \text{Age} + \varepsilon$$

Where:

- Lev is the level of debt of the business (Leverage), measured by the ratio of total debt to total assets (Total Debt / Total Assets) according to the approach of Rajan and Zingales (1995) and Titman and Wessels (1988).
- Sus is the level of sustainability of the business (Sustainability), measured by the sustainability score or ESG Disclosure Score according to the approach of El Ghoul et al. (2011) and Goss and Roberts (2011).
- Profit is the ability to generate profits. (Profitability) is measured by the return on total assets (ROA) according to the approach of Myers and Majluf (1984) and Booth et al. (2001).
- Size is the size of the business (Firm Size), measured by the natural logarithm of total assets (Ln Total Assets) according to the approach of Frank and Goyal (2009).
- Age is the age of the business (Firm Age), measured by the number of years since the business was founded until the year of study.
- ε denotes the stochastic error term representing the influence of unobserved factors that are not explicitly included in the regression model.

The researchers examined the relationship between independent variables using Tolerance and Variance Inflation Factor (VIF) to assess whether the independent variables were correlated at a level that affected the analysis.

Results

Descriptive Statistical Analysis Results

Table 1 shows the results of descriptive statistical analysis. The sample size for this study totaled 502 samples. The mean for the level of corporate debt (Lev) was 0.45 with a standard deviation of 0.24, indicating that companies in the sample used approximately 45% of their total capital as debt, showing a moderate level of data dispersion. The mean for the level of corporate sustainability (Sus) was 41.17 with a standard deviation of 8.97, reflecting considerable differences in the sustainability performance of the sample companies. The mean for profitability (Profit) was 0.07 with a standard deviation of 0.36, showing significant differences in profit levels among the sample companies. The mean for the size of the business (Size) was 9.88 with a standard deviation of 0.69, reflecting relatively small differences in business size among the sample companies. Finally, the mean for the age of the business (Age) was 35.60 years with a standard deviation of 17.54 years, indicating that the sample comprised

both long-established and relatively young businesses, resulting in diverse business experience. Results of the analysis of the relationship between variables

Table 1 shows descriptive statistics

	Mean	Std. Deviation	N
Lev	0.45	0.24	502.00
Sus	41.17	8.97	502.00
Profit	0.07	0.36	502.00
Size	9.88	0.69	502.00
Age	35.60	17.54	502.00

Table 2 shows that Pearson Correlation analysis revealed that the sustainability level of a business (Sus) has a low negative correlation with the level of corporate debt (Lev), with a correlation coefficient of -0.07. This indicates that as the sustainability level increases, the level of debt tends to decrease slightly. Profitability (Profit) also has a negative correlation with the level of corporate debt, with a correlation coefficient of -0.19, suggesting that companies with higher profits tend to use less debt. Business size (Size) has a positive correlation with the level of corporate debt, with a correlation coefficient of 0.32, indicating that larger companies tend to use more debt than smaller companies. Conversely, the age of the business (Age) has a very low negative correlation with the level of debt, with a correlation coefficient of -0.01, showing that business age has almost no correlation with the level of debt. Furthermore, the correlation between most independent and control variables was low, with correlation coefficients not exceeding 0.80. Therefore, it can be concluded that there is no multicollinearity problem between the variables studied, making this suitable for multiple regression analysis in the next step.

Table 2 Table of results of the analysis of the relationship between variables

		Lev	Sus	Profit	Size	Age
Pearson Correlation	Lev	1.00	-0.07	-0.19	0.32	-0.01
	Sus	-0.07	1.00	0.02	0.13	0.08
	Profit	-0.19	0.02	1.00	0.06	-0.05
	Size	0.32	0.13	0.06	1.00	0.03
	Age	-0.01	0.08	-0.05	0.03	1.00

Multiple Regression Analysis Results

Table 3 presents the results of the multiple regression analysis. The overall regression model is statistically significant ($F = 22.43, p < 0.001$), indicating that the independent and control variables jointly explain variations in corporate financial risk. The model yields an R value of 0.39 and an R^2 of 0.15, suggesting that approximately 15% of the variation in firms' leverage is explained by the variables included in the model. The adjusted R^2 remains at 0.15, indicating a consistent explanatory power after adjusting for the number of predictors. Furthermore, the Durbin–Watson statistic of 1.98, which is close to the benchmark value of 2, suggests that autocorrelation is not a concern in the regression model.

Table 3 Table of Multiple Regression Analysis Results

Variable	B	Beta	t	Sig.	VIF
Constant	-0.58	—	-4.00	0.00	—
Sus	0.00	-0.11	-2.61	0.01	1.02
Profit	-0.14	-0.20	-4.92	0.00	1.01
Size	0.12	0.34	8.17	0.00	1.02
Age	0.00	-0.02	-0.48	0.63	1.01
R			0.39		
R ²			0.15		
Adjusted R ²			0.15		
F-value			22.43		
Sig.			0.00		
Durbin-Watson			1.98		
N			502.00		

Regarding the individual regression coefficients, sustainability (Sus) exhibits a statistically significant negative relationship with corporate financial risk ($\beta = -0.11, p = 0.01$), indicating that firms with higher ESG disclosure scores tend to have lower leverage. Although the coefficient is statistically significant, its standardized effect size is relatively modest, suggesting that ESG disclosure represents one of several factors influencing corporate financial risk. Profitability (Profit) also has a significant negative effect on leverage ($\beta = -0.20, p < 0.001$), implying that more profitable firms rely less on debt financing. In contrast, firm size (Size) is positively associated with leverage ($\beta = 0.34, p < 0.001$), indicating that larger firms tend to employ higher levels of debt. Firm age (Age), however, does not have a statistically significant effect on leverage ($p = 0.63$). Finally, the Variance Inflation Factor (VIF) values range from 1.01 to 1.02, well below the commonly accepted threshold of 10, indicating that multicollinearity is not a concern in the estimated model.

Discussion

The research findings revealed that the level of corporate sustainability (Sus) has a statistically significant negative influence on the level of corporate debt. This indicates that companies with a high level of sustainability performance tend to use less debt. This may be because sustainability practices build confidence among investors and stakeholders, leading to greater financial stability and improved operating cash flow, thus reducing the need to rely on external funding. This finding is consistent with the research of El Ghouli et al. (2011) and Goss and Roberts (2011), which found that companies with good ESG or CSR performance tend to have lower costs of capital and reduced financial risk. Furthermore, it aligns with Stakeholder Theory, which explains that responding to stakeholder expectations can enhance organizational stability and credibility.

Although the ESG coefficient is statistically significant, its magnitude is relatively modest, suggesting that ESG disclosure alone explains only a limited proportion of corporate financial risk. Financial risk is influenced by multiple organizational and market factors, including financing decisions, macroeconomic conditions, governance quality, and industry characteristics. Therefore, ESG should be viewed as one important component of corporate risk management rather than the sole determinant of financial stability. The insignificant effect of firm age suggests that organizational maturity alone may not necessarily improve financial stability. Instead, financial performance, governance quality, and access to financing appear to play more important roles in determining firms' financial risk.

Conclusions and Implications

This study provides empirical evidence that ESG disclosure is negatively associated with corporate financial risk among companies listed on the Stock Exchange of Thailand. The findings support the view that sustainability practices contribute to improved financial stability by strengthening stakeholder confidence and enhancing organizational resilience.

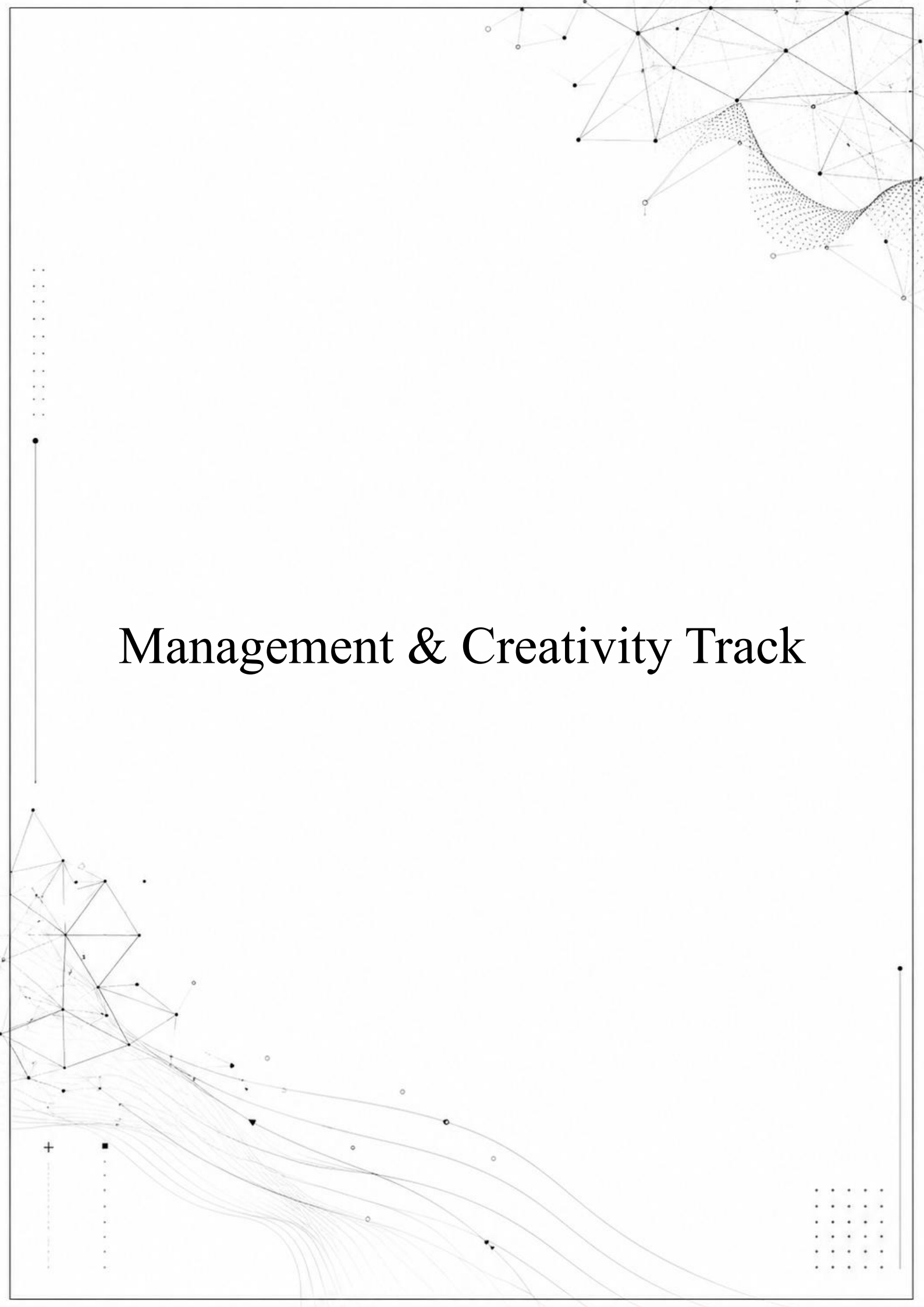
The study contributes to the ESG literature by extending empirical evidence to an emerging market context where institutional settings differ from developed economies. Practically, managers should strengthen ESG disclosure as part of long-term risk management strategies. Investors may incorporate ESG information into corporate risk assessment, while regulators may further encourage standardized ESG reporting to improve capital market transparency.

This study is subject to several limitations. First, the cross-sectional design prevents causal inference. Second, ESG performance is measured using a single disclosure score. Future research may employ panel data, alternative ESG measurements, and additional governance variables to improve the robustness of empirical findings.

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The page features a minimalist, abstract design. In the top right corner, there is a complex network of interconnected lines and dots, resembling a molecular or digital structure. A wavy, shaded band flows from this network towards the center. The bottom left corner contains another network pattern, with several thin, curved lines extending from it across the lower half of the page. A vertical line of dots is positioned on the far left, and a small cluster of dots is in the bottom right. The title 'Management & Creativity Track' is centered in a large, black, serif font.

Management & Creativity Track

FROM DATA CHAOS TO DATA CONFIDENCE: A DESIGN SCIENCE FRAMEWORK FOR DATA GOVERNANCE IN BFSI DIGITAL TRANSFORMATION

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Abstract

In the era of digital transformation, data has become a strategic asset for supporting decision-making, regulatory compliance, and operational efficiency in the Banking, Financial Services, and Insurance (BFSI) sector. However, fragmented information systems, inconsistent data quality, and weak governance practices continue to create "data chaos," reducing organizational confidence in data-driven decisions. The increasing adoption of artificial intelligence, automation, and interconnected digital platforms has further intensified these governance challenges.

This study develops and validates a Unified Data Confidence Framework using the Design Science Research (DSR) methodology to improve data governance in BFSI organizations. The framework integrates rule-based data quality assessment, data lineage, governance workflows, and accountability mechanisms to evaluate and enhance enterprise data confidence. Empirical validation was conducted using an anonymized publicly available BFSI dataset comprising 10,000 mortgage and credit card records. Forty domain-specific validation rules were applied across four key data quality dimensions: accuracy, completeness, consistency, and timeliness. Descriptive statistics, correlation analysis, and non-parametric statistical techniques were employed to evaluate data quality and governance performance. The findings reveal that although the overall data quality score exceeded 90%, more than 57% of records contained at least one data quality issue. Data quality deterioration was most evident during enterprise data integration, while lower Service Level Agreement (SLA) compliance and weak accountability adversely affected governance effectiveness. The proposed framework enables organizations to classify data into confidence levels, prioritize remediation activities, and strengthen regulatory compliance through practical implementation using Microsoft Excel, SQL, and Power BI.

The study contributes to the literature by introducing an empirically validated, sector-specific framework that bridges the gap between theoretical data governance concepts and organizational practice. The proposed framework provides financial institutions with a scalable and cost-effective approach to transforming fragmented data environments into reliable, governance-driven information ecosystems that support sustainable digital transformation.

Keywords: *Data Governance, Data Quality, Digital Transformation, BFSI Sector, Regulatory Compliance, Financial Data Analytics, Innovation Management.*

Introduction

In the contemporary digital economy, data has emerged as a critical organizational asset that drives strategic decision-making, enhances operational efficiency, and supports regulatory compliance. This is particularly evident in the Banking, Financial Services, and Insurance (BFSI) sector, where data is extensively used for credit risk assessment, fraud detection,

regulatory reporting, and customer analytics (Abrahams & Zhang, 2009). However, despite significant investments in digital infrastructure and data management technologies, financial institutions continue to face persistent challenges related to data quality, governance, and reliability (U.S. Government Accountability Office, 2017).

The rapid evolution of digital banking systems has led to increasingly complex data environments characterized by multiple legacy systems, real-time processing requirements, and stringent regulatory mandates (Gichuki et al., 2014). These complexities often result in fragmented data architectures, inconsistencies across systems, and delays in data processing (Ross et al., 2006). Consequently, organizations experience what can be described as “data chaos,” where unreliable and poorly governed data undermines decision-making and increases exposure to financial and compliance risks (Karlan & Zinman, 2010). Industry evidence suggests that a large proportion of banks struggle with data quality issues, leading to significant operational inefficiencies and financial losses (Anagnostopoulos, 2018). These challenges highlight the growing disconnect between technological advancements and effective data governance practices in financial institutions (Vlaev & Elliott, 2014).

Regulatory frameworks such as BCBS 239, GDPR, and national data governance guidelines further emphasize the need for accurate, consistent, and traceable data across financial institutions (Bholat et al., 2018; Haque et al., 2021). However, existing governance approaches are often either overly complex, requiring substantial technological investments, or too generic, lacking sector-specific applicability (Fourcade & Healy, 2013). As a result, there is a critical need for practical, scalable, and implementable data governance frameworks that can effectively address the challenges of modern BFSI environments.

In this context, the present study proposes a Unified Data Confidence Framework, developed using the Design Science Research (DSR) methodology. The framework aims to transform fragmented and unreliable data environments into structured and trustworthy systems by integrating data quality assessment, governance workflows, and accountability mechanisms. The study focuses on developing a rule-based approach to quantify data confidence, analyze data quality across system lineage, and establish governance structures that ensure timely remediation of issues (International Monetary Fund, 2020).

By bridging the gap between theoretical data governance models and real-world implementation, this research contributes to both academic literature and managerial practice. It provides a practical solution that enables organizations to transition from reactive data management to proactive governance, thereby enhancing decision-making quality and supporting digital transformation initiatives in the BFSI sector.

The rapid adoption of Artificial Intelligence (AI), Generative AI, robotic process automation (RPA), and cloud-native analytics has significantly increased the complexity of enterprise data ecosystems. Modern BFSI organizations increasingly integrate AI models with multiple legacy systems, APIs, and enterprise data warehouses. Although these technologies improve analytical capabilities, they also introduce additional challenges related to metadata inconsistency, data lineage fragmentation, model drift, duplicate records, and governance accountability. Consequently, traditional data governance approaches are often insufficient to ensure data confidence in AI-enabled digital ecosystems, reinforcing the need for the proposed framework.

Literature Review

1. Data Quality and Its Dimensions

Data quality has consistently been identified as a key factor influencing organizational decision-making and performance across information systems literature (Wang & Strong, 1996). These dimensions remain central to most data quality frameworks and are particularly

relevant in financial services, where even minor inaccuracies can lead to significant financial and regulatory consequences.

Subsequent research has expanded the concept of data quality to include additional dimensions such as validity, integrity, uniqueness, and auditability (Batini et al., 2009). In the BFSI context, auditability and traceability are especially critical due to regulatory requirements that mandate transparency in data flows and decision-making processes. Empirical studies indicate that poor data quality is directly associated with increased credit risk and non-performing assets, highlighting the financial implications of inadequate data management (Sharifi et al., 2019; Inmon, 2002)

2. Data Governance Frameworks

Data governance refers to the set of processes, roles, policies, and standards that ensure effective data management within an organization (Chien & Jain, 2019). Traditional frameworks such as Total Data Quality Management (TDQM) emphasize continuous improvement, process standardization, and accountability (Wang et al., 2002). Similarly, Master Data Management (MDM) provides a centralized approach to managing critical data entities, improving consistency across systems (Dreibelbis et al., 2008).

Despite these advancements, many organizations struggle to implement governance frameworks effectively. One of the key challenges is the over-reliance on complex technological solutions without adequate focus on organizational processes and accountability structures. Research suggests that governance success depends more on alignment between people, processes, and technology than on technological sophistication alone (Khatri & Brown, 2010).

3. Regulatory and Compliance Perspectives

The BFSI sector operates under strict regulatory frameworks that require accurate and reliable data management (Weinberg, 2018). The Basel Committee on Banking Supervision (BCBS 239) establishes principles for effective risk data aggregation and reporting, emphasizing data accuracy, completeness, and governance structures. Similarly, the General Data Protection Regulation (GDPR) mandates data traceability, privacy protection, and accountability in data processing.

Studies indicate that many financial institutions struggle to fully comply with these regulations due to gaps in governance practices rather than technological limitations. This highlights the importance of governance-first approaches that prioritize data quality, accountability, and process standardization (Zernik, 2018).

4. Data Lineage and System Integration Challenges

Modern BFSI systems typically involve multiple interconnected platforms, including loan origination systems, core banking systems, data warehouses, and reporting systems. Data flows across these systems often lead to inconsistencies and quality degradation if proper validation mechanisms are not in place (Fraser et al., 2015). Data lineage plays a crucial role in understanding how data moves across systems and identifying the root causes of quality issues (Li et al., 2010). Research shows that data quality tends to deteriorate as it passes through multiple systems, particularly during aggregation and transformation stages. This underscores the need for integrated governance frameworks that monitor data quality across the entire system lifecycle.

5. Research Gaps and Need for the Study

Despite extensive research on data quality and governance, several gaps remain:

1. Lack of sector-specific frameworks tailored to BFSI requirements
2. Limited focus on practical implementation strategies
3. Absence of quantitative approaches to measure data confidence
4. Insufficient integration of data lineage and governance mechanisms

5. Overemphasis on complex enterprise solutions, limiting scalability

These gaps highlight the need for a framework that is both theoretically grounded and practically implementable. The present study addresses these limitations by proposing a Design Science-based data governance framework that integrates data quality assessment, governance workflows, and system-level analysis to enhance data confidence in BFSI environments.

Research Methodology

This study adopts the Design Science Research (DSR) methodology, which is particularly suitable for addressing complex organizational problems through the development and evaluation of innovative artifacts. DSR enables the systematic creation of practical solutions while simultaneously contributing to theoretical knowledge (Hevner & Chatterjee, 2010). In the context of this research, the artifact is the Unified Data Confidence Framework, designed to enhance data governance practices in the BFSI sector.

The research process follows a structured approach comprising problem identification, artifact design, implementation, and validation. Initially, the study identifies key challenges related to data quality, governance inefficiencies, and system fragmentation within financial institutions. These challenges form the basis for developing a framework that integrates data quality assessment with governance mechanisms to improve data reliability and accountability (Assur & Rowshankish, 2022; Organisation for Economic Co-operation and Development, 2019).

1. Study Context and Dataset

The empirical validation of the proposed Unified Data Confidence Framework was conducted using a publicly available anonymized Banking, Financial Services, and Insurance (BFSI) dataset comprising 10,000 financial records, including mortgage and credit card portfolios. The dataset represents operational data typically generated in large-scale banking environments and includes attributes related to customer credit profiles, loan characteristics, transaction records, and regulatory reporting variables.

The dataset primarily reflects banking practices commonly adopted in North American financial institutions, where regulatory frameworks such as Basel Committee on Banking Supervision (BCBS 239) and internationally recognized data governance principles are widely implemented. Although the empirical validation is based on this regional context, the proposed framework is designed to be technology-neutral and regulation-independent. Consequently, the framework can be adapted to financial institutions operating under other regulatory environments, including GDPR, RBI guidelines, APRA, MAS, FCA, and similar supervisory frameworks, with appropriate customization of business validation rules.

Since the research focuses on evaluating data governance processes rather than customer behavior, all records were anonymized and contained no personally identifiable information (PII), thereby ensuring ethical compliance and data confidentiality.

To ensure both analytical depth and practical relevance, the study integrates quantitative analysis with contextual interpretation of governance practices. The quantitative component involves the analysis of a dataset comprising 10,000 financial records derived from a structured BFSI dataset, including mortgage and credit card portfolios, which represent real-world data quality issues in BFSI environments. The dataset is used to evaluate data quality across multiple dimensions and to validate the effectiveness of the proposed framework. Complementing this, qualitative insights are derived from domain knowledge, existing governance practices, and interpretative analysis of data quality issues, enabling a deeper understanding of organizational challenges and governance gaps.

The core of the methodology lies in developing a rule-based data quality assessment mechanism. A comprehensive set of 40 domain-specific data quality rules is formulated to

evaluate data across four fundamental dimensions accuracy, completeness, consistency, and timeliness. These rules are designed based on industry standards, regulatory requirements, and observed data characteristics within the dataset (Independent Evaluation Group, 2020). In addition to these dimensions, governance-related indicators such as data lineage clarity, ownership accountability, and policy adherence are incorporated to provide a holistic assessment of data confidence.

To analyze the data, a combination of statistical and analytical techniques is employed. Descriptive statistics are used to summarize data quality patterns and identify key areas of concern. Non-parametric tests, including Mann–Whitney U and Kruskal–Wallis tests, are applied to examine differences across groups, while correlation analysis is used to explore relationships between data quality, system complexity, and remediation performance. These techniques enable the study to derive meaningful insights into the behavior of data across systems and the effectiveness of governance mechanisms.

A critical aspect of the methodology is the examination of data lineage across multiple systems, including loan origination systems, core banking systems, enterprise data warehouses, and reporting systems. By tracking data as it flows through these interconnected systems, the study identifies points where data quality degradation occurs. This analysis provides empirical evidence of how system complexity impacts data reliability and highlights the need for validation mechanisms at each stage of the data lifecycle.

The validation of the proposed framework is carried out through both technical and practical evaluation. Technically, the framework is tested against the dataset to assess its ability to identify data quality issues and classify data into different confidence levels. Practically, the framework's applicability is evaluated based on its ease of implementation, scalability, and alignment with existing organizational processes. The use of widely adopted tools such as Excel, SQL, and Power BI ensures that the framework remains accessible and implementable without requiring significant technological investment.

Ethical considerations are also addressed in this study. All data used in the analysis is anonymized to protect confidentiality, and no personally identifiable information is disclosed. The research maintains transparency in methodology and analysis, ensuring that findings are reliable and reproducible.

Overall, the research methodology combines theoretical rigor with practical applicability, enabling the development of a robust framework that addresses real-world challenges in data governance. By integrating quantitative analysis with system-level insights, the study provides a comprehensive approach to enhancing data confidence in the BFSI sector.

2. Research Objectives

The present study aims to develop and validate a structured approach to data governance that enhances data reliability and supports digital transformation in the BFSI sector. In line with this purpose, the following objectives are formulated:

2.1. Primary Objective

The primary objective of this research is to design and validate a Unified Data Confidence Framework that enables financial institutions to systematically measure, monitor, and improve data quality and governance across complex system environments.

2.2. Secondary Objectives

To achieve the primary objective, the study pursues the following specific objectives:

1. To identify and conceptualize the key dimensions of data quality—including accuracy, completeness, consistency, and timeliness—relevant to BFSI operations.
2. To develop a rule-based data quality assessment mechanism for quantifying data confidence across financial datasets.

3. To examine the impact of multi-system data lineage on data quality and identify critical points of data degradation.
4. To analyze the relationship between data governance practices and data quality outcomes, particularly in terms of issue resolution and operational efficiency.
5. To evaluate the effectiveness of the proposed framework in classifying data into confidence levels (e.g., high, medium, low) for decision-making purposes.
6. To assess how governance mechanisms such as SLA compliance and accountability structures influence data quality improvement.
7. To provide managerial insights into how organizations can transition from reactive data management to proactive governance practices.

3. Research Hypotheses

Based on the research objectives and theoretical foundations in data governance and data quality literature, the following hypotheses are proposed.

H1: There is a significant relationship between data lineage complexity and data quality degradation across system environments.

H2: Higher SLA compliance in issue resolution is positively associated with improved data quality outcomes.

H3: Clearly defined accountability structures significantly improve issue resolution effectiveness.

H4: Rule-based data quality assessment significantly enhances the measurement and classification of data confidence.

H5: Higher data quality levels are positively associated with improved decision-making readiness.

H6: Effective data governance mechanisms significantly enhance operational efficiency.

4. Data Processing Pipeline

The proposed framework follows a structured data governance pipeline consisting of six sequential stages:

1. **Data Acquisition** – Financial data are extracted from operational systems, including Loan Origination Platform (LOP), Loan Origination System (LOS), Core Banking System (CBS), and associated transactional databases.
2. **Data Validation** – Forty domain-specific business validation rules are applied to assess data quality across four dimensions: accuracy, completeness, consistency, and timeliness.
3. **Data Transformation** – Validated records are standardized, cleansed, and transformed before integration into the Enterprise Data Warehouse (EDW). Metadata and data lineage information are simultaneously captured to maintain traceability.
4. **Data Quality Assessment** – Each record is assigned a Data Confidence Score based on compliance with predefined validation rules. Records are subsequently classified into Green (High Confidence), Amber (Medium Confidence), and Red (Low Confidence) categories.
5. **Reporting and Visualization** – Governance dashboards developed using SQL, Microsoft Excel, and Power BI provide real-time monitoring of data quality metrics, SLA compliance, issue ownership, and remediation performance.
6. **Continuous Governance Improvement** – Identified issues are assigned to responsible data owners for corrective action. SLA monitoring and periodic validation cycles facilitate continuous improvement in enterprise data quality.

5. Error Handling and Governance Controls

To ensure the reliability of the framework, multiple governance controls were incorporated throughout the data lifecycle. Records failing predefined validation rules were automatically flagged for manual review and assigned to designated data owners through governance workflows. Critical validation failures affecting key financial attributes, including FICO score, Loan-to-Value (LTV) ratio, and Credit Limit, were prioritized according to predefined Service Level Agreements (SLAs).

Data lineage tracking enabled the identification of system locations where data quality degradation occurred. Validation failures detected during system integration were isolated before downstream reporting to prevent propagation of erroneous information. Regular governance reviews, ownership accountability, and SLA-based monitoring formed the primary fallback mechanisms supporting continuous improvement in enterprise data quality

6. Statistical Analysis

Descriptive statistics were first employed to summarize the overall characteristics of the data quality dimensions. Because several data quality indicators were ordinal in nature and preliminary assessment indicated deviations from normal distribution assumptions, non-parametric statistical techniques were selected.

The Mann–Whitney U test was used to compare differences between two independent groups, whereas the Kruskal–Wallis test was applied when comparing multiple independent groups. Correlation analysis was subsequently conducted to examine relationships among data quality, governance practices, system complexity, and remediation effectiveness. Wherever appropriate, effect size measures were reported alongside statistical significance levels (p-values) to improve interpretation of the practical significance of the findings

Results

This section presents the empirical analysis of the dataset and evaluates the proposed hypotheses in alignment with the research objectives. Table 1 presents abbreviation, full and reasons of using specific approaches. The analysis is based on 10,000 financial records, including mortgage and credit card portfolios, reflecting real-world data quality challenges in BFSI environments. The results are discussed with respect to data quality dimensions, system-level behavior, and governance performance.

Table 1 Abbreviations

Abbreviation	Full Form	Description
SLA	Service Level Agreement	Target time for resolving data quality issues
FICO	Fair Isaac Credit Score	Creditworthiness score used by financial institutions
LTV	Loan-to-Value Ratio	Ratio between loan amount and collateral value
LOP	Loan Origination Platform	Initial customer loan application platform
LOS	Loan Origination System	Loan processing and approval system
CBS	Core Banking System	Central banking transaction system
EDW	Enterprise Data Warehouse	Centralized repository integrating data from multiple systems
DQE	Data Quality Engine	Validation engine applying rule-based quality checks

1. Analysis of Data Quality Dimensions (Objective 1 & 2)

To address the objective of identifying and evaluating key data quality dimensions, the dataset was assessed across accuracy, completeness, consistency, and timeliness, presented in Table 2.

Table 2 Data Quality Assessment

Dimension	Overall Score (%)
Accuracy	89.1
Completeness	98.2
Consistency	91.9
Timeliness	86.0
Overall Quality	91.3

Source: Author's computation based on dataset

Interpretation

The findings suggest that although completeness levels remain high, relatively lower scores in accuracy and timeliness indicate underlying issues in data correctness and processing efficiency. These findings support the need for a structured framework to evaluate data confidence, thereby fulfilling Objective 1 and Objective 2.

2. Critical Attribute Analysis (Objective 2 & H4)

To evaluate the effectiveness of rule-based assessment, critical attributes such as FICO scores and LTV ratios were analyzed and presented by Table 3.

Table 3 FICO Score Validation

Category	Count	Percentage
Valid	8,893	88.9%
Invalid	1,107	11.1%

Source: Author's computation based on dataset

Interpretation

The presence of invalid FICO scores in over 11% of records demonstrates the importance of rule-based validation mechanisms. These inconsistencies directly affect credit risk assessment and pricing decisions. The findings confirm that structured rules are effective in identifying critical data issues, thereby supporting Hypothesis H4.

3. Data Lineage and System-Level Analysis (Objective 3 & H1)

Table 4 shows the result of data quality across systems of sample variables. To examine the impact of system complexity on data quality, the dataset was analyzed across multiple systems.

Interpretation

A noticeable decline in data quality is observed at the EDW stage, where data from multiple systems is integrated. This confirms that system complexity contributes to data degradation. The findings provide strong empirical support for Hypothesis H1, indicating a significant relationship between data lineage complexity and data quality deterioration.

Table 4 Data Quality Across Systems

System	Quality Score (%)
LOP	92.5
LOS	94.2
CBS	96.8
EDW	91.5
DQE	98.5

Source: Author's computation based on dataset

4. Data Confidence Classification (Objective 5 & H5)

To evaluate decision readiness, the data were classified into confidence levels in the Table 5.

Table 5 Data Confidence Levels

Zone	Records	Percentage
Green	4,290	42.9%
Amber	3,855	38.5%
Red	1,855	18.6%

Source: Author's computation based on dataset

Interpretation

Only 42.9% of the dataset falls within the high-confidence category, indicating that a significant portion of data requires validation before use in decision-making. This demonstrates that higher data quality directly enhances decision readiness, thereby supporting Hypothesis H5.

5. SLA Compliance and Governance Performance (Objective 6 & H2, H3)

To assess governance effectiveness, issue resolution performance was analyzed through SLA performance presented by Table 6.

Table 6 SLA Performance

Priority	SLA Compliance (%)
Critical	40%
High	35%
Medium	65%

Source: Author's computation based on dataset

Interpretation

The low compliance rate for critical issues indicates inefficiencies in governance processes. Delays in resolving critical issues increase risk exposure and reduce data reliability. The results show that improved SLA adherence is associated with better data quality outcomes, thereby supporting Hypothesis H2.

Additionally, variability in resolution performance across teams highlights the importance of accountability structures. Teams with clearer ownership demonstrate better resolution rates, providing evidence in support of Hypothesis H3.

6. Relationship Between Governance and Operational Efficiency (Objective 4 & H6)

The study also examines how governance mechanisms influence operational efficiency.

6.1. Key Observations

The implementation of structured governance processes resulted in reduced manual intervention, faster identification of data issues, and improved efficiency in data processing activities.

6.2. Interpretation

The results indicate that effective governance frameworks enhance operational efficiency by streamlining data management processes. This provides empirical support for Hypothesis H6, confirming that governance mechanisms positively influence efficiency outcomes.

7. Summary of Hypothesis Testing

Table 7 presents the summary of hypothesis testing where the outcomes are highlighted that all hypothesis supported by the evaluations.

Table 7 summary of hypothesis testing

Hypothesis	Result
H1: Data lineage vs quality degradation	Supported
H2: SLA compliance vs quality improvement	Supported
H3: Accountability vs resolution effectiveness	Supported
H4: Rule-based assessment vs data confidence	Supported
H5: Data quality vs decision readiness	Supported
H6: Governance vs operational efficiency	Supported

Source: Author's computation based on dataset

Discussions

The discussion of findings provides deeper insights into how the proposed framework aligns with existing theoretical perspectives while addressing practical challenges in BFSI data governance. The findings of this study provide strong empirical support for the proposed Unified Data Confidence Framework and its relevance in addressing data governance challenges in the BFSI sector. The results demonstrate that data quality issues persist even in environments where overall quality scores appear satisfactory. This aligns with prior research, which suggests that aggregated data quality metrics can often mask critical weaknesses in specific dimensions such as accuracy and timeliness (Batini et al., 2009).

The observed degradation of data quality across system lineage, particularly at integration points such as enterprise data warehouses, reinforces the arguments made by Li et al. (2010) who highlight that data transformations and multi-system flows are key sources of inconsistencies. This finding also supports the hypothesis that increased system complexity contributes to data quality deterioration, emphasizing the importance of embedding validation mechanisms across all stages of the data lifecycle.

Furthermore, the results related to SLA compliance and governance performance demonstrate that organizational factors play a crucial role in data quality management. The relatively low compliance rates for critical issues indicate that governance challenges are not purely technological but are also influenced by accountability structures and process efficiency. This observation is consistent with the findings of Khatri and Brown (2010), who argue that effective data governance depends on the alignment of people, processes, and technology.

The effectiveness of the rule-based data quality assessment approach further validates the practical applicability of structured frameworks in improving data reliability. Unlike complex machine learning-based solutions, rule-based systems provide transparency and auditability, which are essential in regulated environments. This supports the notion that simpler, well-designed governance mechanisms can outperform more complex systems when aligned with organizational needs (Abraham et al., 2019).

From a broader perspective, the study highlights the critical role of data governance in enabling digital transformation. As organizations increasingly adopt data-driven strategies, the ability to ensure data reliability becomes a key determinant of success. The findings align with Bharadwaj et al. (2013), who emphasize that digital transformation requires not only technological adoption but also robust data management practices.

Conclusion

This study aimed to address the challenges of data quality and governance in the BFSI sector by proposing a Design Science-based Unified Data Confidence Framework. The

findings demonstrate that data chaos—characterized by fragmented systems, inconsistent data, and weak governance—can be effectively transformed into data confidence through structured and practical governance mechanisms.

The empirical analysis of 10,000 financial records revealed that a significant proportion of data is affected by quality issues, particularly in critical attributes such as credit scores and loan-to-value ratios. The study also identified system-level data degradation and governance inefficiencies as key contributors to these challenges. By integrating rule-based data quality assessment with governance workflows, the proposed framework provides a comprehensive approach to improving data reliability.

Overall, the study demonstrates that the transition from data chaos to data confidence is achievable through structured, scalable, and practical governance frameworks. By aligning data quality processes with organizational accountability and system-level controls, the proposed framework offers a sustainable pathway for enhancing data-driven decision-making in the BFSI sector.

Implications

1. Managerial Implications

The findings of this study offer several important implications for practitioners in the BFSI sector. First, organizations should prioritize the implementation of structured data governance frameworks that focus on measurable data quality dimensions. The ability to classify data into confidence levels enables better decision-making and reduces reliance on manual validation processes.

Second, the study highlights the importance of addressing data quality issues at system integration points. Managers should ensure that validation mechanisms are embedded across all stages of the data lifecycle, particularly in data aggregation environments such as data warehouses.

Third, governance effectiveness depends on clearly defined roles and accountability structures. Organizations should establish ownership for data quality and enforce SLA-based issue resolution processes to improve operational efficiency and reduce risk exposure.

Finally, the use of widely available tools such as Excel, SQL, and Power BI demonstrates that effective governance can be achieved without significant technological investment. This makes the framework particularly valuable for organizations seeking cost-effective solutions.

2. Academic Implications

From an academic perspective, this study contributes to the literature on data governance and digital transformation by introducing the concept of data confidence as a measurable construct. It extends the application of Design Science Research in the domain of data governance, demonstrating how theoretical frameworks can be translated into practical solutions.

The study also addresses existing research gaps by providing a sector-specific framework tailored to BFSI requirements. By integrating data quality dimensions, governance mechanisms, and system-level analysis, the research offers a comprehensive approach that can serve as a foundation for future studies.

3. Policy Implications

The findings of this study have implications for regulators and policymakers. Given the increasing importance of data in financial systems, regulatory frameworks should emphasize not only compliance requirements but also the implementation of practical governance mechanisms.

The proposed framework aligns with regulatory principles such as BCBS 239 and data governance guidelines, providing a structured approach to improving data reliability and transparency. Policymakers can use such frameworks to promote standardized governance practices across financial institutions.

Future Research

The proposed Unified Data Confidence Framework provides a practical and scalable approach to improving data governance in BFSI organizations. However, the rapidly evolving digital landscape presents several opportunities for extending this research. First, future studies may investigate the integration of Artificial Intelligence (AI) and Machine Learning (ML) techniques to automate data quality assessment and anomaly detection. Rather than relying solely on predefined rule-based validation, intelligent algorithms could continuously learn from historical data patterns to identify emerging data quality issues, thereby improving the adaptability and predictive capability of governance systems.

Second, future research could explore the application of Generative AI and Large Language Models (LLMs) to support metadata generation, business rule recommendation, documentation, and automated governance reporting. AI-assisted rule generation may significantly reduce the manual effort required to maintain enterprise data quality while improving consistency across multiple business domains.

Third, the proposed framework may be extended to incorporate real-time streaming data governance within cloud-native financial architectures. As financial institutions increasingly adopt digital banking, Internet of Things (IoT), open banking APIs, and real-time payment systems, governance mechanisms must evolve beyond batch-oriented validation towards continuous monitoring and intelligent event-driven quality assurance.

Another promising direction involves integrating the framework with blockchain technology to establish immutable audit trails for data lineage, ownership, and regulatory compliance. Such integration could substantially enhance transparency, traceability, and trust in highly regulated financial environments.

From a methodological perspective, future studies may validate the proposed framework using cross-country datasets representing different regulatory environments, including Asia-Pacific, Europe, and emerging economies. Comparative analyses would improve the generalizability of the framework and identify country-specific governance requirements influenced by regulations such as BCBS 239, GDPR, RBI, MAS, or APRA.

Finally, future research could investigate the relationship between data confidence and broader organizational outcomes, including operational resilience, fraud detection capability, customer experience, ESG reporting quality, and AI model governance. Such extensions would further strengthen the role of data governance as a strategic capability supporting sustainable digital transformation in the global BFSI sector.

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DECISION-MAKING FRAMEWORKS FOR THE SELECTION OF DIGITALIZATION TECHNOLOGIES: A SYSTEMATIC LITERATURE REVIEW

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Abstract

The selection of digitalization technologies has become a consequential pre-adoption decision for organizations across supply chain, logistics, and adjacent settings, but the frameworks proposed to support it rest on a narrow conception of what is being decided. Dominated by multi-criteria decision-making methods — in particular Analytic Hierarchy Process variants and their fuzzy extensions — these frameworks treat technology selection as a problem of preference elicitation and alternative ranking, and the review literature consolidating them has tended to reproduce this orientation rather than to interrogate it. The organizational conditions that scholarship on strategic decision-making identifies as constitutive of such choices — uncertainty under genuinely incomplete information, multi-stakeholder dynamics shaped by political processes rather than by opinion aggregation, and the embeddedness of selection within the operational processes a technology is meant to support — receive comparatively limited theoretical engagement. This work-in-progress paper reports on a systematic literature review designed to address this mismatch. A coding frame derived from the three organizational dimensions operationalizes the analytical lens for a thematic analysis of the reviewed frameworks. A pilot application to three purposively selected cases shows that all three displace, rather than address, the dimensions on which their decision contexts ultimately rest: uncertainty is reduced to judgmental imprecision absorbed by fuzzy or rough-set procedures, stakeholder heterogeneity is handled through aggregation rather than negotiation, and the operational process figures as motivating setting rather than as referent for evaluating fit. Subsequent work will extend the analysis to the stabilized corpus and develop a thematic synthesis that articulates the building blocks on which theoretically grounded framework development can build.

Keywords: *Decision-Making, Digitalization Technology Selection, Systematic Literature Review (SLR), Transportation Logistics*

1. Introduction

The digital transformation of supply chain management has produced a rapidly expanding landscape of digitalization technologies (Yang et al., 2021; Büyüközkan & Göçer, 2018) that promise to enhance operational efficiency (Gunasekaran et al., 2017), reduce costs (Queiroz et al., 2020), and improve service quality (Klump, 2018). However, before these benefits can be realized, organizations face a consequential and far from trivial challenge: selecting which technology to adopt for their specific operational processes (Shehabuddeen et al., 2006; Farooq & O'Brien, 2015; Farshidi et al., 2018). The complexity of this selection stems from at least three interrelated conditions. First, decision-makers must evaluate a growing number of technological options under considerable uncertainty (Zarea et al., 2026), as neither the technology's actual performance in the specific organizational context (Vavpotič

et al., 2026) nor the full complexity of the task environment is known at the point of selection (Torkkeli & Tuominen, 2002). Second, the selection process involves multiple stakeholders (Tang & Liao, 2024) who may hold competing evaluation criteria (Naseem et al., 2026; Görçün et al., 2023), transforming what might appear as a technical comparison (Vavpotič et al., 2026) into a negotiated organizational process (Arslan et al., 2025). Third, the chosen technology must ultimately align with the operational processes it is intended to support (Santos et al., 2023; Gregory, 1995), a requirement that many selection approaches fail to address explicitly. The consequences of an inappropriate choice — costly implementation failures (Russell & Hoag, 2004; Mathauer & Hofmann, 2019), operational disruptions (Chatterjee et al., 2022), and unrealized adoption benefits (Tarofder et al., 2017) — underscore the significance of this decision. Accordingly, the challenge of technology selection has attracted substantial scholarly attention, producing a considerable body of research that discusses decision-making frameworks across supply chain (Jede & Teuteberg, 2015), logistics (Naseem et al., 2026), and adjacent domains such as manufacturing (Santos et al., 2023; Farooq & O'Brien, 2015).

Despite this growing body of work, the prevailing orientation of existing frameworks tends toward technical optimization. Many proposed approaches are rooted in the tradition of operations research (Pinochet et al., 2025) and concentrate on mathematical procedures for criteria weighting and alternative ranking (Basílio et al., 2022; Kozłowska, 2022) while the organizational dimensions of technology selection as a decision-making process receive comparatively limited theoretical attention (Madanchian & Taherdoost, 2025). Multi-criteria decision-making (MCDM) methods, particularly the Analytic Hierarchy Process and its fuzzy extensions, dominate the field (Basílio et al., 2022; Kahraman et al., 2015), offering mathematical mechanisms for handling imprecise judgments within pairwise comparison matrices. While these methods provide computational rigor, they do not engage with the more fundamental question of how decision-makers in respective organizations reason under genuine uncertainty about how technology fit (Malik et al., 2025) with the tasks they are intended to ultimately support — that is, in situations where neither the technology's actual performance nor the full complexity of the task environment is yet known (Kumar et al., 2025). Similarly, while most frameworks incorporate aggregation procedures for combining multiple decision-maker opinions (Więckowski & Sałabun, 2025; Tang & Liao, 2024; Schmitz et al., 2025), the theoretical foundations of how different stakeholder roles shape the evaluation process, including competing criteria and group negotiation dynamics, appear to remain underexplored in the current literature (Huang et al., 2024; Kahraman et al., 2007, 2015). Furthermore, only a minority of existing studies incorporate an explicit reference to business processes within their decision-making frameworks (Madanchian & Taherdoost, 2025; Huang et al., 2024), which raises questions about how well current selection approaches account for the operational reality in which a chosen technology is ultimately intended to function (Santos et al., 2023; Gregory, 1995). Taken together, these observations suggest that the literature has yet to provide a comprehensive assessment of how current frameworks engage with the dimensions that organizational decision-making scholarship identifies as central to such processes, namely uncertainty, multi-stakeholder dynamics, and process embeddedness.

This limitation extends to the review literature itself. Over the past decade, several reviews have advanced understanding of technology selection research, predominantly by consolidating methodological toolkits and mapping application patterns. Early contributions examined fuzzy AHP methods across diverse industries (Liu et al., 2020) and provided bibliometric overviews of multiple criteria analysis in technology selection and assessment (Kozłowska, 2022), while others highlighted the growing prevalence and interdisciplinary reach of AHP-based approaches (Basílio et al., 2022). Building on the work of Hamzeh and Xu (2019), Santos et al. (2023) synthesized decision methods and criteria into a research agenda for structured decision-aiding procedures in manufacturing technology selection. More

recent reviews have continued this trajectory by systematically cataloguing MCDM techniques (Pinochet et al., 2025), criteria structures and application patterns across technology selection settings (Magabaleh et al., 2024), and selection approaches for specific technology objects such as third-party software components (Jaberzadeh Ansari & Barcomb, 2026). This emphasis on method comparison, preference elicitation, and ranking mechanics is further reinforced by ongoing work that tests and refines the pairwise and direct-evaluation procedures central to AHP-style selection logics (Cavallo & Ishizaka, 2025). While each of these contributions is valuable in its own right, they share a common orientation toward the how of technology evaluation rather than the what kind of decision technology selection represents from an organizational perspective. This shared orientation is not a neutral choice. As long as the review literature consolidates methodological toolkits without systematically reflecting on the organizational conditions under which selection decisions are made, it implicitly sustains the premise that technology selection is a problem of optimization rather than of situated organizational decision-making. The frameworks informed by this view risk remaining mismatched to the decision situations they are meant to support — precisely those in which uncertainty is constitutive (Zarea et al., 2026), stakeholder configurations shape which criteria become salient (Hoblos et al., 2024), and the operational process the technology is intended to serve (Malik et al., 2025) determines what fit can even mean. Clarifying this mismatch calls for a systematic engagement with the existing literature rather than another primary framework proposal.

Therefore, this study addresses this problem through a systematic literature review of decision-making frameworks for digitalization technology selection within business and management research. A systematic literature review provides the appropriate means for this inquiry, as it combines comprehensive coverage of the relevant literature with a structured analytical procedure that enables consistent comparison across studies. The review examines frameworks across supply chain, logistics, and adjacent fields, with transportation logistics serving as the primary application context. Transportation logistics provides a particularly suitable empirical lens for this inquiry, because technology adoption decisions in this domain characteristically involve cross-organizational coordination among multiple actors (Bossong et al., 2025; Gu et al., 2025; Sternberg et al., 2023), process-specific operational requirements that vary across shipment modes and service configurations (Cichosz et al., 2020; Zhang et al., 2025), and rapidly evolving technological and market conditions (Sun et al., 2024) that amplify the uncertainty surrounding prospective technology decisions (Sel & Minner, 2025; Yang et al., 2021). The central research question guiding this review is: *What decision-making frameworks exist in business and management research for selecting suitable digitalization technologies, and how do they account for the uncertainty, stakeholder dynamics, and process embeddedness that characterize such decisions to determine the fit between digitalization technologies and supported tasks?* Based on the findings, the study will synthesize the key components identified across the reviewed literature — including decision criteria, technology alternatives, decision-making methods, process relationships, and decision-maker configurations — into an integrated assessment that delineates the essential building blocks for future framework development. In doing so, this study aims to contribute a structured foundation upon which subsequent research can develop more theoretically grounded decision-making frameworks that move beyond technical optimization toward a richer understanding of technology selection as a situated organizational decision-making process.

The remainder of this paper is structured as follows. Section 2 provides the theoretical background on technology selection and the dimensions of organizational decision-making that inform the analytical lens of this review. Section 3 outlines the systematic literature review methodology, including the search strategy, eligibility criteria, and data analysis approach. Section 4 presents preliminary descriptive findings from the corpus and outlines the analytical

approach for the thematic synthesis along the three identified dimensions, the full results of which will be presented at the conference. Section 5 concludes with a reflection on the anticipated contribution, limitations, and next steps toward the completed review.

2. Theoretical Background

2.1 Technology Selection within the Pre-Adoption Phase

Technology adoption is not a singular event but a process that unfolds through successive phases, each characterized by distinct informational conditions and decision-making demands. Innovation diffusion research (Meyer & Goes, 1988; Rogers, 1995) and subsequent work on information technology (IT) innovation assimilation (Fichman, 2000; Zhu et al., 2006) have long conceptualized this trajectory as a sequence that spans the initial consideration of a technology, its acquisition and implementation, and its eventual integration into organizational routines. Information systems scholarship has sharpened this view by separating pre-adoption — the stage at which organizations form judgments and commitments about technologies they have not yet deployed — from post-adoption, where behaviors are shaped by accumulated experience (Jasperson et al., 2005), routinized use (Schwarz & Chin, 2024), and the integration of the technology into organizational workflows (Karahanna et al., 1999).

This distinction is more than terminological. Pre-adoption decisions rest on expectations and prospective judgments about how a technology will perform in an organizational context that has yet to encounter it (Karahanna et al., 1999; Torkkeli & Tuominen, 2002). Post-adoption, by contrast, operates on an accumulating base of experiential evidence. Performance can be observed, problems diagnosed, and behaviors recalibrated against empirical feedback (Jasperson et al., 2005; Schwarz & Chin, 2024). The two phases therefore confront decision-makers with qualitatively different epistemic conditions, and this asymmetry has direct consequences for how selection decisions can be grounded and justified.

Within the pre-adoption phase, organizations must translate a broad space of technological possibilities into concrete commitments. Gregory (1995) conceptualized this transition through the established technology management framework, which comprises five interrelated activities: identification, selection, acquisition, exploitation, and protection. Within this framework, technology selection refers to the organizational process of deciding which technologies should be supported and promoted within the organization. Phaal et al. (2001) subsequently refined this framework toward a more explicit business-process perspective, and the positioning of selection as a distinct pre-adoption activity has remained influential across subsequent treatments in technology management and adjacent fields (Shehabuddeen et al., 2006), even as parallel research has advanced more iterative or cyclical conceptualizations of technology choice (Fichman, 2000). To avoid terminological ambiguity, this paper uses technology selection as an umbrella term for the pre-adoption decision process through which organizations identify candidate technologies, evaluate them against relevant criteria, and commit to those that will enter the subsequent implementation pipeline. This usage reflects how the decision-making framework literature reviewed in this paper typically treats identification, evaluation, and final choice as integrated stages of a single selection problem rather than as sharply bounded sub-activities.

The focus of this paper on pre-adoption selection is motivated by its consequential position in the adoption trajectory. It is at this juncture that organizations make commitments that subsequently shape the implementation path, ranging from the allocation of financial resources to the orientation of organizational attention and the formation of early dependencies on specific vendors, architectures, or process designs. Once implementation has begun, these commitments are progressively locked in. Sunk costs accumulate (Keil, Mann, et al., 2000; Keil, Tan, et al., 2000), political and reputational investments develop around the chosen option

(Lapointe & Rivard, 2005), and escalation-of-commitment dynamics make it increasingly costly to reverse course (Keil, Mann, et al., 2000; Keil, Tan, et al., 2000). Domain-specific evidence from IT-enabled supply chain and logistics settings reinforces this observation. Correcting a misaligned technology choice after implementation has commenced typically incurs substantial operational, financial, and organizational costs (Mathauer & Hofmann, 2019; Russell & Hoag, 2004).

Scholars across several research traditions have characterized early technology choice as a particularly demanding managerial task. In innovation and technology management, opportunity selection under deep uncertainty has been described as a persistent challenge for decision-makers who must commit to alternatives before in-context performance data become available (Myers et al., 2026). In information systems research, the prospective nature of pre-adoption judgments has been shown to introduce cognitive and organizational complexities that differ substantively from those of post-adoption use (Karahanna et al., 1999). In organizational digitalization contexts, small and medium-sized enterprises have been observed to hesitate and defer in the face of unresolved uncertainties about anticipated value and implementation feasibility (Kallmuenzer et al., 2025). And in logistics and supply chain settings specifically, the coordination of multiple organizational actors (Sternberg et al., 2023), the heterogeneity of operational processes (Cichosz et al., 2020), and the rapid evolution and proliferation of the technology landscape (Sun et al., 2022) compound the difficulty of forming well-founded pre-adoption commitments.

Taken together, these observations suggest that technology selection in the pre-adoption phase is not simply an early step along a linear adoption path but a decision moment with distinctive informational, organizational, and operational features. The theoretical background that follows therefore clarifies these features and derives from them the analytical dimensions along which the reviewed frameworks will be assessed. Section 2.2 first specifies what is meant by the digitalization technologies that constitute the alternatives in such selection decisions. Section 2.3 then develops the three organizational dimensions — the treatment of uncertainty, the accommodation of multi-stakeholder dynamics, and the embeddedness of selection within operational processes — that inform the analytical lens of this review.

2.2 Digitalization Technologies as Decision Alternatives

Having established that technology selection in the pre-adoption phase confronts decision-makers with distinctive informational and organizational conditions, this section specifies the alternatives among which such selection takes place. The specification is not merely terminological. It also delimits the levels at which the review will examine how frameworks characterize the technologies under evaluation.

The terms digitization, digitalization, and digital transformation refer to conceptually distinct phenomena, even though they are frequently used interchangeably in the literature (Hagberg et al., 2016; Hess et al., 2016). Following the definitional synthesis offered by Gradillas and Thomas (2023), this paper distinguishes between digitization as the creation of digital artifacts through technical processes of conversion and representation (Gradillas & Thomas, 2023), and digitalization as the transformation of the socioeconomic environment through the adoption, application, and utilization of digital artifacts (Gradillas & Thomas, 2023). Digital transformation, in turn, refers to the ongoing strategic renewal of an organization's business model, collaborative approach, and culture enabled by advances in digital technologies (Warner & Wäger, 2019). This study positions itself within the domain of digitalization, examining the digital artifacts that organizations evaluate and select as part of their digitalization efforts.

The concept of technology itself resists straightforward definition, and information systems scholarship has long emphasized that IT artifacts are better understood as multi-layered rather than as singular objects (Orlikowski & Iacono, 2001). For the purposes of this

review, this paper adopts the multi-layer conceptualization proposed by Berger et al. (2018), which distinguishes between a technology's concept (the general idea it addresses), its approach (the defined principle through which the concept is realized), and its physical component (the specific functional element that performs a defined task). This layered understanding is more than a definitional convenience. It provides an analytical lens through which the review can examine on which level existing frameworks operate when they evaluate technology alternatives. Frameworks that compare technologies at the level of broad concepts engage with a different decision problem than frameworks that compare specific components or implementations, and the level at which a framework operates has implications for how it can account for the fit between a technology and the tasks it is intended to support.

Within the empirical context of transportation logistics, which serves as the primary application lens of this review, digitalization technologies encompass a range of capabilities. Building on the classifications proposed by Marchet et al. (2009) and Perego et al. (2011) and incorporating the capability-oriented perspective of Callefì et al. (2022), the literature distinguishes between technologies oriented toward transportation management, transportation information exchange, transportation operations, transportation monitoring, and transportation infrastructure. These categories inform how the review will characterize the application areas of the frameworks identified in the corpus. The heterogeneity across these categories is compounded by terminological variety, with terms such as digital technology (Attaran, 2020; Núñez-Merino et al., 2020; Raja & Venkatachalam, 2022), Industry 4.0 technology (Ali & Phan, 2022; Benitez et al., 2022; Rahman et al., 2022), information system (Helo & Szekely, 2005; Ketikidis et al., 2008; Grabara et al., 2014), and smart technology (Baldwin et al., 2016; Chung, 2021) being used with overlapping but non-identical meanings. This variety itself has consequences for decision-makers in the pre-adoption phase, who must navigate not only the selection among technologies but also the categories under which relevant alternatives can be identified in the first place. For the purposes of this review, this paper adopts the term digitalization technology as a unifying label for the technological alternatives under consideration within the reviewed frameworks.

2.3 Organizational Dimensions of Technology Selection Decisions

This section develops three dimensions along which the reviewed frameworks will be assessed: (i) the treatment of uncertainty inherent in strategic technology decisions, (ii) the accommodation of multi-stakeholder dynamics in the evaluation process, and (iii) the embeddedness of selection within the operational processes the technology is intended to serve. These dimensions derive from established lines of inquiry within organizational decision-making research and reflect conditions that are particularly pronounced in the pre-adoption context established in Section 2.1.

2.3.1 Strategic Decision-Making in Uncertain Organizational Contexts

Selecting a digitalization technology in the pre-adoption phase can plausibly be conceptualized as a strategic decision, following Mintzberg, Raisinghani, and Théorêt's (1976) view that strategic decisions are consequential because they shape organizational action, involve meaningful resource commitments, and establish precedents for future decision-making. Much of the empirical work on how such decisions actually unfold (Eisenhardt & Zbaracki, 1992; Papadakis et al., 1998; Schwenk, 1995; Shepherd & Rudd, 2014) offers limited support for a model of rational optimization. Decision-makers tend to satisfice rather than optimize (Simon, 1979, 2013), search locally rather than exhaustively (March & Simon, 1993), and rely substantially on organizational routines (Cyert & March, 2020), a pattern that appears especially pronounced where information is incomplete and stakes are high (Eisenhardt & Zbaracki, 1992).

Beyond bounded cognition, the condition that most consistently shapes how strategic decisions unfold is uncertainty (Papadakis et al., 1998; Shepherd & Rudd, 2014). Knight's

(1965) distinction between risk, where probability distributions of outcomes can be estimated, and uncertainty proper, where they cannot, places strategic decisions more often in the latter regime than in the former (Cyert & March, 2020). The pre-adoption phase appears to intensify this condition in several respects. Cohen et al. (1972) characterized ambiguous decision contexts by preferences that are inconsistent and often discovered during the evaluation (March et al., 1976), by alternatives whose performance cannot be observed in advance (Torkkeli & Tuominen, 2002), and by stakeholder participation that shifts over the course of the decision (Eisenhardt & Zbaracki, 1992; March et al., 1976). These conditions describe the informational landscape of pre-adoption technology selection with some precision, even if strategic decisions rarely conform to a purely stochastic logic (Eisenhardt & Zbaracki, 1992).

Uncertainty in this sense appears largely constitutive of the decision context rather than a residual condition to be reduced through more sophisticated calculation. Frameworks that approach technology selection through fuzzy aggregation procedures (Kahraman et al., 2015; Zadeh, 1965) address judgmental imprecision, but the deeper informational uncertainty of the pre-adoption phase appears to lie outside their analytical reach.

2.3.2 Multi-Stakeholder Dynamics in Organizational Decision-Making

Strategic decisions are also fundamentally social. Organizations are commonly understood as coalitions of individuals and groups whose preferences may only partially align or may even conflict (Cyert & March, 2020). On this view, organizational decision-making is not merely a rational or technical process, but also a political one shaped by negotiation, influence, and competing interests (March, 1962). On this view, decisions in such coalitions emerge less from preference aggregation than from political processes through which preferences are themselves formed and contested (Eisenhardt & Zbaracki, 1992).

Goals among organizational actors tend to arise from functional position (Allison & Zelikow, 1971) and from perceived self-interest (Pettigrew, 2014), producing conflict that is partial but persistent. When preferences clash, more powerful actors often prevail over the application of rational criteria, a pattern documented in studies that juxtapose the two models directly (Pfeffer & Salancik, 1974). Actors in turn engage in coalition formation (Pettigrew, 2014), cooptation (Pfeffer, 1992), control of information channels (Pettigrew, 2014), and agenda manipulation (Pfeffer, 1992) to shape outcomes. Pettigrew's (2014) study of computer vendor selection in a British retailer captures these dynamics in a technology-choice context. Differences in vendor preferences among three managers arose not from technical disagreement alone, but also from their organizational positions and the interests these positions implied.

More recent work has sharpened this account. Powell et al. (2011) treat intergroup bargaining and conflict resolution as constitutive concerns of behavioral strategy, while Joseph and Gaba (2020) draw attention to informational sources of conflict, where divergence among stakeholders may stem not only from competing interests but also from differing problem representations tied to their structural positions in the organization.

The multi-stakeholder character of technology selection is therefore difficult to reduce to a methodological problem of opinion aggregation. Mathematical procedures that combine stakeholder evaluations (Kahraman et al., 2007), such as arithmetic or geometric averaging within multi-criteria decision-making methods (Mardani et al., 2015), operate on the assumption that preferences are pre-formed inputs to be combined, yet preferences themselves can be understood as outcomes of the political process (Cyert & March, 2020; Pettigrew, 2014). Arrow's (2012) classical result that no aggregation method can simultaneously satisfy all desirable properties reinforces, on independent grounds, the limits of treating stakeholder heterogeneity as an aggregation problem alone.

2.3.3 Process Embeddedness of Technology Selection

Technologies tend to deliver value not in isolation but through integration into the operational processes of the organization (Davenport, 1993; Davenport & Short, 1990). On this view, organizations can be understood as configurations of business processes, that is, sequences of coordinated activities producing defined outputs, and technology investments are instrumentally tied to the design and performance of these processes. Automating a poorly understood or poorly designed process tends to amplify rather than resolve its inefficiencies (Davenport & Short, 1990), which suggests that a technology is difficult to evaluate independently of the process it is meant to support.

A deeper basis for this position is found in socio-technical systems theory (Bostrom & Heinen, 1977). Work systems are conceptualized as comprising a social subsystem, which includes people, roles, and interaction, and a technical subsystem, which includes tools, technologies, and procedures (Bostrom & Heinen, 1977), with system performance depending on the joint optimization of both. Bostrom and Heinen (1977) traced recurrent failures in information-systems implementations to technology decisions taken without explicit consideration of the task and process context the technology was meant to support. On this reading, fit between technology and operational process appears less as an additional desirable property to be assessed alongside other criteria than as a condition on which meaningful evaluation rests.

The operational process also shapes how the decision itself unfolds. Organizational information-processing is structured by procedural arrangements (Galbraith, 1974; Joseph & Gaba, 2020), and an evaluation that lacks an explicit process referent may lose access to questions about which actors hold the relevant operational knowledge and how the chosen alternative will interact with existing routines. Generic comparisons among alternatives, conducted without reference to the operational context in which the technology will function, can forfeit the basis on which fit might be assessed in the first place.

3. Methodology

This study follows the procedural framework for systematic literature reviews proposed by Kitchenham (2004) and Kitchenham and Charters (2007). Consistent with Tranfield et al. (2003) and Kraus et al. (2022), the review is structured in three sequential stages: planning the review (Section 3.1), conducting the review (Section 3.2), and reporting the review (Section 3.3). Following the classification of Paul et al. (2021), this review constitutes a domain-based and structured theme-based systematic literature review. The domain examined is that of decision-making frameworks for digitalization technology selection within business and management research, with supply chain, logistics, and freight transportation serving as the primary application context. The three organizational dimensions developed in Section 2.3 — uncertainty, multi-stakeholder dynamics, and process embeddedness — function as the a priori analytical structure through which the reviewed frameworks are assessed, in combination with an inductive reading (Durach et al., 2021) of the theoretical framings and assumptions (Alvesson & Sandberg, 2011) on which these frameworks rest.

3.1 Planning the Review

A review protocol was developed prior to the search to ensure a systematic, transparent, and reproducible process (Kraus et al., 2022; Tranfield et al., 2003). The protocol specified the research question, the thematic search components and associated terms, the database strategy, and the inclusion and exclusion criteria applied during screening. Protocol-driven planning is a prerequisite for the replicability on which the credibility of an SLR rests (Tranfield et al., 2003), and it is particularly consequential in domain-based reviews, where the delineation of relevant literature depends on decisions made at the planning stage.

Web of Science (WoS) was selected as the sole database. Although dual-database

strategies combining Scopus and WoS are common in management research, recent methodological work shows that the two databases yield a substantial overlap in business and management fields (Mongeon & Paul-Hus, 2016; Sánchez et al., 2017), and that WoS offers a comprehensive overview of the international scholarly output relevant to this study. To compensate for the possibility that relevant studies might be missed by a single-database search, the database-driven search was complemented by backward and forward snowballing following Wohlin (2014), as described in Section 3.2.

The research question was decomposed into four thematic components to construct the search string: (i) decision-making, (ii) framework, (iii) digitalization technologies as the object of selection, and (iv) application context in supply chain, logistics, and freight transportation. For each component, synonyms and related terms were identified to maximize retrieval coverage (Table 1). Compared with earlier iterations used in prior exploratory searches on this topic, the search string was recalibrated to explicitly capture technology evaluation and Industry 5.0 terminology, both of which have gained substantive presence in the literature in recent years.

Table 1 Thematic components, keywords, and search string.

Thematic component	Keyword	Synonyms
(1) decision-making	“decision-making”	“decision making” OR select* OR assess* OR evaluat* OR identif*
(2) framework	Framework*	model* OR method* OR concept* OR approach* OR technique* OR tool* OR procedure*
(3) digitalization technology as object of selection	“digi* AND technolog*”	“industry 4.0” OR “industry 5.0”
(5) application context	“supply chain”	logistic* OR “freight transport*”
Search string	(“decision-making” OR “decision making” OR select* OR assess* OR evaluat* OR identif*) AND (framework* OR model* OR method* OR concept* OR approach* OR technique* OR tool* OR procedure*) AND ((digi* AND technolog*) OR “industry 4.0” OR “industry 5.0”) AND (“supply chain” OR logistic* OR “freight transport*”)	

Source: Authors’ own compilation.

The search was restricted to peer-reviewed journal articles published in English between 2009 and 2026. The starting year of 2009 reflects the period following the 2008 economic contraction, which is commonly identified as a point of accelerated emergence of digitalization technologies in industrial environments (European Comission, 2018; Weerabahu et al., 2023). Journal articles were selected as the exclusive source type because peer review provides an established signal of methodological and theoretical quality (Podsakoff et al., 2005; Rowland, 2002). The search was further restricted to the WoS research categories ‘Business’, ‘Management’, ‘Operations Research Management Science’, as well as ‘Engineering Industrial Transportation’ to ensure thematic relevance to business and management research while retaining the operations-oriented literatures in which the technology selection debate is anchored.

Journal quality was additionally controlled through the Chartered Association of Business Schools' Academic Journal Guide (AJG 2024). Articles were retained if published in journals rated AJG 2024 ≥ 2 . This threshold was chosen to restrict the review to outlets with established rigour in peer review and an expectation of theoretically grounded argumentation — a requirement consistent with the analytical focus of this review on how frameworks theorize the organizational dimensions of technology selection decisions. This criterion operationalizes quality as a reviewed, discipline-consistent standard rather than a discipline-specific basket, and is increasingly adopted in high-quality SLRs in management research (Durach et al., 2017; Kraus et al., 2022). During snowballing, the AJG threshold was relaxed where thematically central studies were required to contextualize or theoretically anchor the review. The inclusion and exclusion criteria are summarized in Table 2.

Table 2 Inclusion and exclusion criteria.

Criterion	Type	Statement
IC 1	Inclusion	Peer-reviewed journal article
IC 2	Inclusion	Published between 2009 and 2026
IC 3	Inclusion	Journal listed with AJG 2024 rating ≥ 2
IC 4	Inclusion	Article proposes, develops, or applies a decision-making framework (or method, model, tool, procedure) for the selection of digitalization technologies
IC 5	Inclusion	Application context in supply chain, logistics, or freight transportation
EC 1	Exclusion	Duplicate record
EC 2	Exclusion	Article has been retracted
EC 3	Exclusion	Full text is unavailable
EC 4	Exclusion	Technology is used as a tool for decision-making rather than being the object of decision-making
EC 5	Exclusion	Publication is not in English

Source: Authors' own compilation.

Following Fink (2019), inclusion criteria were applied through three response categories — "Yes", "No", or "?" — where an answer of "Yes" or "?" retains the article for further screening, while "No" leads to exclusion. Exclusion criteria follow the reverse logic (Vanwersch et al., 2011).

3.2 Conducting the Review

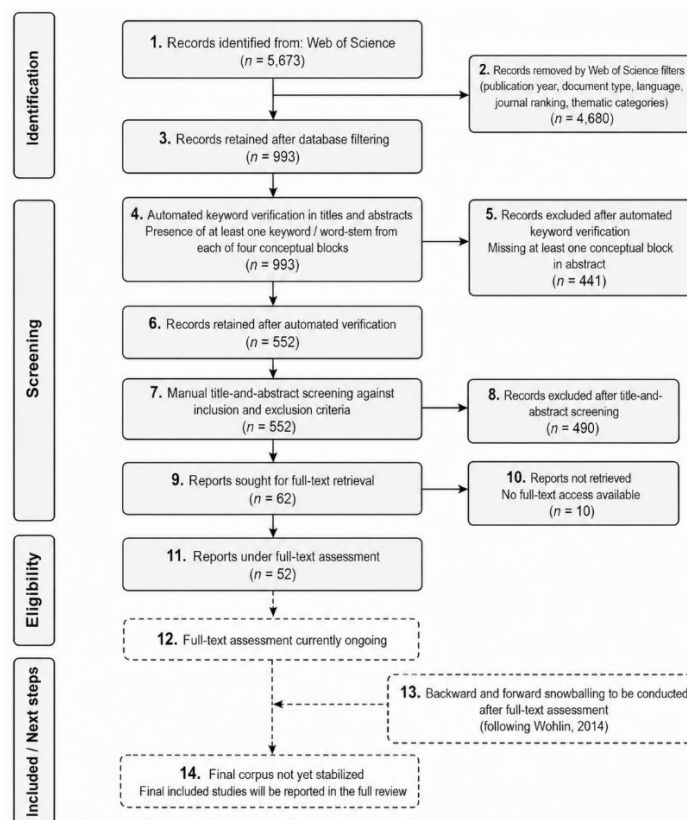
The search was executed in Web of Science using the search string presented in Table 1 and the filter settings derived from Section 3.1. The initial search yielded 5,673 records. After applying the WoS filters for publication year, document type, language, journal ranking, and thematic categories, 993 records were retained for screening. The screening process is structured into four sequential stages: automated keyword verification within titles and abstracts, manual title-and-abstract screening, full-text screening, and snowballing.

In the first screening stage, a deterministic abstract-level verification was performed to ensure that each retained record exhibited thematic alignment with the four conceptual blocks of the search string. For each abstract, the presence of at least one keyword or word-stem from each thematic block was tested via spreadsheet formula based on a substring-matching procedure. Records failing to exhibit at least one match in any of the four blocks were excluded,

on the methodological assumption that abstract-level absence indicates the original Web of Science match was triggered by metadata fields outside the article's primary thematic focus. The verification reduced the corpus from 993 to 552 records. In the second screening stage, the retained records underwent manual title-and-abstract screening against the remaining inclusion and exclusion criteria listed in Table 2, resulting in the exclusion of 490 records. A further 10 records were excluded as no full-text access was available. The full-text assessment of the remaining 52 records is currently ongoing and will, together with the subsequent snowballing stage, determine the final corpus.

To complement the database-driven search and to capture relevant studies that the search string may not have retrieved, a snowballing procedure following Wohlin (2014) will be conducted upon completion of the full-text assessment. Both backward snowballing (inspection of reference lists of included studies) and forward snowballing (identification of articles citing the included studies through Web of Science) will be applied. Throughout the screening, decisions and reasons for exclusion are documented in a structured extraction sheet to ensure traceability.

Given that corpus selection is in progress, the present work-in-progress paper does not yet report a stabilized final corpus. Instead, the contribution is structured around three components: (i) the methodological protocol developed for the review, (ii) the coding frame derived from the three organizational decision-making dimensions established in Section 2.3, and (iii) a pilot application of the coding frame to a purposively selected subset of three cases drawn from the 52 records under full-text assessment. The pilot procedure is detailed in Section 3.3. A complete PRISMA-style flow diagram, including final-corpus and snowballing yields, will be reported in the full version of this review.



Note: This flowchart reflects the work-in-progress status of the review. Screening decisions and exclusion reasons are documented in a structured extraction sheet.

Figure 1 Flow Diagram of the Review Process according to Shamseer et al. (2015)
Source: Authors' own compilation.

3.3 Methods

The reporting of the review follows the structured theme-based approach described by Paul and Benito (2018) and Paul et al. (2023) and proceeds in two complementary steps that consist of a descriptive bibliometric characterization of the corpus and a thematic analysis of the reviewed frameworks as methods applied to answer the research question posed.

3.3.1 Descriptive characterization

Following Mukherjee et al. (2022), descriptive information was extracted from each article using a structured data extraction form developed for this review. The extracted metadata comprise authorship and publication year, publication outlet, research design, application area, the digitalization technology or technology class under consideration, and the methodological family of the proposed framework. This descriptive layer provides the empirical basis for situating the corpus and identifying broad patterns in how the field has developed. Given the work-in-progress status of the corpus (cf. section 3.2), the descriptive layer is reported in the full version of this review.

3.3.2 Thematic analysis

The substantive analysis follows the thematic analysis procedure of Braun and Clarke (2006) in a chosen hybrid variant, which combines deductively derived themes with inductively emerging sub-themes (Boyatzis, 1998). The three organizational dimensions developed in Section 2.3 — uncertainty, multi-stakeholder dynamics, and process embeddedness — serve as the a priori themes against which each framework is coded. Within each theme, the coding proceeds inductively to identify the specific mechanisms through which the frameworks address (or fail to address) the respective dimension (Durach et al., 2021). To ensure the methodological rigor of the thematic analysis, the procedure was conducted in accordance with the trustworthiness criteria articulated by Nowell et al. (2017), which operationalize Lincoln's (1985) classical quality criteria of credibility, dependability, confirmability, and transferability.

To sharpen the analytical focus of the thematic analysis, the approach is complemented by the analytical perspective developed by Alvesson and Sandberg (2011) on the identification of assumptions underlying a body of research. This perspective directs attention beyond the surface features of the reviewed frameworks — their declared methods, criteria, and outputs — toward the often implicit assumptions they embed about the nature of the decision under investigation. Applied to the present review, this lens supports the identification of what the reviewed frameworks presuppose about uncertainty, stakeholder dynamics, and process embeddedness, and of how these presuppositions relate to the theoretical framings the frameworks explicitly invoke (if any).

3.3.3 Coding frame

The coding frame that operationalizes this analytical approach is presented in Table 3. It comprises three layers: a descriptive layer capturing the bibliometric and contextual characteristics of each study, a theoretical-framing layer capturing the theoretical lenses and assumptions invoked by the authors, and a dimensional layer operationalizing the three analytical dimensions from Section 2.3 into specific coding questions and outputs. A synthesis layer records the framework components proposed by each study and the theoretical contribution claimed. The coding outputs for the dimensional layer distinguish between explicit treatment (the dimension is theoretically or methodologically addressed in the framework), implicit treatment (the dimension is acknowledged or hinted at but not operationalized), and not addressed (the dimension is absent from the framework). Each coding entry is supported by a textual reference to the coded article to ensure confirmability (Nowell et al., 2017).

Table 3 Coding frame for the thematic analysis of the reviewed frameworks.

Layer	Code	Coding question	Output type
Descriptive	D1	Author(s), year, journal	Bibliographic
	D2	Research design / type of study	Categorical (conceptual, qualitative, quantitative, mixed, review)
	D3	Application area / empirical context	Textual
	D4	Digitalization technology / technology class under selection	Textual
	D5	Methodological family of the framework	Categorical (e.g., AHP, fuzzy AHP, TOPSIS, hybrid MCDM, optimization, AI-based, other)
Theoretical framing	T1	Stated theoretical lens or conceptual anchor of the framework	Textual
	T2	Stated research goal	Textual
	T3	Implicit assumptions about technology selection (cf. (Alvesson & Sandberg, 2011))	Textual
Uncertainty (2.3.1)	U1	How does the framework conceptualize uncertainty in the selection decision?	Textual
	U2	Which mechanism does the framework use to handle uncertainty (if any)?	Categorical (fuzzy aggregation / scenario analysis / sensitivity analysis / robustness / not addressed / other)
	U3	Treatment of uncertainty	Categorical (explicit / implicit / not addressed)
Multi-stakeholder dynamics (2.3.2)	M1	Who is involved in the decision process, and how are their roles differentiated?	Textual
	M2	How are competing or divergent evaluations handled?	Categorical (aggregation / negotiation / consensus / single decision-maker / not addressed)
	M3	Treatment of multi-stakeholder dynamics	Categorical (explicit / implicit / not addressed)
Process embeddedness (2.3.3)	P1	Is the operational process that the technology is intended to support explicitly referenced and sufficiently characterized?	Yes / No
	P2	Is fit between the technology and the operational process evaluated, and if so, at what point?	Categorical (prospective / during / retrospective / not evaluated)
	P3	Treatment of process embeddedness	Categorical (explicit / implicit / not addressed)
Synthesis	S1	Framework components (criteria, alternatives, method, outputs, decision-maker configuration)	Textual
	S2	Claimed (theoretical) contribution	Textual

Source: Authors' own compilation.

The coding frame was developed a priori on the basis of theoretical lenses and conceptual anchors underpinning this study and piloted on a small set of articles from the corpus, allowing refinements to the phrasing of coding questions before full application. The frame is applied uniformly across the corpus, and the coded data serve as the input for the synthesis presented in the following section.

4. Preliminary Results

The findings reported here are preliminary. They draw on a purposively selected pilot subset of three articles from the 52 records currently undergoing full-text assessment (cf. Section 3.2), and the analytical procedure does not yet correspond to the complete thematic analysis announced in Section 3.3. Following Braun and Clarke (2006), the present analysis concentrates on the earlier phases of their six-phase procedure — familiarization, systematic coding against the frame developed in Section 3.3.3, and the initial search for within- and cross-case patterns — while the later phases of reviewing, refining, and naming overarching themes are deferred until the corpus has stabilized. Sections 4.1 and 4.2 thus serve as an early, exploratory step toward the full thematic synthesis to be presented at the conference. The three cases were selected to maximize variation across methodological family, decision object, and empirical anchoring: one fuzzy AHP/TOPSIS framework comparing broad Industry 4.0 technology classes, one hesitant-fuzzy combinatorial framework for SSCF technologies, and one rough-MCDM framework applied to concrete blockchain platforms in a focal organization.

4.1 Per-Case Coding Profiles

The three pilot cases share an immediate similarity at the descriptive level. All three propose decision-making frameworks for the selection of digitalization technologies in supply chain settings; and all three rely on expert panels of comparable size (twelve to fifteen) for the elicitation of evaluative judgements. Beyond this, the cases diverge in ways that the coding frame makes visible.

The perishable-reverse-logistics case (Naseem et al., 2026) develops a two-stage framework that combines the Fuzzy Analytic Hierarchy Process (Fuzzy AHP) for criterion weighting with the Fuzzy Technique for Order of Preference by Similarity to Ideal Solution (Fuzzy TOPSIS) for alternative ranking. The framework is anchored conceptually in the Technology–Organization–Environment framework, which the authors extend by introducing scalability and social acceptance as two additional dimensions alongside the canonical technological, organizational, and environmental contexts. Fourteen sub-criteria are organized under the resulting five-dimensional structure and used to evaluate four named Industry 4.0 technologies: the Internet of Things (IoT), Blockchain, Automated Guided Vehicles (AGVs), and Big Data. The expert panel consists of fifteen participants — seven academics and eight senior managers — drawn from China and Pakistan and selected for diversity rather than for affiliation with a focal organization. The framework returns a closeness-coefficient ranking in which IoT leads ($CC_i = 0.668$), followed by Blockchain (0.618), AGVs (0.587), and Big Data (0.571). The framework is not anchored in any specific organization, sector segment, or operational process; the perishable reverse-logistics context is introduced as a motivating empirical setting but does not enter the evaluation procedure itself.

The Sustainable Supply Chain Finance case (Soni et al., 2022) combines hesitant fuzzy set theory with graph theory and the permanent function to evaluate combinations of digital technologies for Sustainable Supply Chain Finance in small and medium-sized enterprises. Four base technologies — IoT, cloud computing, big data, and analytics — together with all eleven possible combinations of these technologies, yield fifteen alternatives. The evaluation criteria comprise fourteen sub-criteria grouped under the three pillars of the Triple Bottom Line (economic, environmental, social), borrowed directly from Tseng et al. (2018). No organizational or management theory is invoked to anchor the criteria framework. The expert

panel of fifteen academics and practitioners from India is, as in Naseem et al., not anchored in a focal organization. The aggregated Sustainable Supply Chain Finance index ranks analytics as the highest-performing single technology (0.8902), with various combinations of analytics and complementary technologies populating the upper ranks.

The healthcare blockchain case (Erol et al., 2023) develops a novel multi-criteria decision-making framework that integrates an extent-analysis-based Rough Analytic Hierarchy Process (Rough AHP) for criterion weighting with Rough Compromise Programming for alternative ranking. The framework is applied to the selection of one among ten public blockchain platforms — ETHEREUM, BINANCE COIN, CARDANO, POLKADOT, VECHAIN, CHAINLINK, SOLANA, TRON, NEO, and EOS — for a Turkish healthcare group operating fifty facilities. In contrast to the other two cases, the framework is anchored in a focal organization: a "Project Committee" of eight members — comprising managers from the healthcare group's data-management and technology function, software product managers from a partnering blockchain start-up, and members of the authors' research team — defines the project requirements, selects the criteria, and produces the evaluative judgements, complemented by four external academic experts (a twelve-person panel in total). Ten generic platform properties (security, interoperability, community support, business reputation and resiliency, multi-functionality, developer availability, capacity, scalability, throughput, and latency) constitute the evaluation criteria; cost is deliberately deferred to a later stage of the project. ETHEREUM ranks first, followed by CARDANO and EOS. The case is also distinctive in two further respects: it is the only one of the three to embed a single-organization pilot, and the only one to validate the proposed methodology against five alternative configurations — crisp AHP, Fuzzy AHP, Rough AHP, crisp Compromise Programming, and Fuzzy Compromise Programming — through a comparative benchmarking analysis.

4.2 Cross-Case Observations Along the Three Dimensions

Reading across the three cases through the dimensional layer of the coding frame brings into view a set of patterns that are not visible from any single case in isolation. These patterns are reported below for each of the three dimensions developed in Section 2.3. During the pilot coding, one additional code emerged inductively that had not been anticipated in the a priori frame (Table 3): the use of robustness procedures as a distinct mechanism separate from the elicitation-internal handling of imprecision. This code (U3 — Robustness check) was added to the frame and is reported in Table 4.

Treatment of uncertainty (U1–U3). All three frameworks treat uncertainty as a property of expert judgement rather than as a property of the decision context itself. The technical mechanism through which judgmental imprecision is absorbed differs across the cases: triangular fuzzy numbers with centroid defuzzification in Naseem et al.; hesitant fuzzy elements in Soni et al.; and rough numbers with lower- and upper-limit intervals in Erol et al. Of the three, only Erol et al. articulate a substantive methodological rationale for their choice, framing rough numbers as preferable to fuzzy approaches because they "[employ] the original data without the need for supplementary information" (p. 7). Two of the three frameworks include a sensitivity analysis: Soni et al. vary the weights of the three Triple Bottom Line pillars, while Erol et al. conduct ten rounds of pairwise weight exchange among the ten criteria and report Spearman rank correlations across rounds; Naseem et al. report no sensitivity analysis. Erol et al. additionally validate their proposed method against five alternative configurations. Across the three cases, however, none engages with the informational uncertainty that surrounds the pre-adoption decision itself; the uncertainty addressed by all three frameworks is the uncertainty internal to the elicitation procedure.

Multi-stakeholder dynamics (M1–M3). All three frameworks rely on expert panels rather than on broader stakeholder configurations representative of the decision context. Panel size is comparable across the cases (twelve to fifteen participants), but composition and the

mechanism for handling divergent evaluations differ in theoretically interesting ways. The Naseem et al. panel was deliberately heterogeneous on professional background (academics and senior managers) and on national context (industrialized China and emerging-economy Pakistan); divergence among experts was resolved not by mathematical aggregation but by a structured consensus meeting in which the panel deliberated each pairwise comparison until a single collective judgement matrix was reached for each level of the hierarchy. The Soni et al. panel resolved divergence by majority voting with arbitration where no clear majority emerged. The Erol et al. panel relied on geometric-mean aggregation, with the rough boundary interval preserving the spread of expert judgement numerically rather than collapsing it into a single point estimate. Despite these procedural differences, none of the three frameworks integrates the broader stakeholder configurations they invoke at the framing level into the evaluation procedure itself: Naseem et al. reduce external stakeholders to a single sub-criterion ("Acceptance by communities and stakeholders"); Soni et al. treat stakeholders as criterion content within the social Triple Bottom Line pillar; and Erol et al. name seven supply chain members in the proposed blockchain architecture (medical research laboratories, hospitals, patients, insurance companies, medical equipment suppliers, pharmaceutical organizations, and government), yet the decision itself is made by twelve experts.

Process embeddedness (P1–P3). None of the three frameworks models the operational process the technology is intended to support, and none evaluates fit in process-specific terms. Each case invokes its operational context at the framing level only. Naseem et al. characterize perishability, cold-chain dependence, and rapid value deterioration as conditions that motivate the framework, but the fourteen sub-criteria evaluate generic technology properties rather than fit with reverse-logistics processes; the operational urgency that, in their own framing, distinguishes perishable reverse logistics from durable-goods reverse logistics does not enter the evaluation. Soni et al. do not address the underlying Sustainable Supply Chain Finance process at all; their criteria are sustainability performance dimensions rather than features of the financial flows the technology is meant to support. Erol et al. provide the most concrete process referent of the three, presenting a blockchain architecture diagram (their Fig. 2) that names the seven supply chain members and the data each holds; the operational processes through which these data are produced, exchanged, and acted upon are nevertheless not modeled, and the ten evaluation criteria are sector-agnostic platform properties — security, interoperability, scalability, throughput, latency, and so on — that could equally well be applied to any non-healthcare blockchain selection problem. Across the three cases, the operational process figures as setting rather than as referent — a stage on which the selection is made, not an object whose characteristics determine what fit could mean.

The cross-case comparison is summarized in Table 4. The interpretation of the patterns visible in the table is developed in Section 5.

Table 4 Cross-case comparison of the three pilot cases along the descriptive, theoretical-framing, and dimensional layers of the coding frame.

Layer/Code	Naseem et al. (2026)	Soni et al. (2022)	Erol et al. (2023)
Journal (AJG)	Journal of Enterprise Information Management (AJG 2)	Technological Forecasting and Social Change (AJG 3)	Technological Forecasting and Social Change (AJG 3)
D2 (Research design)	Mixed: SLR + 15-expert validation + Fuzzy AHP + Fuzzy TOPSIS	Conceptual model with working example (15 experts)	Methodological development + single-organisation case + sensitivity + comparative validation (12 experts)

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Layer/Code	Naseem et al. (2026)	Soni et al. (2022)	Erol et al. (2023)
D3 (Application context)	Reverse logistics for perishable goods; no firm case (China + Pakistan expert panel)	Sustainable SCF for SMEs; no firm case (India expert panel)	Healthcare supply chain at one Turkish healthcare group (50 facilities)
D4 (Decision object)	Four named I4.0 technologies as classes (IoT, Blockchain, AGVs, Big Data)	Four base technologies (IoT, cloud, big data, analytics) plus eleven combinations (15 alternatives)	Ten named blockchain platforms as concrete software products (ETHEREUM, CARDANO, EOS, ...)
D5 (Methodological family)	Fuzzy AHP + Fuzzy TOPSIS (centroid defuzzification, no sensitivity analysis)	Hesitant fuzzy sets + graph theory + permanent function (TBL-weight sensitivity analysis)	Rough AHP-Extent + Rough Compromise Programming (10-round sensitivity, comparative benchmark vs. 5 alternatives)
T1 (Stated theoretical lens)	Technology–Organization–Environment framework, extended with scalability and social acceptance dimensions	None from organisational or management theory; TBL borrowed from Tseng et al. (2018) for criterion structuring	None from organisational, management, or technology adoption theory; mathematical anchors only (rough sets, AHP, CP)
T2 (Stated goal)	Prioritise I4.0 technologies for RL in perishable-goods SCs	Select most suitable I4.0 technology(ies) for SSCF in SMEs	Pick most suitable BP for the healthcare group's blockchain implementation
U1 (Conceptualization of uncertainty)	Subjectivity and imprecision of expert judgement under “complex, interrelated criteria” and limited data availability	Hesitation among experts in assigning preference values	Vagueness and subjectivity in expert judgement (“subjective or ambiguous human ideas”)
U2 (Mechanism)	Triangular fuzzy numbers; centroid defuzzification; consistency-ratio threshold 0.10	Hesitant fuzzy elements (sets of possible membership degrees); expected-value transformation	Rough numbers (lower limit, upper limit, boundary interval); Eqs. 1–6
U3 (Robustness check)	None reported	Sensitivity analysis on the weights of the three TBL dimensions	10-round sensitivity analysis with Spearman correlations across rounds; comparative benchmark vs. crisp/fuzzy/rough AHP and crisp/fuzzy CP
U4 (Treatment)	Explicit at mechanism level; constitutive uncertainty not addressed	Explicit at mechanism level; constitutive uncertainty not addressed	Explicit at mechanism level and method-comparative; constitutive uncertainty not addressed
M1 (Decision-maker configuration)	15 experts: 7 academics + 8 senior managers; China + Pakistan; ≥15 years' experience	15 experts: 8 academics + 7 industry practitioners; India; ≥10 years' experience	12 experts: 8 Project Committee members (2 start-up PMs + 3 researchers + 3 managers from focal HO) + 4 external academics; Turkey

Layer/Code	Naseem et al. (2026)	Soni et al. (2022)	Erol et al. (2023)
M2 (Handling of divergence)	Structured consensus meeting; explicit refusal of mathematical aggregation; iterative refinement until consistency satisfied	Majority voting with arbitration where no clear majority	Geometric-mean aggregation; rough boundary interval preserves spread numerically
M3 (Treatment)	Explicit at panel-level mechanism; broader stakeholders enter only as criterion SA3	Implicit; stakeholders enter as criterion content in social TBL pillar (SC1–SC5)	Implicit; broader 7-actor architecture invoked but does not enter the decision procedure
P1 (Operational process referenced and characterized?)	Referenced (perishability, cold chain, value deterioration in framing); not modelled	Not addressed	Architecture (Fig. 2) names 7 supply chain members and their data; operational processes not modelled
P2 (Fit between technology and process evaluated?)	Not evaluated; criteria are generic technology properties	Not evaluated; criteria are TBL-categorised sustainability dimensions	Not evaluated; criteria are sector-agnostic platform properties; cost deliberately deferred
P3 (Treatment)	Not addressed (framing-level invocation only)	Not addressed	Not addressed (framing-level invocation only)
Top-ranked alternative	IoT (CCi = 0.668), then Blockchain (0.618), AGVs (0.587), Big Data (0.571)	Analytics (SSCF index = 0.8902)	ETHEREUM (1st), CARDANO (2nd), EOS (3rd); VECHAIN, NEO, TRON last
S2 (Claimed contribution (authors' own framing))	Criteria-driven framework integrating TOE with fuzzy MCDM for perishable RL; methodological + sectoral	Hesitant-fuzzy framework with TBL criteria for SSCF in SMEs; methodological	Novel rough MCDM framework (RAHP-E + RCP), validated through sensitivity and comparative analyses; predominantly methodological

Source: Authors' own compilation.

5. Discussion

The three pilot cases were selected to test the operability of the coding frame, not to support generalizable claims about the literature. They nevertheless converge on a pattern that is worth flagging at this stage of the review. Across the three cases, uncertainty is consistently treated as judgmental rather than informational; stakeholder heterogeneity is consistently handled as an aggregation problem rather than as a political process; and the operational process the technology is intended to support consistently figures as setting rather than as referent. Each of these moves displaces, rather than addresses, the dimensions developed in Section 2.3 as constitutive of pre-adoption technology selection.

The displacement itself is theoretically informative. The uncertainty that fuzzy, hesitant fuzzy, and rough-set procedures absorb is the imprecision internal to expert elicitation, not the Knightian (1965) inability to assign probability distributions to outcomes that characterizes pre-adoption decisions, nor the ambiguity, fluid participation, and preference-formation-in-process that Cohen et al. (1972) describe. The aggregation procedures applied to expert panels — geometric mean, structured consensus, majority with arbitration — operate on the assumption that preferences are pre-formed inputs to be combined, yet the political-process scholarship from Cyert and March (2020) through Pettigrew (2014) treats preferences as outcomes of the decision process itself. And the absence of a process referent in the evaluation

procedure forecloses, at the level of framework design, the question that socio-technical systems theory (Bostrom & Heinen, 1977) places at the center of meaningful technology evaluation, namely the question of what fit means.

These observations are consistent with the broader orientation of the review literature identified in Section 1, which has emphasized methodological refinement of preference elicitation and ranking mechanics rather than reflection on the organizational conditions under which selection decisions are made. The three pilot cases suggest that this orientation is reproduced at the level of individual frameworks. Whether the pattern holds across the full corpus is the question the completed review will address. If it does, the implication for future framework development is not that fuzzy or rough-set procedures should be abandoned — they handle the imprecision they were designed to handle — but that the boundaries of what they can address need to be made theoretically explicit, and that further development should engage the organizational dimensions on which fit ultimately depends.

6. Conclusions and Future Research

This work-in-progress paper has presented the methodological protocol for a systematic literature review of decision-making frameworks for the selection of digitalization technologies, the coding frame derived from three organizational dimensions of pre-adoption technology selection, and a pilot application of the frame to three purposively selected cases drawn from the corpus currently undergoing full-text assessment. The pilot serves to demonstrate the operability of the coding frame and to surface the kinds of patterns that the completed review will be in a position to elaborate; the substantive contribution claimed at this stage is therefore methodological and exploratory rather than evaluative.

Several limitations follow from the work-in-progress status of the review and should be acknowledged. The corpus has not yet stabilized, the snowballing stage has not yet been conducted, and the three pilot cases provide no basis for generalizable claims about the broader literature. The reliance on a single database (Web of Science), although justified in Section 3.1 and complemented by planned snowballing, narrows retrieval at the identification stage. The thematic analysis presented here covers only the earlier phases of the procedure outlined in Section 3.3 and does not yet include the development and refinement of overarching themes.

Three lines of future work follow directly. First, the full-text assessment of the remaining records will be completed and the snowballing stage conducted, after which the final corpus, including a complete PRISMA flow diagram, will be reported. Second, the coding frame will be applied uniformly across the stabilized corpus, and the thematic analysis will be carried through to its later phases, including the identification, review, and naming of overarching themes along the three dimensions. Third, the synthesis layer of the coding frame will be used to consolidate the framework components observed across the literature — decision criteria, technology alternatives, decision-making methods, process relationships, and decision-maker configurations — into an integrated assessment that delineates the building blocks on which future framework development can build.

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THE EMERGENCE OF ARTIFICIAL INTELLIGENCE (AI) INDUCED JOB DEMANDS: INITIAL INSIGHTS FROM A PILOT STUDY

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Abstract

This pilot study examines how the increasing integration of artificial intelligence in the workplace reshapes job demands from a Human Resource Development perspective. While prior research has identified various AI-induced job demands, these are predominantly examined in isolation, limiting a more comprehensive understanding of their development and interrelationships over time. To address this, this pilot study provides initial insights into how AI-induced job demands emerge and how they may be interrelated in an organizational context. Building on an exploratory perspective, the study is part of a larger ongoing research project and follows a qualitative pilot study approach. Data were collected during the early phase of AI implementation using semi-structured interviews, observations, and archival data. The findings suggest that AI-induced job demands do not occur as isolated requirements but begin to emerge in interconnected ways, with initial patterns indicating potential relationships between different types of demands. This study contributes to the literature by offering an initial understanding of the dynamic nature of AI-induced job demands and by highlighting the importance of moving beyond isolated perspectives. The results provide initial insights for future research aimed at developing more integrative explanations of AI-related changes in the workplace.

Keywords: *Artificial Intelligence; Job Demands; Human Resource Development; Pilot Study*

Introduction

Understanding both current and evolving job demands has long been fundamental in Human Resource Development (HRD) (Kim & Christensen, 2017). This is because, depending on how they are understood and addressed, job demands may function either as stressors that impair employee health and performance or as drivers of learning and development (Demerouti & Bakker, 2023).

The digital transformation of work, in which the growing use of AI in the workplace is part of, renews interest among HRD researchers and practitioners in this topic (Bankins, et al., 2024b; Lee, 2023). As AI-based tools and solutions are used in employees' daily routines, this apparently indicates new or changing work requirements (Chuang, 2024).

In light of this, first studies have begun to investigate the impact of this situation on current and future job demands (Bakker et al., 2023; Harju et al., 2021). These studies highlight different AI-induced job demands such as continuous upskilling to keep pace with technological change (Bishnoi et al., 2023), cognitive processing of AI outputs (Tursunbayeva & Renkema, 2023), ethical accountability when using AI tools (Akpuokwe et al., 2024), and managing AI-induced stress (Loureiro et al., 2023). Taken as a whole, these studies have provided promising insights into different AI-induced demands.

However, current research has largely examined AI-induced job demands from relatively isolated perspectives, focusing on individual demands rather than their interrelationships (Juyumaya & Torres, 2023). As a result, this approach tends to treat AI-induced job demands as disjointed work-related requirements, thereby obscuring their developmental dynamics and potential interrelationships. This may be problematic, as treating AI-induced job demands as isolated requirements risks producing oversimplified or potentially flawed assessments of AI's impact on work. Over time, such assessments may constrain meaningful progress toward more integrative and dynamic explanations of this topic.

From a practical perspective, organizations may lack clarity regarding the developmental patterns and interconnections of AI-induced job demands. Consequently, isolated findings may be difficult to prioritize and translate into coherent action, potentially hindering organizations' ability to systematically understand and strategically address these demands (Bankins et al., 2024b).

Recent scholars like Glebova et al. (2024) and Koponen et al. (2023) have sought to address this situation and has stressed the need for a more integrative explanation of AI-induced job demands in organizational contexts. For instance, Glebova et al. (2024) identified and listed AI driven emerging job demands, including accountability, adaptability, programming skills, and data analytics. Similarly, Koponen et al. (2023) identified and structured AI-induced work requirements for middle managers, including increased monitoring of AI systems, intensified information processing, emotional and change management demands, and the need to coordinate human AI collaboration.

While these studies represent important steps toward a more integrative perspective and offer initial attempts at structuring AI-induced job demands, their primary focus lies on identifying and categorizing such demands rather than examining how they develop over time and potentially relate to one another as AI becomes embedded in everyday work.

Moreover, the process through which the implementation and actual use of AI reshape employees' work and job demands over time remains insufficiently understood. This study, which is part of a larger ongoing research project, seeks to initially address this problem by providing initial insights into how AI use reshapes job demands within an organizational context. The focus is placed on exploring how AI-induced job demands emerge and how they may be interrelated over time. As a pilot study, the research follows an exploratory approach and aims to contribute to a more integrative understanding of AI-induced changes in work. Accordingly, the study is guided by the following research question:

How can the emergence and interrelation of AI-induced job demands be initially understood in an organizational context?

To address this question, an exploratory qualitative approach was conducted in an organizational setting. This approach enables an exploration of emerging phenomena in their real-world context and is particularly suitable for capturing dynamic developments. Data were collected during the early phase of Generative AI implementation using semi-structured interviews, observations, and archival data.

Methodology

This pilot study adopts an exploratory qualitative approach according to Merriam and Tisdell (2016) as part of a larger ongoing research project. Pilot studies are particularly useful for generating initial insights into emerging and insufficiently understood phenomena and for informing subsequent, more comprehensive research efforts (Turner, 2005). Given the still limited understanding of how AI-induced job demands emerge and relate to one another in organizational contexts, the study aims to contribute an initial understanding of this phenomenon. As a pilot study, the research follows an exploratory qualitative approach that is

particularly suited to investigating emerging and dynamic processes in real-world organizational settings (Merriam & Tisdell, 2016). The study was conducted in a medium-sized organization during the early phase of Generative AI implementation, where employees from different functional areas had begun integrating Microsoft Copilot into their daily work. Data were collected during the early phase of AI implementation, enabling the pilot study to capture initial changes in work practices and the early emergence of AI-induced job demands. Data collection was based on semi-structured interviews according to Witzel and Reiter (2012) with different employees working with AI-supported systems across different roles and functions. A total of four employees from different functional areas participated in the interviews. Participants were purposively selected based on their direct involvement in the early use of Microsoft Copilot within their daily work activities. The pilot study was conducted during the first two months following the introduction of Microsoft Copilot, allowing the research to capture employees' initial experiences and emerging AI-induced job demands. The interviews focused on capturing employees' experiences regarding AI-related changes in their daily work, using an interview guide developed from the existing literature. The interview guide addressed perceived changes in work practices, emerging AI-induced job demands, and employees' experiences with AI integration. Follow-up questions were used to clarify and further explore participants' responses where necessary. In addition, observational data were collected following Czarniawska (2007), by shadowing employees in their everyday work activities, asking questions during the process, and selectively engaging in minor tasks to gain deeper insights into actual practices and interactions with AI systems. Archival data, such as internal documents and project materials related to the AI implementation, were included to provide contextual background. The data were analyzed using an exploratory qualitative approach aimed at identifying initial patterns in the data (Merriam & Tisdell, 2016). In line with qualitative data analysis as described by Merriam and Tisdell (2016), the analysis followed an inductive and iterative process in which data collection and analysis were closely intertwined. The researchers engaged in repeated readings of the data to identify meaningful units and to develop initial emerging patterns. Consistent with the exploratory nature of this pilot study, the analysis focused on how AI-induced job demands begin to emerge and how initial relationships between different demands can be observed. Trustworthiness was enhanced through data triangulation by combining interview, observational, and archival data. Furthermore, the iterative analysis process and repeated engagement with the data supported the credibility of the emerging findings. The analysis provides preliminary insights that inform the ongoing research project.

Results

The analysis provides preliminary insights into how AI use begins to reshape work practices and how related job demands may start to emerge in an organizational context. Rather than appearing as fully formed and clearly structured requirements, the findings suggest that AI-induced changes unfold gradually and are embedded in ongoing organizational dynamics. Across the data, AI use appears to enter the organization in a gradual and somewhat unstructured manner. Rather than being introduced solely through formal top-down initiatives, its adoption seems to develop through a combination of organizational attention, performance-related expectations, and individual experimentation. Participants described early AI use as exploratory and, at times, uncoordinated, as tools are tested and integrated into daily tasks without clear guidelines. This early phase is characterized by curiosity, but also by uncertainty regarding appropriate use and potential implications. As AI use becomes more embedded in daily work, initial tensions begin to surface. While AI is associated with efficiency gains and support in task execution, participants simultaneously described an increasing sense of responsibility for managing its use. This includes reflecting on what information can be

shared, how outputs should be interpreted, and where potential risks may arise. One participant, for instance, emphasized the need “to ensure that it goes in the right direction,” indicating an emerging awareness of responsibility in handling AI-related tasks. These early observations suggest that AI use may introduce new forms of accountability alongside its perceived benefits. The data further indicate that AI alters how employees interact with technology in their daily work. Rather than being experienced as a conventional tool, AI appears to require more active engagement and guidance. Participants described that effective use depends on how inputs are formulated and how interactions are structured. As one informant noted, “you have to work with it differently than when I just use Google,” highlighting that AI interaction involves a more iterative and reflective process. This suggests an initial shift from straightforward task execution toward more interactive and adaptive forms of engagement. In addition, there are early indications that AI use influences how work is cognitively approached. Participants reported that AI outputs cannot be taken at face value but require ongoing verification and critical reflection. One participant described this by stating that “you definitely need to question the outputs,” emphasizing the need for continuous evaluation. At the same time, some participants indicated that their work increasingly involves interpreting AI-generated information and understanding broader contexts rather than relying solely on their own knowledge. These observations point toward a potential shift in how knowledge is used and applied in everyday work. Beyond individual task execution, the findings also suggest that AI use may have implications for collaboration and coordination. Participants described that AI is often initially used individually, which can lead to fragmented practices across teams. At the same time, there are early signs that shared practices and collective approaches to AI use become increasingly relevant over time. This includes exchanging knowledge about effective usage and aligning ways of working within teams. Finally, the data indicate that AI integration is accompanied by an ongoing need for adaptation. Participants described that working with AI requires continuous learning and adjustment, both in terms of developing new skills and adapting to evolving work processes. While some experience this as an opportunity for exploration and growth, others reported uncertainty and strain associated with continuous change. This suggests that the emergence of AI-related changes in work may be experienced differently across individuals. Taken together, these preliminary findings suggest that AI-induced job demands do not emerge as isolated or static requirements. Instead, they appear to develop gradually, shaped by organizational context, patterns of use, and individual sensemaking.

Discussion

This study provides preliminary insights into how AI-induced job demands begin to emerge and evolve within an organizational context. The findings suggest that these demands develop gradually and are embedded in ongoing organizational practices, unfolding through everyday use rather than appearing as clearly defined and stable requirements.

A central insight concerns how AI use enters and spreads within the organization. While prior literature often emphasizes top-down implementation processes driven by management decisions, the findings of this study suggest a more nuanced picture. In addition to formal initiatives, AI use also emerges through employee dynamics, as employees independently experiment with and integrate AI tools into their daily work. This indicates that the introduction of AI is not solely a controlled organizational process, but also shaped by informal adoption practices.

The findings further suggest that AI-induced job demands do not emerge as isolated elements (Glebova et al., 2024; Koponen et al., 2023), but rather develop gradually in relation to the extent and intensity of AI use. As employees increasingly engage with AI systems, new

demands begin to surface and evolve over time. Importantly, these demands appear to be interconnected and influencing one another.

In addition, the findings highlight that the emergence of AI-related job demands is associated with experiences of uncertainty and performance pressure. Employees describe situations in which they are required to adapt to new ways of working, often without clear guidance or established routines. While some perceive these changes as opportunities for learning and development, others experience them as demanding and, at times, stressful. This suggests that AI-induced job demands may involve both cognitive and emotional challenges, particularly in early phases of implementation.

Taken together, these findings contribute to the existing literature on AI and work (Bankins et al., 2024a) by emphasizing the processual and emergent nature of job demands. While prior research often conceptualizes job demands as relatively stable characteristics of work, the present study suggests that, in the context of AI, they may develop dynamically over time and in close interaction with actual usage practices.

From a theoretical perspective, these insights point toward the need to further consider the dynamic and evolving nature of job demands in models such as the Job Demands-Resources (JD-R) model (Demerouti et al., 2001). The findings suggest that AI-induced job demands may not be adequately captured as static factors, but rather as developing and interrelated elements that change over time. This indicates that future research could benefit from a more process-oriented perspective on job demands in contexts of technological change.

This study is subject to several limitations. As an exploratory pilot study conducted within a single organizational context, the findings are based on a limited empirical scope and reflect early-stage observations of AI implementation. Accordingly, the insights are closely tied to the specific organizational setting in which the study was conducted. While this context-sensitive approach allows for an in-depth understanding of emerging processes, it also means that the findings should be interpreted with regard to their situated nature.

At the same time, these limitations point to opportunities for future research. As this pilot study forms part of a larger ongoing research project, the preliminary findings presented here provide the foundation for subsequent research phases that will further examine and refine the development and interrelationships of AI-induced job demands. Further studies could examine how AI-induced job demands evolve over longer periods of time and across different organizational contexts. This would allow for a deeper understanding of the dynamic development and potential interrelations of such demands. In addition, future research could aim to further specify and validate the emerging patterns identified in this study, for example by combining qualitative and quantitative approaches.

Conclusions and Implications

This study provides initial insights into how AI-induced job demands emerge and evolve in organizational contexts. Rather than appearing as predefined and stable requirements, the findings suggest that these demands develop gradually through everyday use and are shaped by interaction, sensemaking, and organizational context. From a theoretical perspective, the results indicate that AI-induced job demands may be more dynamic and interrelated than commonly assumed in existing research. This highlights the need to further explore process-oriented perspectives on job demands, particularly in the context of ongoing technological change. From a practical perspective, the findings suggest that organizations should not view AI implementation as a purely technical or top-down process. Instead, attention should be given to how employees actively engage with AI in their daily work and how emerging demands, such as uncertainty, responsibility, and adaptation, can be supported through appropriate structures and guidance.

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CREATIVE PEDAGOGY WITH AI: DESIGNING AND EVALUATING THE MOJIQ AI CHATBOT FOR CAREER PREPARATION IN HIGHER EDUCATION

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Abstract

The advances in Generative Artificial Intelligence (GenAI) applications have transformed digital workplaces and pedagogical approaches used to prepare students for future careers. This study presented the design and evaluation of the Mojiq AI Chatbot, an AI-powered conversational agent platform that was developed to support career preparation in higher education classrooms. The chatbot was designed not merely as an information provider but as a creative learning partner that supported students' career exploration, self-reflection, and professional communication skills, such as CV development and Mock Job interview sessions. This study adopted a design-and-evaluation approach. First, we described the pedagogical rationale and conversational design principles underpinning Mojiq AI, including generative feedback, personalized career mockup simulation, and iterative reflective prompts. Next, the chatbot was implemented in a career preparation course for 3rd- and 4th-year undergraduate students during one academic term. To evaluate its impact, we collected mixed-methods data, including surveys, student reflections, and measures of perceived career readiness. Quantitative results showed that students viewed the chatbot as helpful, especially in areas such as supporting idea development, augmenting classroom dialogue, providing personalized feedback, and supporting creative pedagogy. Qualitative results revealed that students viewed the chatbot as a helpful tool for facilitated reflection on career goals, critical feedback, and improvement in confidence and interview preparation.

Rather than replacing instructors, Mojiq AI served as a co-creative agent that augmented classroom dialogue and enabled personalized feedback. This study contributed to research on digital creativity in education by demonstrating how generative AI chatbots could be intentionally designed and evaluated as helping tools for creative pedagogy. Implications for human-AI collaboration in higher education and future research directions were discussed.

Keywords: *Creative Pedagogy, Generative AI In Education, AI Chatbot, Career Preparation, Human–AI Interaction*

Introduction

The recent development of generative artificial intelligence (AI) tools is potentially transformative for both education and work, although it is also highly contested. Opinion studies among university professors have revealed that there is a lot of conflicting evidence and opinions about how best to use AI in the classroom (Lee et al., 2024). One of the most promising applications of AI so far has been as a career preparation tool, helping students build skills and confidence and supporting student self-reflection, career exploration and other

activities. For example, AI-based tools have been shown to contribute to student awareness of their current career preparation and skills gaps (Lai, Gagero, Zhang, Sze, & Lim, 2026) and to help students prepare more effectively for interviews (Lewton & Haddad, 2024). This suggests that use of AI as a career preparation tool may be one of the most effective ways to use AI in the classroom to support students' future goals. We have developed a tool called the Mojiq AI Chatbot, which is a co-creative tool to support career exploration, introspection and application and interview preparation. The purpose of this study is to investigate the effectiveness of the Mojiq AI Chatbot in assisting third and fourth year university students.

Literature Review

Generative AI in Higher Education

Over recent years, generative AI has been far developed to serve students' and teachers' needs. Thanks to the development of large language models (LLMs), the AI chatbot is now capable of learning activities that require reflection, explanation, and feedback (Labadze et al., 2023). They can give personalized feedback and adjust themselves to fit each user's learning pace. Students can ask questions, revise their answers, ask follow-up questions, and improve their work as much and as often as they want. This is helpful for students who lack confidence (Labadze et al., 2023; Wollny et al., 2021).

Career Readiness in Higher Education

In higher education, preparing students for their future careers is not less important than serving academic content, especially in this era when soft skills such as communication, negotiation, critical thinking, or even the ability to understand ourselves and clearly explain to employers are considered very important (National Association of Colleges and Employers [NACE], 2024).

However, many students still experience difficulties in this career preparation. Some students cannot clearly explain their skills and experiences. Some lack confidence in job interviews, while others are unsure whether the career path they are pursuing exactly matches their interests.

AI-Supported Career Preparation

To solve the aforementioned needs, AI tools have been developed to support students' career preparation in several ways.

- **By providing personalized support.**

Different students need different support. Some might struggle with the interview process, while others might find it difficult to polish their resumes. In this way, AI can respond to individual learning needs (Labadze et al., 2023).

- **By supporting self-reflection and turning general experiences into clear career narratives.**

The chatbot can help students by asking reflective questions and providing feedback in a less judgmental environment. Instead of only correcting students' answers, chatbots can help students develop their ideas further. For example, a chatbot may ask students to describe their experiences more clearly or connect their skills to a specific job position. Through this process, students are likely to improve their ideas step by step (Chompunuch et al., 2026; Labadze et al., 2023).

- **By increasing opportunities for repeated practice outside the classroom.**

A single workshop provided by a university might not be enough for some students who lack confidence. In this case, an AI chatbot will play a role in acting as an interviewer so that the students can have an unlimited number of mock interviews.

Human-AI Collaboration

Several studies suggest that AI today has transformed from being a support tool to an interactive learning partner for humans. AI can give feedback, ask questions, organize ideas, and support repeated practice. However, humans are still needed to set goals, interpret suggestions, make decisions, and take responsibility for learning outcomes. This idea is consistent with the view of AI as a helper or partner, where humans and AI support each other instead of replacing each other (Chompunuch et al., 2026; Davis et al., 2016; Karimi et al., 2018).

Educational Chatbot Designing

The design of educational AI chatbots should be based on both technology and pedagogy. Here are the five keys that AI chatbots can use to prepare students for their job applications.

- **Personalized feedback:** The chatbot should provide suggestions that are connected to students' answers, goals, and experiences. This helps students receive feedback that is more relevant to their personal needs.
- **Iterative learning:** The chatbot should allow students to revise their CVs, improve their interview answers, and try again as many times as they need.
- **Reflective prompts:** The chatbot should include questions that encourage students to think more deeply about their strengths, career goals, and professional identity. These prompts can support self-reflection and clearer career planning (Labadze et al., 2023).
- **Simulation-based learning:** The chatbot should be able to simulate mock job interviews so that they have a chance to practice explaining themselves and not be frightened when meeting with difficult questions from real interviews.
- **Usability and trustworthiness:** The chatbot should be easy to use and reliable. Students should understand how to interact with it, while instructors should guide students on how to use AI with responsibility as well as explain the purpose of the chatbot, provide examples of effective prompts, and remind students to evaluate AI feedback critically (Miao & Holmes, 2023).

Evaluating AI Chatbots in Educational Settings

To fairly judge whether the chatbots positively impact students' career readiness, researchers should evaluate both quantitative and qualitative data. The former can be the ordinal scale results from the surveys that measure students' perceptions of usefulness, confidence, engagement, and readiness. The latter can be descriptive outcomes such as student experience, reflection, or how the chatbots support their learning.

While a mixed-methods approach is useful for understanding both measurable outcomes and deeper student experiences in AI-supported learning, Wollny et al. (2021) argue that education research still requires stronger evaluation designs.

Research Gap

Although AI chatbots have been increasingly studied in education, many studies still focus on general learning support, tutoring, administration, or information delivery. This area of research is relatively advanced, with tools like the CHAT-ACTS pedagogical framework emerging to facilitate the use of chatbots in education (Ballantyne et al., 2025). There is still limited research on how GenAI chatbots can support career preparation in higher education through creative and reflective dialogue (Labadze et al., 2023; Wollny et al., 2021). These early explorations of chatbot use in career preparation have predominantly focused on the utility of chatbots as reflection partners, rather than potential role play tools or information sources. Furthermore, the studies have mainly drawn on earlier chatbot implementations, which were not as powerful or flexible as those available today. Therefore, they do not truly reflect the current situation of chatbot use for career preparation.

This study addresses this gap by designing and evaluating Mojiq AI Chatbot as a co-creative learning partner in a career preparation course. The chatbot is designed to support career exploration, CV development, mock job interview practice, self-reflection, and creative confidence. Rather than replacing instructors, Mojiq AI aims to support classroom dialogue and provide personalized feedback to students. This research contributes to understanding the use of current chatbot tools in a broader set of career preparation goals, extending prior knowledge on chatbots as potential tools through an exploratory study.

Methodology

The Mojiq AI Chatbot was built on a local installation of Gemma 4.0, an open large language model (LLM) developed by Google DeepMind. Gemma 4.0 was selected because it balances ease of use and installation and compatibility with consumer-grade computing hardware with multimedia input and a context window of up to 256K context window (GoogleAI, 2026). Gemma 4.0 was installed on a central server which could be accessed via a Web interface from a controlled number of machines. The chatbot was designed with a specific system prompt which specified aspects of the context, tasks students could undertake (i.e., career readiness advice and reflective guidance, confidence improvement, and interview preparation). The system prompt also included specific safety guardrails, which were designed to keep students on-task and to redirect interactions outside the scope of the chatbot's intent (career planning and reflection). The system prompt also detailed specific personas to use during interview role play, which reflected real-world personalities and experiences.

Effectiveness of the Mojiq AI Chatbot was tested in a quasi-experimental study, in which a single group is used without control group (Jones & Montgomery, 2020). A sample of 88 final year undergraduate students were recruited from three faculties. These students were in either their third or fourth year, depending on faculty and specific program. Participants were asked to use Mojiq AI Chatbot in a single session, which could last up to 30 minutes.

They were given guidance on how to use the chatbot and offered three specific scenarios (general career readiness advice, interview preparation, and reflective evaluation of career goals), which they could explore as they wished. Following the scenario, data was collected using two instruments, including a short quantitative survey and a one-page reflective essay in which students were asked to consider how their experience with Mojiq AI Chatbot affected their sense of career readiness, confidence, and preparation. Quantitative questions were structured as five-point Likert scales, with values indicating: 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; and 5 = strongly agree. Quantitative data from the survey was analyzed using descriptive statistics. The qualitative data was analyzed using thematic analysis. The qualitative and quantitative data are synthesized in this research to provide a detailed view of the efficacy of the Mojiq AI Chatbot for career preparation.

Results

Sample. The sample (n = 88 students) included 50 male students and 38 female students. The sample was drawn from faculties including Business Administration (n = 34), Architecture (n = 26), and Entrepreneurship (n = 28). While not fully representative of the student population, this constituted a good spread between different faculties.

Quantitative Results. (Table 1) Overall, students felt positively about their experience with Mojiq AI Chatbot and its effect on their career preparation. Students were most likely to agree that their chatbot experience augmented classroom dialogue on career preparation, supported development of their ideas and career goals, provided personalized feedback on their own preparation, and supported creative pedagogy for career preparation. They were also likely to agree that the chatbot enhanced creative confidence and facilitated human-AI collaboration. They were least likely to agree that the chatbot acted as a co-creative agent,

however. Something to note is that there was a bimodal distribution between responses on “Acting as a co-creative agent”, with students feeling either very strongly or very negatively about this question. This caused a relatively high standard deviation compared to the other values, which were more closely distributed.

Qualitative results. The thematic analysis revealed two significant themes: supporting reflective evaluation on career choices and developing interview confidence. On supporting reflective evaluation, students provided feedback like:

- “I felt like talking to the chatbot helped me work out what I really wanted.” (Maree)
- “I was thinking, and it was pushing back to help me think harder and make a better choice.” (Ji)

On developing interview confidence, students said:

- “I used it for interviews, and it helped me get better at answers.” (Mark)
- “I think I feel more confident now for interviews, like I know what kinds of questions might be asked and how I should answer them.” (Mai)

Table 1 Analysis of survey results: Mojiq Chatbot Effectiveness

Mojiq AI Chatbot can help...	Mean	Std. Deviation	Interpretation of Mean
Enhancing Creative Confidence	4.13	0.63991	Agree
Supporting Idea Development	4.26	0.61578	Strongly Agree
Acting as a Co-Creative Agent	3.55	1.09239	Agree
Augmenting classroom dialogue	4.27	0.67342	Strongly Agree
Providing Personalized Feedback	4.23	0.63838	Strongly Agree
Supporting Creative Pedagogy	4.23	0.70674	Strongly Agree
Facilitating Human–AI Collaboration	4.13	0.84163	Agree

Discussion

This exploratory study of the Mojiq AI Chatbot revealed that it did have positive effects as a career development tool, especially helping students build confidence, engage in reflective evaluation and develop ideas about their career goals, and offering personalized feedback to improve their outcomes. This is consistent with prior studies on the use of AI chatbots and other tools for career preparedness (Lai et al., 2026; Lee et al., 2024; Lewton & Haddad, 2024). The exploratory study suggests that AI chatbots may also have a role in encouraging and developing reflective practice, which has not been investigated as much in prior research. This is something which deserves further study, as reflective practice is crucial for adult learners (Coryell, Baumgartner, & Bohonos, 2024).

The findings also recall the importance of AI in supporting creativity and personal reflection in the classroom and in students’ self-directed learning, but were not as strong on co-creativity. Prior research has suggested that AI is best positioned in the classroom as a helper or co-creator, assisting students in creative learning rather than directing them (Chompunuch et al., 2026; Davis et al., 2016; Karimi et al., 2018). Within this research there was little sign that students felt directed, although they were also only mildly positive about the chatbot’s role as a co-creative agent. While this could be due to student understanding of what co-creation is, it is also possible that the chatbot or the tool does not lend itself to co-creation. This is another area for further study.

Conclusion and Implications

In this research, we conducted an exploratory quasi-experiment to investigate the efficacy of the Mojiq AI Chatbot, a tool developed to support student career preparation. The outcomes showed that students found the chatbot an effective tool for developing confidence (particularly with interview preparation) and for supporting reflective evaluation of career

goals. They also felt it supplemented classroom material, although they were less certain about the chatbot's value as a co-creation tool. This study showed that the chatbot approach can be an effective supplementary tool for career preparation, enabling students to participate in self-guided exploration, reflection, and preparation for their own careers and supporting classroom learning.

The practical implication of this study is that specially designed career preparation tools are worth investigating as a pedagogical support, particularly for students who are entering the workplace. By providing students with tools like Mojiq AI Chatbot, lecturers can better prepare students, help them identify their own career direction, and help them build confidence in areas like interview planning. However, practitioners implementing chatbots must take care to monitor output quality and carefully guide student use, as well as establishing a clear set of ground rules for the chatbot itself. This is a matter of student safeguarding as well as ethical use of chatbots, and should not be overlooked.

More research is needed into AI chatbots and how they can support career preparation, especially with respect to co-creation and co-creativity, but there is now strong support for making practical use of these tools in the classroom. Additionally, there is a need to critically evaluate educational chatbot outputs for helpfulness, accuracy, and hallucination and instruction following issues. This evaluation is in progress for the chat transcripts produced in this exploratory research, and a broader continuation of this research would be appropriate.

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BEYOND THE DARK SIDE: HIDING KNOWLEDGE WITH POSITIVE INTENTIONS

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Abstract

Knowledge hiding is conceptualized as an intentional attempt to withhold requested knowledge and is typically associated with negative motives and outcomes. However, comparatively little attention has been paid to how individuals respond to knowledge requests when hiding knowledge serves legitimate or protective purposes. Addressing this gap, the present study examines participants' preferred knowledge hiding responses across three hypothetical workplace scenarios involving positive intentions: preserving confidentiality, promoting another person's self-development, and protecting a third party's feelings or interests.

Data were collected from 187 knowledge workers employed in a German company using a video-based scenario design. Participants viewed three predefined workplace video scenarios, each representing a different legitimate reason for withholding knowledge, and selected one response from three knowledge hiding behaviors (evasive hiding, playing dumb, and rationalized hiding). Exploratory chi-square analysis was conducted to examine differences in response distribution patterns across intention conditions.

The findings revealed distinct response patterns across the scenarios. In the confidentiality scenario, participants overwhelmingly selected rationalized hiding, whereas evasive hiding predominated in the third-party protection scenario. The self-development scenario produced a more mixed response pattern, with rationalized hiding selected most frequently, followed by evasive hiding and playing dumb. Across the three scenarios, playing dumb was comparatively infrequent except in the self-development condition. These findings suggest that participants distinguished among knowledge hiding responses when confronted with different legitimate or protective reasons for withholding knowledge.

This study contributes to the knowledge hiding literature by shifting attention from the negative antecedents of knowledge hiding toward legitimate and protective contexts in which knowledge may be withheld. The findings support a more differentiated conceptualization of knowledge hiding by suggesting that participants perceive evasive hiding, playing dumb, and rationalized hiding as behaviorally and ethically distinct responses rather than as uniformly detrimental forms of workplace behavior. Given the scenario-based design, the findings should be interpreted as participants' response preferences rather than observations of actual workplace behavior.

Keywords: *Knowledge Hiding, Positive Intentions, Evasive Hiding, Playing Dumb, Rationalized Hiding*

Introduction

Knowledge hiding, defined by Connelly et al. (2012) as a deliberate effort by an individual to withhold or conceal knowledge in response to another person's request, has received considerable attention in knowledge management and organizational behavior literature. Existing literature largely portrays knowledge hiding as a dysfunctional workplace behavior with harmful consequences for both individuals and organizations. Knowledge hiding has been linked to reduced creativity, lower innovation performance, emotional exhaustion, turnover intention, and weakened organizational learning (Ahmad, 2025; AlGhaithy & Al-Busaidi, 2025; Ballekura et al., 2025; Rhee & Choi, 2017; Wei & Zheng, 2025). Research also shows that knowledge hiding creates unfriendly work environments characterized by anxiety, stress, and deteriorating interpersonal relationships (Haque, 2024).

Accordingly, prior studies have primarily focused on identifying the antecedents associated with knowledge hiding. Existing research demonstrates that knowledge hiding may arise from workplace incivility, destructive leadership, envy, organizational politics, psychological stress, unethical peer behavior, and dark personality traits such as Machiavellianism and narcissism (Alev & Balkar, 2025; Arshad & Ismail, 2018; Gupta et al., 2026; Hoang et al., 2025; Joshi et al., 2025; Malik et al., 2019; Offergelt & Venz, 2023; Tran Pham, 2025; Venz & Mohr, 2023). Such findings reinforce the dominant assumption that knowledge hiding represents the "dark side" of organizational knowledge behavior.

Nevertheless, this perspective may be overly simplistic. Connelly et al. (2012) originally acknowledged that employees may hide knowledge for reasons that are not necessarily malicious, such as protecting confidential information, safeguarding a third party's interests, or avoiding interpersonal harm. Emerging evidence further suggests that different forms of knowledge hiding may carry different ethical meanings and organizational consequences. For instance, rationalized hiding may positively affect project performance (Khan et al., 2024), while evasive hiding may encourage self-learning and resourcefulness among knowledge recipients (Restrepo-Gil et al., 2025). Similarly, supervisor gratitude expression has been found to increase rationalized hiding while reducing evasive hiding and playing dumb (Xu & Yao, 2025).

Despite these developments, prior research has paid limited attention to how individuals respond to knowledge requests in situations involving legitimate or protective reasons for hiding knowledge. Existing studies overwhelmingly focus on negative antecedents and harmful outcomes, while comparatively neglecting the possibility that knowledge hiding may sometimes serve constructive, protective, or prosocial purposes. This limited attention paid to these positive intentions is problematic for several reasons. First, it risks portraying knowledge hiding as uniformly malicious, resulting in an incomplete understanding of the phenomenon. Second, it constrains our ability to explain why individuals may prefer different responses to knowledge requests, particularly the distinction between deceptive forms of hiding and more transparent forms such as rationalized hiding. Third, it may lead to overly simplistic managerial recommendations that fail to recognize situations in which hiding knowledge is justified or beneficial.

To address this gap, the present study examines whether participants exhibit different response preferences across scenarios representing distinct legitimate reasons for hiding knowledge. It addresses the following overarching research question:

How do participants respond to knowledge requests across scenarios involving different positive intentions for hiding knowledge?

Specifically, this study examines participants' preferences among three knowledge hiding behaviors, i.e., evasive hiding, playing dumb, and rationalized hiding, in scenarios involving preserving confidentiality, promoting another person's self-development, and

protecting a third party's feelings or interests. By shifting attention from the "dark side" of knowledge hiding toward its underlying motivations, this study responds to previous call for a deeper exploration into the subjective nature and the individualized reasons of knowledge hiding (Tokyzhanova & Durst, 2025). In doing so, it provides initial evidence that participants distinguish among knowledge hiding responses when faced with different legitimate or protective reasons for hiding knowledge, thereby contributing to a more nuanced understanding of knowledge hiding beyond its traditional characterization as an inherently detrimental behavior.

Literature Review

1. Knowledge Hiding Behaviors

Connelly et al. (2012) conceptualized knowledge hiding as an intentional attempt to withhold requested knowledge and identified three primary forms: evasive hiding, playing dumb, and rationalized hiding. Evasive hiding involves providing misleading or partial information, playing dumb refers to pretending not to possess the requested knowledge, and rationalized hiding involves openly explaining why the knowledge cannot be shared.

These hiding strategies differ in transparency and ethical implications (as shown in Table 1). Playing dumb is generally considered the most deceptive form because it involves intentional dishonesty, whereas rationalized hiding is comparatively transparent because employees provide explicit justifications for withholding information. Prior research increasingly supports these distinctions. Workplace incivility predicts deceptive hiding behaviors such as evasive hiding and playing dumb more strongly than rationalized hiding (Venz & Mohr, 2023). Likewise, supervisor gratitude expression positively relates to rationalized hiding while negatively relating to evasive hiding and playing dumb (Xu & Yao, 2025).

Table 1 Three hiding behaviors on a continuum of transparency

Behavior	Transparency	Ethical Tone
Rationalized hiding	High	Most socially acceptable
Evasive hiding	Moderate	Indirect/protective
Playing dumb	Low	Most deceptive

Importantly, the consequences of hiding behaviors are not uniformly negative. Khan et al. (2024) found that playing dumb negatively affects project performance, whereas rationalized hiding may positively contribute to performance outcomes. Similarly, evasive hiding may encourage self-learning and resourcefulness among knowledge recipients (Restrepo-Gil et al., 2025). When taking into consideration recent arguments that knowledge hiding may sometimes arise from situational constraints rather than purely intentional concealment (Anand et al., 2020), its consequences become even more complex and difficult to predict. Accordingly, the view that knowledge hiding behaviors should not be treated as a homogeneous construct becomes increasingly compelling.

Knowledge hiding is an individual-driven and strategic behavior, and it is immediate reactive and mostly relational (Tokyzhanova & Durst, 2025). Existing literature has predominantly examined knowledge hiding as a response to negative individual and workplace experiences. Studies have shown that individuals are more likely to engage in knowledge hiding when they feel envied (Liu et al., 2020), experience job insecurity (Serenko & Bontis, 2016), or suffer from exhaustion and burnout (Ali et al., 2020). Knowledge hiding has also been linked to adverse relational and organizational conditions, such as antisocial

leadership, abusive supervision (Atif Saleem & Ahmad Bayiz, 2019), workplace incivility (Arshad & Ismail, 2018; Shah & Hashmi, 2019), workplace bullying (Yao et al., 2020), and employee cynicism (Aljawarneh & Atan, 2018). Collectively, these studies portray knowledge hiding primarily as a reaction to unfavorable personal, interpersonal, and organizational circumstances, thereby emphasizing its detrimental aspects while leaving comparatively little attention to situations in which knowledge may be withheld for legitimate or protective reasons. Consequently, relatively little is known about how individuals respond to knowledge requests when such positive intentions are made salient.

2. Positive Intentions and Knowledge Hiding

Although knowledge hiding is commonly associated with selfish or harmful motives, employees may also hide knowledge for legitimate and prosocial reasons. Connelly et al. (2012) explicitly noted that knowledge hiding may also arise from legitimate or prosocial motives, including preserving confidentiality, protecting sensitive information, or safeguarding others' interests. It was also found that individuals, particularly those in senior positions within an organization, withhold what they know with the intention of encouraging their subordinates to develop their own knowledge independently (Yang & Ribiere, 2020). Such motivations fundamentally differ from retaliatory or exploitative intentions because the purpose is not to harm the requester.

Recent evidence indirectly supports this perspective. Rationalized hiding is typically motivated by the knowledge holder's positive intentions (Kumar et al., 2025). Similarly, Xu and Yao (2025) found that authentic supervisor gratitude expression positively predicts rationalized hiding while discouraging more deceptive hiding forms. Rationalized hiding has also been associated with relatively constructive outcomes because it maintains transparency and social legitimacy. Offergelt et al. (2019) argued that rationalized hiding may preserve perceptions of cooperativeness because the knowledge holder provides an understandable justification for withholding information. These findings suggest that rationalized hiding may represent a socially acceptable response when employees perceive legitimate constraints on disclosure. By contrast, evasive hiding may function as an indirect protective strategy. Restrepo-Gil et al. (2025) demonstrated that evasive hiding can encourage self-learning and resourcefulness among knowledge recipients. Xia and Li (2024) further found that evasive hiding positively mediated brokers' creativity under certain network conditions. Such findings imply that evasive hiding may not always be malicious but may sometimes be employed to encourage independent learning or avoid interpersonal harm.

Importantly, prior research indicates that individuals strategically select different hiding behaviors depending on contextual and relational considerations. For example, women are more likely to use evasive hiding and playing dumb, whereas men more frequently employ rationalized hiding (Andreeva & Zappa, 2023). Likewise, narcissists tend to prefer rationalized hiding, whereas Machiavellians predominantly engage in evasive hiding (Joshi et al., 2025). These findings suggest that knowledge hiding strategies are not randomly adopted but reflect different interpersonal goals and relational considerations. While previous studies have largely examined how contextual factors influence knowledge hiding, they also indicate that the three hiding strategies differ substantially in transparency, ethical implications, and communicative function. Consequently, it is reasonable to expect that individuals facing different legitimate reasons for hiding knowledge may regard some hiding responses as more appropriate than others. Examining participants' responses across scenarios involving different positive intentions therefore provides an opportunity to explore whether particular intentions are associated with preferences for specific knowledge hiding responses.

Building on this reasoning, the present study examines participants' preferred responses to knowledge requests when different positive intentions underlie the decision to

withhold knowledge. Specifically, it investigates whether participants exhibit different response preferences across scenarios in which knowledge hiding is motivated by distinct legitimate or protective reasons:

H1: Participants' preferred knowledge hiding responses differ across scenarios involving different positive intentions for hiding knowledge.

3. Confidentiality and Rationalized Hiding

Confidentiality represents one of the most legitimate reasons for withholding knowledge in organizations. Employees are frequently required to protect commercially sensitive information, intellectual property, client data, or confidential personnel matters in accordance with organizational policies, professional ethics, or legal obligations. In such situations, the decision to hide knowledge is not intended to disadvantage the knowledge seeker but rather to fulfill responsibilities to the organization or other stakeholders (Connelly et al., 2012). Consequently, confidentiality obligations often require employees to withhold information while preserving organizational norms and interpersonal trust.

Research on organizational justice suggests that when individuals are unable to comply with another person's request, providing a truthful explanation enhances perceptions of fairness, respect, and procedural legitimacy (Bobocel & Zdaniuk, 2005; Colquitt, 2001). These findings imply that, when disclosure is legitimately constrained, individuals are more likely to communicate the reason for withholding information than to resort to deception.

Rationalized hiding, among the three knowledge hiding behaviors, most closely reflects this communicative approach. Unlike playing dumb, which involves falsely denying possession of knowledge, or evasive hiding, which provides misleading or incomplete information, rationalized hiding openly acknowledges the request while offering a legitimate explanation for non-disclosure. It therefore enables knowledge holders to satisfy confidentiality obligations without compromising interpersonal transparency. Empirical evidence further supports this distinction. Offergelt et al. (2019) argued that rationalized hiding preserves perceptions of cooperativeness because the knowledge holder provides an understandable justification, while Xu and Yao (2025) found that positive relational cues increased rationalized hiding but reduced deceptive forms of knowledge hiding. Collectively, these findings suggest that when confidentiality provides a legitimate reason for hiding knowledge, participants are likely to regard rationalized hiding as the most appropriate response.

Accordingly, the following hypothesis is proposed:

H1a: Participants in a confidentiality scenario will be more likely to select rationalized hiding than evasive hiding or playing dumb.

4. Self-Development and Evasive Hiding

Employees do not always share knowledge immediately when responding to colleagues' requests. In some situations, they may deliberately refrain from providing direct answers because they believe that independent exploration and problem solving promote deeper learning and long-term competence. Such developmental intentions differ fundamentally from self-serving motives because the objective is to enhance another person's knowledge and capabilities rather than to restrict access to the knowledge (Yang & Ribiere, 2020). Consequently, when responding to a knowledge request, individuals motivated by another person's self-development may seek a response that encourages learning while avoiding outright refusal.

Educational psychology provides strong theoretical support for this perspective. Constructivist Learning Theory posits that learners develop more durable knowledge by actively constructing understanding rather than passively receiving information (Hein, 1991; Vygotsky, 1978). Similarly, Self-Determination Theory proposes that supporting another

person's autonomy and competence promotes intrinsic motivation and sustained learning (Ryan & Deci, 2000). Likewise, the knowing in practice perspective views knowing as a dynamic social accomplishment that is continually constituted through actors' interactions and engagement in everyday work practices (Orlikowski, 2002). Consequently, responses to coworkers' knowledge requests are not merely expressions of stable individual dispositions but situated practices shaped by the context, relationships, and intentions surrounding the interaction. Individuals who seek to facilitate another person's development may intentionally avoid providing immediate answers.

Among the three knowledge hiding behaviors, evasive hiding appears most compatible with this developmental objective. Unlike playing dumb, which falsely denies possessing the requested knowledge, evasive hiding acknowledges the interaction while delaying or partially withholding knowledge, thereby encouraging the knowledge seeker to continue searching for solutions. Compared with rationalized hiding, which explicitly refuses disclosure, evasive hiding preserves the possibility of future assistance while creating opportunities for independent learning. Emerging knowledge hiding research also suggests that evasive hiding may stimulate recipients' self-learning, resourcefulness, and creativity under certain conditions (Restrepo-Gil et al., 2025; Xia & Li, 2024). Although evasive hiding is generally regarded as deceptive, its indirect nature may sometimes be perceived as a means of fostering developmental learning rather than intentionally frustrating the requester.

Accordingly, the following hypothesis is proposed:

H1b: Participants in a self-development scenario will be more likely to select evasive hiding than other knowledge hiding responses.

5. Protecting Third-Party Feelings and Evasive Hiding

Employees may also decline knowledge requests because disclosing the requested knowledge could harm another individual's interests, reputation, or emotional well-being. Such situations differ from confidentiality obligations because the primary concern is not organizational policy but protecting another person from potential interpersonal harm (Connelly et al., 2012). Responding to these requests therefore requires balancing honesty toward the requester with loyalty and consideration toward the third party whose interests may be affected.

Communication and social psychological research suggest that individuals frequently employ indirect communication when attempting to preserve interpersonal relationships or protect others from embarrassment. According to Politeness Theory, speakers often avoid direct statements that threaten another person's "face" and instead adopt indirect communication strategies to reduce interpersonal discomfort (Brown & Levinson, 1987). Studies of prosocial deception similarly demonstrate that individuals may occasionally provide incomplete or indirect information when they believe doing so protects another person or serves a socially desirable objective (Levine & Schweitzer, 2014).

These perspectives suggest that directly explaining why knowledge cannot be shared may sometimes undermine the very objective of protecting the third party by revealing sensitive information or drawing attention to confidential circumstances. Evasive hiding, by contrast, enables knowledge holders to avoid disclosure without explicitly exposing the reasons for doing so. Consequently, evasive hiding may represent a relationally protective response when knowledge requests involve another person's welfare.

Accordingly, the following hypothesis is proposed:

H1c: Participants in a third party protection scenario will be more likely to select evasive hiding than rationalized hiding or playing dumb.

6. Positive Intentions and Reduced Use of Playing Dumb

Among the three hiding behaviors, playing dumb represents the most overtly deceptive strategy because it involves falsely denying possession of knowledge (Connelly et al., 2012). Compared with evasive hiding and rationalized hiding, it provides no truthful explanation for withholding knowledge and therefore poses the greatest threat to interpersonal trust. Trust research similarly indicates that honesty and transparency constitute fundamental components of cooperative workplace relationships (Mayer et al., 1995). Accordingly, when individuals perceive legitimate reasons for withholding knowledge, they are more likely to favor responses that preserve credibility and relational trust than responses involving explicit dishonesty.

Consistent with this reasoning, workplace incivility, unethical climates, and dark personality traits have been found to predict playing dumb more strongly than more transparent knowledge hiding behaviors (Joshi et al., 2025; Venz & Mohr, 2023). Because positive intentions are generally more compatible with transparency, relational maintenance, and ethical legitimacy, individuals motivated by constructive intentions are less likely to adopt highly deceptive concealment strategies. Therefore, we hypothesized:

H2: Across the three scenarios involving positive intentions, participants will be less likely to select playing dumb than other knowledge hiding responses.

Objectives

The primary objective of this study is to examine participants' preferred responses to knowledge requests across scenarios involving different legitimate or protective reasons for hiding knowledge. Specifically, the study seeks to:

1. examine whether participants exhibit different response preferences across scenarios involving the preservation of confidentiality, the promotion of another person's self-development, and the protection of a third party's feelings or interests;
2. identify the knowledge hiding response most frequently preferred under each positive-intention scenario, with particular attention to the use of evasive hiding, playing dumb, and rationalized hiding; and
3. explore whether playing dumb is selected less frequently than other knowledge hiding responses across the three positive-intention scenarios.

Methodology

1. Research Design and Procedure

Due to the difficulty in observing and capturing knowledge hiding behavior, which is a socially undesirable behavior and, therefore, very often hidden and invisible, self-report measurement is deemed to be the most appropriate method (Connelly et al., 2012). However, given the socially undesirable nature of knowledge hiding, scenario-based inquiry offers distinct advantages. By asking respondents to evaluate predefined workplace situations rather than directly report their own behavior, scenario-based methods can reduce social desirability bias and elicit more candid responses to sensitive issues (Aguinis & Bradley, 2014). Such methods also allow researchers to systematically manipulate contextual conditions while maintaining a high degree of realism, making them particularly suitable for examining intentions, attitudes, and behaviors in workplace settings (Aguinis & Bradley, 2014). Consequently, scenario-based inquiry provides an appropriate approach for investigating how individuals respond to knowledge requests under different positive-intention conditions.

This study employed a scenario-based survey design using pre-recorded workplace videos to examine the association between positive intentions and knowledge hiding behaviors. Participants were informed, when invited, that the study aimed to examine how

employees respond to workplace knowledge requests under different organizational and interpersonal considerations. Before watching each video, participants were explicitly informed of the specific positive intention underlying the situation. The three intention conditions included: (1) preserving confidentiality, (2) promoting a colleague's self-development, and (3) protecting a third party's feelings or interests.

Participants then watched a short prerecorded video in which a colleague requested work-related knowledge from them. After viewing each scenario, participants were presented with three response options representing the three forms of knowledge hiding identified by Connelly et al. (2012), i.e., evasive hiding, playing dumb, and rationalized hiding, and were asked to select the response that best reflected how they would realistically react in each situation. For example, under the confidentiality condition, participants were presented with a scenario in which they were explicitly instructed that their intention was to preserve the confidentiality of the requested knowledge. They were then asked to choose among three possible responses: (1) an evasive hiding response (claiming temporary inability to access the requested information), (2) a playing dumb response (denying knowledge availability without further explanation), and (3) a rationalized hiding response (explicitly explaining that the information could not be disclosed due to confidentiality policies). The format, structure, wording, and tone of the scenario description were standardized as much as possible across all conditions to ensure comparability of the stimuli. The knowledge management unit of the company interested in our study assisted in developing and validating the scenarios. The involvement of these subject matter experts, who possessed extensive experience in organizational knowledge processes, helped establish the content validity of the instrument (Haynes et al., 1995).

The use of video-based scenarios enabled the study to present standardized interpersonal situations while providing richer contextual and emotional cues than text-based vignettes. Previous study found no significant differences between participants' responses to a scenario-based simulation and a written narrative, a common data collection method in decision-making research (Vermillion et al., 2017). Importantly, interactive stimuli improve processing fluency, promote deeper engagement with the presented situation, and enhance perceived realism, all of which contribute to the generation of more authentic participant responses (Vermillion et al., 2017). These characteristics make such stimuli particularly valuable for investigating behavioral responses in hypothetical workplace scenarios. Following established guidance on ecological validity, this approach embeds variables in realistic, context-rich scenarios (Brewer & Crano, 2014). This simulation approach was particularly suitable for examining how distinct positive intentions shape employees' selection of specific knowledge hiding strategies in realistic workplace interactions.

2. Participants and Data Collection

An invitation to participate in the video-based scenario study was distributed to approximately 7,900 knowledge workers employed by a German company. The survey was administered with the support of the company's knowledge management unit, which publicized the study and distributed anonymous access accounts created by the researcher to interested employees. Before being released for participation, the scenario-based survey was subject to a comprehensive review and approval process involving multiple departments of the company including production, legal, and labor departments, to ensure its appropriateness and compliance with organizational requirements. The study was conducted through an online platform during a data collection period lasting approximately two months, from early July to mid-September 2023. A total of 214 employees requested access to participate, yielding a response rate of 2.7%. Two reminder invitations were distributed during the data collection process.

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All participants were knowledge workers employed within the company's production unit, excluding front-line operational workers. They were considered knowledge workers because their work was characterized by the continuous, systematic, and predominant development and application of organizational knowledge through activities such as exploration, experimentation, and innovation (De Sordi et al., 2021). Participants completed the study by watching the predefined workplace video scenarios and selecting their preferred knowledge hiding responses under each intention condition. Ultimately, 187 participants generated usable responses for analysis.

Participation in the study was fully anonymous. While the researcher originally planned to gather additional demographic information, organizational privacy requirements limited the collection of employee demographic data.

Results

The data collected in this study consisted of categorical frequency data representing participants' selections of knowledge hiding behaviors across three predefined positive-intention scenarios. After watching each workplace video scenario, participants selected one of three mutually exclusive responses, i.e., evasive hiding, playing dumb, or rationalized hiding. The responses were coded and aggregated into a contingency table showing the frequencies of each hiding behavior under each intention condition.

Because the study aimed to examine whether the distribution of knowledge hiding behaviors differed across positive intentions, a chi-square test of independence was employed. The chi-square test is appropriate for analyzing associations between categorical variables represented in frequency data (Field, 2024). Prior to analysis, the aggregated frequencies were weighted in SPSS 26 to ensure that each response count was properly represented in the statistical analysis. Crosstabulation analysis was then conducted to compare behavioral distributions across the three intention conditions. In addition to the Pearson chi-square statistic, row percentages and standardized residuals were examined to identify the specific cells contributing to significant associations (Agresti, 2013). Cramér's V was also calculated to assess the strength of the association (Cohen, 1988). Because each participant responded to all three scenarios, the observations were not fully independent. Therefore, the chi-square analysis was primarily used as an exploratory examination of behavioral distribution patterns across intention conditions.

Exploratory chi-square analysis revealed a significant association between positive intentions and knowledge hiding behaviors, $\chi^2(4, N = 561) = 386.479$, $p < .001$, with a large effect size (Cramér's $V = .587$), supporting H1. Table 2 presents the results of the chi-square analysis.

Table 2 Positive intentions and knowledge hiding strategy preferences

Positive intentions	Evasive hiding n (%)	Playing dumb n (%)	Rationalized hiding n (%)	Total
To preserve confidentiality	4 (2.1%) [-8.6]	3 (1.6%) [-2.6]	180 (96.3%) [8.9]	187
To promote knowledge seeker's self-development	63 (33.7%) [-2.0]	30 (16.0%) [5.2]	94 (50.3%) [0.0]	187
To protect third party's feelings	176 (94.1%) [10.6]	3 (1.6%) [-2.6]	8 (4.3%) [-8.9]	187
Total	243	36	282	561

Note. Values in brackets represent standardized residuals.

The findings reveal distinct patterns in participants' knowledge hiding responses across the three positive intention conditions. Under the confidentiality condition, participants overwhelmingly selected rationalized hiding (96.3%), whereas evasive hiding and playing dumb were selected only minimally. The large positive standardized residual for rationalized hiding (8.9) and large negative residuals for evasive hiding (-8.6) and playing dumb (-2.6) indicate that rationalized hiding occurred more frequently than expected under this condition. This pattern is consistent with H1a, suggesting that intentions to preserve confidentiality are associated with a preference for rationalized hiding over deceptive forms of knowledge hiding.

In the self-development condition, rationalized hiding remained the most frequently selected response (50.3%), followed by evasive hiding (33.7%) and playing dumb (16.0%). Notably, playing dumb was selected more frequently than expected, as indicated by the positive standardized residual (5.2). This pattern does not fully align with H1b, which predicted evasive hiding to be the dominant response, and instead suggests that participants most often preferred rationalized hiding when motivated by self-development intentions.

Under the condition involving protection of a third party's feelings or interests, participants predominantly selected evasive hiding (94.1%). The very large positive standardized residual for evasive hiding (10.6), together with the strongly negative residual for rationalized hiding (-8.9), indicates that evasive hiding occurred substantially more frequently than expected under this condition. This observed response pattern is consistent with H1c, suggesting that intentions to protect others are associated with a preference for evasive hiding.

Across all three intention conditions, playing dumb was comparatively infrequent except in the self-development scenario. Overall, the findings suggest that individuals tend to prefer relatively less deceptive or more socially acceptable forms of knowledge hiding when motivated by positive intentions. This response pattern is broadly consistent with H2, although the absence of neutral or harmful comparison conditions precludes conclusions about whether positive intentions themselves reduce the likelihood of playing dumb.

Discussion

This study extends the knowledge hiding literature by examining whether participants' responses differ across three knowledge request scenarios involving distinct positive intentions. Moving beyond the dominant "dark side" perspective, the findings demonstrate that knowledge hiding may also arise in situations characterized by constructive or protective intentions rather than purely self-serving motives. Across the three scenarios, participants exhibited distinct patterns in their selection of knowledge hiding strategies, suggesting that employees do not adopt knowledge hiding behaviors randomly; instead, they strategically select different forms of hiding depending on the underlying intention, demonstrating varying behavioral preferences.

The confidentiality scenario particularly highlighted the distinctive role of rationalized hiding. In the scenario involving confidentiality concerns, they overwhelmingly selected rationalized hiding over evasive hiding and playing dumb. This response pattern is consistent with the argument that rationalized hiding is perceived as a comparatively legitimate and socially acceptable form of knowledge hiding because it allows employees to justify non-disclosure while maintaining transparency and organizational norms (Connelly & Zweig, 2015). The finding also aligns with organizational justice research, which suggests that when individuals cannot comply with another person's request, providing an explanation promotes perceptions of fairness, respect, and legitimacy (Bobocel & Zdaniuk, 2005; Colquitt, 2001). This interpretation is further supported by knowledge hiding research suggesting that

rationalized hiding differs from more deceptive hiding forms in both ethical implications and organizational consequences (Khan et al., 2024; Offergelt et al., 2019) as well as by Xu and Yao (2025), who showed that authentic relational contexts encourage rationalized hiding while discouraging deceptive behaviors.

The self-development condition produced a comparatively mixed pattern. Although evasive hiding was expected to dominate, rationalized hiding remained the most frequently selected response, while playing dumb occurred more frequently than anticipated. This response pattern suggests that, in the self-development scenario, participants generally preferred transparent justification over deception. Rationalized hiding allows individuals to explain why they are withholding knowledge without misleading the knowledge seeker (Connelly et al., 2012), making it more consistent with developmental motives. From the perspective of Self-Determination Theory, fostering another person's competence and autonomous learning involves providing meaningful rationales for one's actions (Ryan & Deci, 2000). It is also consistent with evidence that positive relational cues, such as line manager gratitude, increase rationalized hiding while reducing deceptive forms of knowledge hiding (Xu & Yao, 2025), suggesting that prosocial motives encourage more transparent responses to knowledge requests.

Nevertheless, playing dumb occurred more frequently than expected, suggesting that a developmental intention does not entirely preclude the use of deception. One possible explanation is that some participants perceived pretending not to possess the requested knowledge as a more effective means of preventing dependence on the knowledge holder and encouraging the knowledge seeker to solve the problem independently. This interpretation is consistent with research on prosocial deception, which suggests that individuals may occasionally employ deceptive behavior when they believe it ultimately benefits another person or serves a socially desirable objective (Levine & Schweitzer, 2014). In this context, participants may have viewed playing dumb not as an act of self-interest but as a strategic means of promoting independent learning. The finding therefore suggests that scenarios involving developmental objectives do not necessarily preclude the selection of deceptive knowledge hiding. Rather, participants generally preferred more transparent responses while still selecting deception when they perceived it as serving the intended developmental purpose.

The scenario involving the protection of a third party's feelings or interests was characterized by a clear preference for evasive hiding. Participants predominantly selected indirect concealment strategies rather than openly refusing disclosure. This pattern suggests that evasive hiding may function as a relationally protective mechanism that allows employees to avoid interpersonal harm or conflict while still preventing disclosure. The finding contributes to emerging evidence that evasive hiding may not always reflect hostility or opportunism but may sometimes serve socially protective purposes. More broadly, it is consistent with communication research demonstrating that individuals frequently rely on indirect communication to preserve others' "face" and maintain interpersonal harmony in situations involving sensitive information (Brown & Levinson, 1987). It also accords with research on prosocial deception, which suggests that individuals may occasionally communicate indirectly or incompletely when they believe doing so protects another person or serves a socially desirable objective (Levine & Schweitzer, 2014). Within this context, participants may have perceived evasive hiding as a means of preventing disclosure without exposing sensitive information or damaging the interests of the third party. This interpretation is broadly consistent with Restrepo-Gil et al. (2025), who found that evasive hiding can encourage self-learning and resourcefulness among knowledge recipients.

Importantly, the observed response patterns challenge the prevailing assumption that all forms of knowledge hiding are equally unethical or destructive. Across the three scenarios, participants differentiated among hiding strategies in terms of their apparent transparency, relational orientation, and perceived legitimacy. In particular, rationalized hiding was most frequently selected in the confidentiality and self-development scenarios, whereas evasive hiding predominated in the third-party protection scenario. These findings suggest that participants distinguish among knowledge hiding strategies when responding to different legitimate or protective reasons for withholding knowledge. Collectively, the findings reinforce growing evidence that knowledge hiding should not be conceptualized as a homogeneous phenomenon but rather as a set of behaviorally and ethically distinct responses whose appropriateness may depend on the context in which knowledge requests occur.

Conclusions and Implications

The study contributes to the knowledge hiding literature in several ways. First, it shifts the focus from the negative antecedents and consequences of knowledge hiding toward the intentions underlying the behavior itself. Second, the study contributes to the differentiation of hiding strategies by demonstrating that evasive hiding, playing dumb, and rationalized hiding carry distinct relational meanings and are selected differently depending on the motivational context. In particular, rationalized hiding was most frequently selected in the confidentiality and self-development scenarios, whereas evasive hiding predominated in the third-party protection scenario. These findings provide preliminary, context-specific evidence that different legitimate or protective contexts may be associated with different preferred knowledge hiding responses. Third, the findings provide empirical support for a more nuanced conceptualization of knowledge hiding that extends beyond its traditional characterization as inherently harmful workplace behavior. Given the scenario-based design and the single-company sample, these contributions should be viewed as an initial step toward understanding how legitimate or protective contexts may shape individuals' preferred responses to knowledge requests, warranting further validation across organizational and cultural settings.

The findings also carry important managerial implications. The findings suggest that organizations may benefit from recognizing that not all knowledge hiding behaviors necessarily stem from malicious intent. In some situations, employees may hide knowledge to preserve confidentiality, protect others, or encourage independent problem-solving. Therefore, managerial interventions aimed at reducing knowledge hiding should distinguish between destructive and legitimate forms of withholding behavior rather than treating all hiding behaviors uniformly. In particular, rationalized hiding may represent a more acceptable organizational response when employees face legitimate disclosure constraints.

Limitations

Several limitations should nevertheless be acknowledged. First, the study relied on scenario-based responses rather than actual workplace behaviors. Although video scenarios enhance contextual realism, participants' selected responses may not fully reflect real-world actions. Second, each positive intention was represented by a single scenario. Consequently, the observed response patterns may reflect characteristics of the specific scenarios in addition to the intended motivational context. Future research should employ multiple scenarios for each intention to improve construct representation and reduce potential scenario-specific effects. Third, participants were explicitly informed of the positive intention underlying each scenario before selecting a response. While this design was necessary to examine the influence of specific intentions on behavioral choices, it may have increased participants'

awareness of the socially desirable aspects of the scenarios and, consequently, encouraged the selection of responses perceived as more socially acceptable. Fourth, the study did not include neutral or harmful intention conditions. As a result, the findings describe participants' preferred responses within three positive-intention scenarios but do not permit comparisons with responses under other motivational conditions. Also concerned with research design, because all participants responded to all scenarios, the observations were not fully independent. Accordingly, the chi-square analysis should be interpreted primarily as an exploratory examination of behavioral distribution patterns. Lastly, the study did not collect demographic information due to organizational restrictions, preventing analysis of potential individual differences across participants.

Future research may extend this work by examining positive-intention knowledge hiding in real organizational settings using longitudinal designs. Researchers may also investigate how recipients interpret positively motivated knowledge hiding and whether such behaviors produce different relational and performance outcomes compared with malicious hiding. Furthermore, future studies could explore cultural, personality, and organizational factors that shape employees' selection of hiding strategies under constructive intentions.

Overall, the present study demonstrates that knowledge hiding is not necessarily a purely destructive workplace behavior. Rather, employees may strategically employ different hiding behaviors to balance interpersonal, ethical, and organizational considerations. By highlighting the role of positive intentions, this study advances a more balanced and nuanced understanding of knowledge hiding beyond its traditionally "dark" characterization.

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IDENTIFYING AND VALIDATING A MULTIDIMENSIONAL ETHICAL EVALUATION SCALE FOR CANNABIS-RELATED PRODUCTS IN HOSPITALITY AND TOURISM

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Abstract

The rapid expansion of cannabis-related businesses within the hospitality and tourism industries has intensified calls for ethical scrutiny and regulatory accountability. Despite growing scholarly attention to corporate social responsibility and ethical consumption in tourism, a validated instrument capable of capturing consumers' multidimensional ethical evaluations of cannabis-related hospitality and tourism offerings remains absent from the literature. Addressing this gap, the present study aims to identify and validate a context-specific Multidimensional Ethical Evaluation Scale (MEES) for cannabis-related products in hospitality and tourism. Grounded in the Multidimensional Ethics Scale (MES) framework, this research adapts and refines the moral equity, relativism, contractualism, and utilitarianism dimensions to the cannabis-hospitality tourism context. Data were collected via a structured self-administered survey from international tourists, and analyzed using exploratory factor analysis (EFA) followed by confirmatory factor analysis (CFA). Findings provide initial support for a four-factor structure with acceptable psychometric properties, including composite reliability, convergent validity, and discriminant validity across all dimensions. The validated MEES advances tourism ethics and consumer behavior scholarship and offers a methodological foundation for future research on ethically sensitive products in hospitality and tourism. Practical implications for destination managers and policymakers are also discussed.

Keywords: *Cannabis Tourism, Ethical Evaluation, Multidimensional Ethics Scale, Scale Development, Hospitality and Tourism*

Introduction

Cannabis legalization across multiple jurisdictions has triggered rapid commercialization, with cannabis-related businesses increasingly embedded in hospitality and tourism contexts. In Thailand, the landmark decriminalization of cannabis in June 2022 gave rise to a flourishing market of cannabis-infused cafes, restaurants, retail outlets, and tourism experiences, generating both economic opportunity and ethical controversy (Meeprom et al., 2023). However, Thailand's cannabis regulatory environment has continued to change, with increasing emphasis on medical use, regulatory control, and consumer protection rather than the unrestricted promotion of recreational cannabis tourism. The global cannabis market—valued at approximately USD 25 billion annually in the United States alone—underscores the commercial imperative driving this expansion (Charlebois et al., 2020). Yet rapid commercialization has also engendered widespread concerns about consumer safety, regulatory non-compliance, and social responsibility among hospitality operators (Charlebois et al., 2018).

Ethics in tourism and hospitality has received increasing scholarly attention, particularly in relation to corporate social responsibility, sustainable consumption, and ethical

consumer behavior (Han & Hyun, 2017). However, the application of ethics frameworks to cannabis-related contexts within hospitality and tourism remains largely uncharted territory. Prior research has examined consumer perceptions of cannabis-infused food (Charlebois et al., 2018), travel motivations for cannabis tourism (Wen et al., 2020), and consumption values driving cannabis-related choice behavior (Meeprom et al., 2023). Yet no validated scale exists to systematically capture the ethical dimensions through which tourists evaluate cannabis-related hospitality and tourism products.

The Multidimensional Ethics Scale (MES), originally developed by Reidenbach and Robin (1990), provides a theoretically grounded framework comprising moral equity, relativism, contractualism, and utilitarianism—four philosophical dimensions that collectively capture ethical evaluations across deontological, teleological, and relativistic orientations. The MES has been validated across diverse consumer behavior contexts (Singhapakdi et al., 1996; Vitell et al., 1991), yet it has not been adapted or validated in the cannabis-related hospitality and tourism domain. Given that cannabis-related hospitality products involve health and safety concerns, changing regulations, cultural differences, and responsibilities toward consumers, their ethical evaluation may not be adequately captured by a single general ethical judgment. Adapting and validating the MES in this context enables the study to examine whether moral equity, relativism, contractualism, and utilitarianism remain distinct dimensions when tourists evaluate cannabis-related business practices.

Accordingly, this study develops and validates a Multidimensional Ethical Evaluation Scale (MEES) for cannabis-related products in hospitality and tourism. Guided by Churchill (1979) scale development paradigm and informed by Hinkin (1995) procedural recommendations, the study employs both EFA and CFA on a sample of international tourists in Thailand. The paper is organized as follows: a review of the relevant literature precedes the methodological exposition; results of the EFA and CFA are then reported; and the paper closes with a discussion of theoretical contributions, managerial implications, limitations, and directions for future research.

Literature Review

1. Ethics in Hospitality and Tourism

Ethical behavior in hospitality and tourism encompasses a broad spectrum of practices, from environmental stewardship and fair labor conditions to honest advertising and consumer protection. Consumers increasingly factor ethical considerations into their hospitality choices, particularly in contexts involving health risk, social harm, or regulatory ambiguity (Han & Hyun, 2017). Research has consistently demonstrated that tourists' ethical orientations are shaped by multiple philosophical dimensions, including personal moral principles, social norms, perceptions of fairness, and utilitarian calculations of benefit and harm (Singhapakdi et al., 1996). Understanding these dimensions is essential for destination managers and cannabis hospitality operators seeking to build consumer trust and demonstrate responsible business conduct.

2. The Multidimensional Ethics Scale (MES)

Reidenbach and Robin (1990) advanced the MES as a multi-philosophical instrument for measuring ethical judgments, drawing on Kohlberg's moral development theory and classical ethical philosophy. The four dimensions of the MES are: (1) moral equity, which captures deontological notions of justice, fairness, and moral acceptability; (2) relativism, which reflects cultural and social contextual standards of acceptability; (3) contractualism, which assesses the degree to which behavior violates implicit social contracts, unspoken promises, and moral rules; and (4) utilitarianism, which evaluates whether a behavior maximizes aggregate benefits and minimizes harm to the greatest number. These four

dimensions collectively offer a theoretically rich and empirically tractable framework for capturing the moral complexity of consumer ethical evaluations (Vitell et al., 1991).

The MES has demonstrated strong psychometric properties and has been applied across marketing ethics (Vitell et al., 1991), online consumer behavior (Mantel & Kardes, 1999), and service quality contexts. However, its application in cannabis-related hospitality and tourism is entirely novel. Given the unique regulatory, cultural, and public health dimensions that characterize the cannabis tourism context, adaptation of MES dimensions to this domain offers both theoretical extension and practical validity.

3. Cannabis-Related Ethics in Hospitality and Tourism

The ethics of cannabis-related businesses in hospitality and tourism intersects several domains of scholarly inquiry. Consumer perceptions of cannabis-infused food products have been linked to concerns over public health, product safety, and social responsibility (Charlebois et al., 2018; 2020). Kosa et al. (2017) found that consumers harbor reservations about unclear labeling, unexpected psychoactive effects, and the risks of inadvertent cannabis consumption. In tourism contexts, Wen et al. (2020) identified clusters of cannabis-motivated travelers—cannabis enthusiasts, recreationists, and the curious—reflecting diverse risk tolerances and ethical orientations toward cannabis consumption. More recently, Meeprom et al. (2023) applied the Theory of Consumption Values (TCV) to cannabis-infused food in Thailand, identifying functional and social values as key drivers of consumer enjoyment and well-being. Nevertheless, the ethical evaluation of cannabis-related hospitality businesses from consumers' perspectives has not been operationalized through a validated multidimensional scale.

This gap is particularly salient in the Thai context, where cannabis decriminalization has produced rapid but uneven regulatory enforcement. Consumers and tourists navigating this landscape exhibit complex ethical responses shaped by moral equity concerns (Is this fair and just?), relativistic social norms (Is this acceptable in this culture?), contractual obligations (Does this violate implicit social agreements?), and utilitarian calculations (Does this benefit society?). A validated MEES would enable systematic measurement of these responses, supporting both academic inquiry and industry self-regulation efforts.

Objectives

This study aims to develop and validate a Multidimensional Ethical Evaluation Scale (MEES) for cannabis-related products in the hospitality and tourism context. Specifically, the study seeks to:

1. Adapt the Multidimensional Ethics Scale (MES) to the context of cannabis-related hospitality and tourism by operationalizing the four ethical dimensions of moral equity, relativism, contractualism, and utilitarianism.
2. Examine the underlying factor structure of the proposed scale using Exploratory Factor Analysis (EFA).
3. Validate the measurement model by assessing its reliability, convergent validity, discriminant validity, and overall model fit using Confirmatory Factor Analysis (CFA).
4. Provide a psychometrically sound instrument that can be used by researchers, hospitality practitioners, and policymakers to evaluate consumers' ethical perceptions of cannabis-related hospitality and tourism products.

Methods

1. Study Location and Context

Thailand was selected as the study context given its status as the first Southeast Asian country to decriminalize cannabis in June 2022, and its emergence as a significant cannabis-related tourism destination (Fakfare et al., 2022). The rapid growth of cannabis-infused hospitality offerings in tourist destinations such as Bangkok, Phuket, and Chiang Mai—alongside persistent concerns about regulatory compliance and consumer safety—provides a theoretically and practically relevant setting for the development of an ethical evaluation scale.

2. Scale Development Procedure

This study followed the scale development paradigm recommended by Churchill (1979) and Hinkin (1995), proceeding through domain specification, item generation, and scale purification. The initial item pool was informed by: (1) an extensive review of the MES literature (Reidenbach & Robin, 1990; Vitell et al., 1991); (2) the cannabis hospitality and tourism literature (Charlebois et al., 2018; 2020; Meeprom et al., 2023); and (3) an analysis of tourism regulatory documents and ethical guidelines pertaining to cannabis businesses in Thailand. Items were constructed as bipolar semantic differential scales, consistent with the MES format (Reidenbach & Robin, 1990). An initial pool of 20 items was developed across the four a priori dimensions: moral equity (ME), relativism (RE), contractualism (CON), and utilitarianism (UTL).

An expert panel comprising three tourism scholars and two industry practitioners reviewed the initial item pool for content validity, clarity, and contextual relevance, following DeVellis (2003) recommendations. Six items were retained per dimension after revision and consolidation. A pilot test with 32 respondents was conducted to assess item comprehensibility, resulting in minor wording revisions. The final instrument comprised 14 items across the four dimensions measured on seven-point bipolar scales, with anchors reflecting the MES format (e.g., Just–Unjust, Culturally acceptable–Culturally unacceptable). Items were framed in relation to unethical practices by cannabis-related businesses in Thailand's hospitality and tourism sectors, consistent with the study's focus on consumers' ethical evaluations.

3. Data Collection

A self-administered structured questionnaire was distributed to international tourists visiting Thailand using convenience-based intercept sampling. Data were collected at key tourist sites and international departure facilities, where trained research assistants assisted with respondent screening and questionnaire distribution. As a non-probability sampling approach was employed, the sample should not be considered fully representative of all international tourists visiting Thailand. Two screening questions ensured that respondents had visited Thailand within the previous two years and had encountered or been aware of cannabis-related hospitality or tourism offerings during their visit. Respondents who had visited a cannabis tourist destination were excluded to focus on the broader evaluative perspective of international tourists. A 7-point bipolar Likert-type scale was employed, consistent with MES conventions. The data were collected over a period of six weeks.

A total of 490 questionnaires were distributed (response rate: 92.7%). The sample was divided into two subsamples: a calibration sample ($n = 230$) for EFA and a validation sample ($n = 224$) for CFA, consistent with best practices in scale development (Churchill, 1979; Hinkin, 1995). Both subsamples exceeded 200 respondents and provided more than 15 observations per item, which was considered adequate for the EFA and CFA models examined in this study.

4. Respondent Profile

Table 1 presents the demographic profile of the full sample.

Table 1 Respondent Profile

Profile	Frequency	%
Gender		
Male	223	49.1
Female	231	50.9
Age		
21–30	278	61.2
31–40	114	25.1
41–50	52	11.5
Other	10	2.2
Education		
High school or below	60	13.2
Associate/Diploma	72	15.8
Bachelor's degree	238	52.4
Postgraduate	84	18.5
Monthly Income (USD)		
< \$30,000	148	32.6
\$30,000–\$49,999	168	37.0
\$50,000–\$69,999	84	18.5
\$70,000 and above	54	11.9
Continent of Residence		
Europe	190	41.9
Asia	122	26.9
North America	76	16.7
Oceania	31	6.8
Other	35	7.7

5. Analytical Procedure

EFA was conducted on the calibration sample using principal axis factoring with an oblique rotation (Promax), given the expected intercorrelations among factors. Items with factor loadings below 0.40 or communalities below 0.40 were eliminated (Hair et al., 2019). Factors with eigenvalues greater than 1.0 were retained, supplemented by scree plot inspection. CFA was subsequently performed on the validation sample using maximum likelihood estimation to confirm the factor structure and assess model fit, convergent validity, and discriminant validity. Model fit was evaluated using chi-squared/df ratio, Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA). Composite reliability (CR) and average variance extracted (AVE) were computed following Fornell and Larcker (1981). Discriminant validity was assessed by comparing AVE values against squared inter-construct correlations. Common method bias was examined using Harman's single-factor test. EFA and CFA were employed as initial validation procedures, while additional assessments such as criterion validity, measurement invariance, and cross-context replication are recommended for future research.

Results

1. Exploratory Factor Analysis

EFA was conducted on the calibration sample ($n = 229$). The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy was 0.872 and Bartlett’s test of sphericity was significant, $\chi^2(78) = 3215.78$, $p < .001$, confirming the suitability of the data for factor analysis. Initial extraction indicated that three factors had eigenvalues above 1.0 (6.80, 2.07, and 1.27). The fourth factor had an eigenvalue of 0.86; however, it was retained based on the scree plot inflection and theoretical alignment with the MES four-factor structure (Reidenbach & Robin, 1990). Although the fourth eigenvalue was below 1.0, the factor was retained because the scree plot indicated a four-factor solution and the utilitarianism items formed a conceptually distinct and internally reliable dimension. Nevertheless, this result should be interpreted as initial evidence requiring replication in other samples. Retaining four factors yielded a total explained variance of 84.60%.

One item from the utilitarianism domain was eliminated due to cross-loading on both the utilitarianism (loading = 0.38) and contractualism (loading = 0.35) factors, and a low communality ($h^2 = 0.29$). The remaining 13 items loaded cleanly onto their respective factors with primary loadings ranging from 0.735 to 0.941, all cross-loadings below 0.25, and communalities between 0.686 and 0.943. Cronbach’s alpha coefficients ranged from 0.916 (RE) to 0.955 (CON). Although this item was removed because of its weak loading, cross-loading, and low communality, the remaining three utilitarianism items continued to represent the core domain of aggregate benefit and harm. Therefore, the deletion was not considered to substantially reduce the conceptual coverage of the construct. Table 2 presents the full EFA results.

Table 2 Results of Exploratory Factor Analysis ($n = 229$)

Item	F1 ME	F2 RE	F3 CON	F4 UT	h^2
Factor 1: Moral Equity (ME) Eigenvalue = 6.80, Variance = 52.28%, $\alpha = 0.95$					
ME1: Unethical cannabis-related business practices are unjust	0.814	0.196	0.168	0.091	0.803
ME2: Unethical cannabis-related business practices are unfair	0.839	0.188	0.175	0.085	0.842
ME3: Unethical practices are not acceptable to me	0.809	0.212	0.148	0.078	0.818
ME4: Unethical practices are not morally right	0.841	0.178	0.157	0.074	0.843
Factor 2: Relativism (RE) Eigenvalue = 2.07, Variance = 15.93%, $\alpha = 0.92$					
RE1: These practices are culturally unacceptable	0.218	0.886	0.149	0.088	0.943
RE2: These practices are always unacceptable for most people	0.241	0.762	0.204	0.115	0.816
RE3: These practices are unacceptable for my friends/acquaintances	0.198	0.735	0.161	0.055	0.686
Factor 3: Contractualism (CON) Eigenvalue = 1.27, Variance = 9.78%, $\alpha = 0.96$					
CON1: This behavior violates a social contract	0.178	0.131	0.868	0.175	0.888
CON2: This behavior violates an unspoken promise	0.131	0.128	0.889	0.178	0.893
CON3: This behavior violates moral rules	0.148	0.175	0.848	0.188	0.867
Factor 4: Utilitarianism (UT) Eigenvalue = 0.86a, Variance = 6.61%, $\alpha = 0.95$					
UT1: This behavior minimizes benefits while maximizing harm	0.089	0.081	0.168	0.846	0.787

Item	F1 ME	F2 RE	F3 CON	F4 UT	h ²
UT2: This behavior leads to the least good for the greatest number	0.078	0.055	0.121	0.941	0.929
UT3: This behavior is rather disadvantageous to all	0.104	0.071	0.198	0.892	0.883

Note. Primary loadings in bold. Extraction: Principal Axis Factoring; Rotation: Varimax. KMO = 0.872; Bartlett's $\chi^2(78) = 3215.78$, $p < 0.001$. Total variance explained = 84.60%.

2. Confirmatory Factor Analysis

CFA was performed on the validation sample ($n = 224$) to assess the proposed four-factor structure. The measurement model demonstrated acceptable fit: $\chi^2(59) = 126.11$, $\chi^2/df = 2.14$, CFI = 0.979, TLI = 0.972, RMSEA = 0.071. All standardized factor loadings were statistically significant ($p < .001$), ranging from 0.808 (RE3) to 0.974 (RE1), with t-values from 17.72 to 27.71, supporting convergent validity (Anderson & Gerbing, 1988). Table 3 presents the full CFA results.

Table 3 Results of Confirmatory Factor Analysis ($n = 224$)

Factor / Item	Std. Loading	SE	t-Value	CR / AVE
Factor 1: Moral Equity (ME)				CR = 0.950 AVE = 0.825
ME1: Unethical cannabis-related business practices are unjust	0.910	—	N/A (fixed)	
ME2: Unethical cannabis-related business practices are unfair	0.911	0.044	22.31	
ME3: Unethical practices are not acceptable to me	0.886	0.045	20.75	
ME4: Unethical practices are not morally right	0.926	0.044	23.30	
Factor 2: Relativism (RE)				CR = 0.919 AVE = 0.791
RE1: These practices are culturally unacceptable	0.974	—	N/A (fixed)	
RE2: These practices are always unacceptable for most people	0.879	0.042	21.52	
RE3: These practices are unacceptable for my friends/acquaintances	0.808	0.059	17.72	
Factor 3: Contractualism (CON)				CR = 0.964 AVE = 0.900
CON1: This behavior violates a social contract	0.907	—	N/A (fixed)	
CON2: This behavior violates an unspoken promise	0.971	0.040	27.71	
CON3: This behavior violates moral rules	0.967	0.040	27.31	
Factor 4: Utilitarianism (UT)				CR = 0.945 AVE = 0.851
UT1: This behavior minimizes benefits while maximizing harm	0.909	—	N/A (fixed)	
UT2: This behavior leads to the least good for the greatest number	0.942	0.042	23.74	
UT3: This behavior is rather disadvantageous to all	0.916	0.043	22.30	

Note. All loadings significant at $p < .001$. Parameters fixed at 1.0 for identification; t-value not obtained (N/A) for fixed parameters. Model fit: $\chi^2(59) = 126.11$, $\chi^2/df = 2.14$, CFI = 0.979, TLI = 0.972, RMSEA = 0.071. CR = Composite Reliability; AVE = Average Variance Extracted; SE = Standard Error.

3. Reliability, Convergent Validity, and Discriminant Validity

CR values ranged from 0.919 (RE) to 0.964 (CON), all exceeding 0.70 (Nunnally, 1978). AVE values ranged from 0.791 (RE) to 0.900 (CON), all exceeding 0.50 (Fornell & Larcker, 1981), confirming convergent validity. Discriminant validity was fully supported: each construct's AVE exceeded all squared inter-construct correlations. The highest inter-construct correlation was ME–CON ($r = 0.613$, $r^2 = 0.376$), well below each factor's AVE. Harman's single-factor test yielded 24.62% variance, below the 50% threshold, indicating common method bias is not a concern.

Discussion and Implications

1. Theoretical Implications

This study makes several contributions to the tourism ethics and consumer behavior literatures. First, the validation of a 13-item, four-factor MEES—comprising moral equity, relativism, contractualism, and utilitarianism—confirms the multidimensional nature of consumers' ethical evaluations of cannabis-related hospitality and tourism products. The EFA and CFA results collectively demonstrate that the MES framework (Reidenbach & Robin, 1990) retains theoretical relevance and psychometric integrity when adapted to this novel and ethically complex context. The excellent CR values (0.919–0.964) and AVE values (0.791–0.900) attest to the robustness of the instrument.

Second, by distinguishing between deontological moral equity, culturally relative social norms, contractual obligations, and consequentialist utilitarian calculations, the MEES provides a richer portrait of how international tourists evaluate cannabis-related hospitality businesses than unidimensional ethical ratings could offer. The four dimensions represent different but complementary ways in which tourists evaluate cannabis-related business practices. Moral equity reflects judgments of fairness and moral acceptability, relativism reflects culturally influenced standards, contractualism concerns the responsibilities and obligations expected from businesses, and utilitarianism focuses on the wider benefits and harms of business practices. Although the four dimensions were empirically distinguishable, the present study does not establish that they are equally important across all cultural or regulatory settings. The mean scores suggest that contractualism ($M = 5.96$) and utilitarianism ($M = 6.43$) were the most salient dimensions, indicating tourists strongly perceive unethical cannabis businesses as violating social agreements and causing societal harm. Relativism recorded the lowest mean ($M = 5.41$) and highest variance ($SD = 1.22$), reflecting the cultural heterogeneity of an international sample.

Third, the MEES contributes to the emerging body of research on cannabis tourism (Wen et al., 2020) and cannabis-infused food (Meeprom et al., 2023) by providing the first validated instrument for operationalizing consumers' ethical evaluations in this domain. The scale can function as an antecedent, mediator, or outcome in future structural models examining boycott intention, protest behavior, and support for regulatory oversight.

2. Practical Implications

The MEES offers actionable implications for cannabis-related hospitality operators, destination management organizations (DMOs), and policymakers. The moral equity dimension indicates that tourists evaluate cannabis businesses against standards of justice and fairness. Operators who engage in transparent pricing, honest THC-level labeling, and non-coercive sales practices are likely to score favorably on this dimension, building consumer trust and reputational capital.

The relativism dimension's lower mean and greater variance highlight the cultural heterogeneity of international cannabis tourists. DMOs should recognize that communications emphasizing local regulatory compliance and community acceptance will resonate more

broadly than appeals to recreational novelty alone. The contractualism dimension's high mean scores suggest tourists hold implicit social expectations of ethical conduct; violations may provoke word-of-mouth penalties and online protest behavior.

The MEES may be used as a diagnostic research instrument by operators, destination managers, and policymakers. Operators may use the scale to identify whether consumers' concerns relate mainly to fairness, cultural acceptability, business responsibility, or potential social harm. Destination managers may use it to assess tourists' understanding of responsible cannabis-related practices, while policymakers may apply it in consumer surveys before and after regulatory or public-information initiatives. In Thailand, its application should focus on regulatory compliance, responsible communication, and consumer protection rather than the promotion of recreational cannabis tourism.

Limitations and Future Research

This study has several limitations. First, data were collected exclusively in Thailand, which exhibits distinctive regulatory, cultural, and market characteristics. The MEES's cross-cultural generalizability requires validation in other cannabis tourism destinations such as Canada, the Netherlands, or U.S. states with legalized recreational cannabis. Future research should replicate the scale across multiple jurisdictions to assess dimensional stability. The changing regulatory environment in Thailand may also affect how tourists evaluate cannabis-related practices. Furthermore, the study did not measure respondents' legal awareness, and ethical evaluations may therefore have been influenced by different levels of understanding of local cannabis regulations. Future studies should validate the MEES in countries with different regulatory systems and examine whether the four-dimensional structure remains stable across medical-use, recreational-use, and more restrictive contexts.

Second, the RMSEA value (0.071), though within acceptable bounds, suggests model fit could be improved. Future studies could explore modifications such as allowing correlated residuals between theoretically proximate items or expanding item pools to strengthen the relativism and utilitarianism dimensions. Third, the cross-sectional design limits causal inference. Longitudinal designs would enable tracking of how ethical evaluations evolve as cannabis tourism markets develop. Future research should also examine domestic tourists and local residents to broaden the policy relevance of findings.

Conclusion

This study developed and validated a Multidimensional Ethical Evaluation Scale (MEES) for cannabis-related products in hospitality and tourism, grounded in the MES framework (Reidenbach & Robin, 1990). Through rigorous application of Churchill (1979) scale development paradigm—encompassing item generation, expert panel review, EFA, and CFA—a final 13-item, four-factor scale comprising moral equity, relativism, contractualism, and utilitarianism was validated with strong reliability, convergent validity, and full discriminant validity. The MEES addresses an important measurement gap in the tourism ethics and cannabis hospitality literature and provides an initially validated instrument for future research on ethical consumer evaluations, regulatory communication, and consumer protection. Further validation across different cultural and regulatory settings remains necessary.

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INDUSTRY ASSOCIATION-LEVEL DOUBLE MATERIALITY ASSESSMENT (DMA): A THREE-PHASE PROCESS MODEL FOR THE GERMAN HOUSING SECTOR

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Abstract

This study presents initial findings from an ongoing research project on the implementation of sustainability strategies in smaller companies. More specifically, it demonstrates how a double materiality analysis (DMA) could be carried out at association level. Members are provided with a customisable DMA ‘starter kit’. Many companies struggle to develop and implement a sustainability strategy due to limited resources. The Housing Association in South-West Germany (VdW) serves as a case study in this paper. The study summarises the process by which the association carried out its DMA at sector level. On this basis, the authors offer a step-by-step and adaptable framework for other (similar) associations to develop their own DMA starter kit for their members, regardless of sector.

Keywords: *Materiality, Double Materiality Analysis, Sustainability reporting, Sustainability Strategy, industry level, SME*

Introduction

Following the European Union’s Corporate Sustainability Reporting Directive (CSRD), which was first published in December 2022 (European Parliament, 2013), a clear trend emerged whereby companies threw themselves wholeheartedly into the process and began with the first associated step: conducting a double materiality analysis (DMA). The aim of the CSRD was to raise non-financial reporting to a standard comparable to that of financial reporting. In 2025, when the research on which this article is based began, the Omnibus Regulation (European Commission, 2025) was adopted, which provided for a drastic narrowing of the scope of application. This was the response to the widespread criticism that the CSRD’s requirements, with 1,1178 data points (EFRAG 2022; Herzog 2023), were excessive.

In order to facilitate and pursue a more collaborative, holistic and targeted approach to sustainability, it seems sensible for industries to join forces. Companies that come together have greater potential to work collectively towards a more sustainable future. In order to comply with reporting requirements, every company must carry out its own materiality analysis. This applies regardless of the fact that impacts, risks and opportunities (IRO) are similar across sectors. For this reason, there are a number of studies that focus on materiality analysis (Papafloratos et al. 2023). As SMEs form part of sustainable supply chains, reporting to customers is a key competitive advantage, and compliance with the legal framework is also of crucial importance (Kannan et. al., 2025). At the same time, resources in smaller companies are generally more limited, particularly when it comes to reporting. To address this situation, associations can play a crucial role by providing support through best practices for implementing a successful sustainability process (Hegab et al., 2023). When it comes to

conducting a DMA, existing research suggests a lot of ambiguity (Reimsbach et al., 2020; Beske et al., 2020) and the more complex the company is, the more complex this process becomes (Beske et al., 2020; Brown et al., 2009). This study therefore aims to provide, at sector level, a comprehensive guide to developing a sustainability strategy based on a DMA (Setyaningsih et al. 2024). While existing industry-specific research in this area address thematic content and disclosure indicators, they do not offer structured process guidance for the DMA itself (Torelli et al., 2019). A framework at the association level can also address inconsistencies at the individual level (Beske et al., 2020; Edgeley, 2014; Puroila et al., 2019; Reimsbach et al., 2020; Padilla-Garrido et al., 2024).

The study focuses on the housing sector. This is an industry with which everyone has some connection, as everyone needs somewhere to live. For example, around 30% of all rented properties in Germany – that is 6 million homes and 13 million people – are managed by 3,000 companies that have joined together to form an association. Through this association, the sector assumes social responsibility and works together with its members to create vibrant and liveable neighbourhoods. They do this regardless of any criteria relating to diversity, without discrimination on the basis of status, origin, education or religion. The sector can thus be a pioneer in the energy transition and the creation of age-appropriate housing in towns and communities (GdW, n.d.). A regional representative in this field is VdW südwest (VdW hereafter). This comprises just under 200 cooperative, municipal and private housing companies in the German federal states of Hesse and Rhineland-Palatinate, representing just under 470,000 homes and 1.1 million people. The association represents political and economic interests and offers its members the opportunity to act together in a socially, environmentally and economically responsible manner (VdW Südwest, n.d.).

Literature Review

In 2019, the European Commission published the Green Deal as a commitment and an integral part to implement the United Nations 2030 Agenda and the Sustainable Development Goals (SDGs) (European Commission, 2019). The aim was to transform the European economy towards a sustainable future and to redirect commercial economic flows towards sustainable investments in order to bring a transformative change in our economy, society and industry (Kunzmann J. et al., 2021; European Commission, 2019). A significant part of this deal was the introduction of non-financial reporting requirements. The result is the Corporate Sustainability Reporting Directive (CSRD), which came into force on 1 January 2024 and required companies to disclose their sustainability activities (European Commission, 2023). Both qualitative and quantitative data are required. The multitude of possible data points from 1,1178 data points (EFRAG, 2022; Herzog, 2023) seems, at first a significant amount. The regulations also require the implementation of a materiality analysis (DMA) as a central component (EFRAG, 2022). This allows companies to significantly reduce the number of data points; however, they must also report on the specific procedure they have followed to achieve this (EFRAG, 2022). The intention of a DMA is to help companies evaluate how sustainability issues affect them and their environment, and to evaluate the prospects, risks and opportunities and involve in the process those of most concern such as internal and external stakeholders (Eccles et al., 2015; Jones et al. 2016; León et al., 2023; Torelli et al., 2019). Authors such as Edgley (2014) argue that materiality has to be interpreted as well as a performance activity to make visible what is hidden. This is also reflected in the application's objective in the field of sustainability: to identify the company's risks, opportunities and impacts (IRO). (Garst et al., 2022) has discovered and provided materiality assessments based on the GRI perspective with business case or financial perspective and societal impact influences or stakeholder perspective they provide a framework with six steps for individual

companies. At the association level, however, this is not directly applicable within the framework of the ESRS from the IRO perspective and should therefore be considered separately.

Studies by the German Sustainability Code (DNK) (Deutscher Nachhaltigkeitskodex, 2022) and the IIÖ & CRREM Initiative (2024), which have examined the relevant sustainability issues in the housing sector in depth, identify the following key themes that are similar across sectors: the provision of affordable/modern housing for a broad section of the population, environmental protection, social responsibility towards the local population, strengthening the local economy, the energy efficiency of residential buildings, barrier-free access to housing, e-mobility infrastructure, urban development policy requirements, soil sealing, use of building materials, circular economy, climate adaptation in cities, skills shortages, development of new business areas and obviously everything related to their own employees. Moving on in this paper, we will examine the approach to prioritizing these points, using VdW as an example.

Objectives

Based on the materiality assessment process carried out by the VdW, with particular focus on the structuring, methodological design, stakeholder engagement, calibration of thresholds, and the associated implementation challenges between the DMA defined in the ESRS and its practical application within an organisation with limited reporting capacity, to examine what a transferable conceptual framework might look like, through which industry associations in the housing sector can provide DMA process templates that are both legally compliant and practical.

Conceptual Framework

This paper draws a process model to develop a DMA on an association level with the underlying premise that the regulatory requirements of the ESRS define the normative constellation, but they do not resolve the practical question of how organizations with limited resources can conduct such an assessment in an efficient manner. The framework proposed in this article views the industry association as an institutional interface between regulatory authorities and individual companies. It can be understood as a "starter kit" that other members of the organization can adapt to their respective operational circumstances, and other associations can also adopt the process at their own level.

Methodology

Due to the complexity of sustainability-related materiality assessment and the regulatory requirements the authors selected a mixed method approach (Creswell et al.; 2004) to gain a broader understanding how sustainability matters affect the undertaking's development, performance and position (Baumüller et al.; 2022). Therefore, different sources of data were integrated to obtain a comprehensive understanding combining qualitative desk research, qualitative expert interviews and qualitative validation. The company under investigation is the double materiality assessment conducted by the Verband der Südwestdeutschen Wohnungswirtschaft e.V. (VdW) (association of the housing industry southwest Germany) between May and August 2024, carried out in accordance with the requirements of Directive 2022/2464/EU (European Commission, 2022) the European Sustainability Reporting Standards (ESRS) in the processing status of 31 July 2023 (European Commission; 2023). It was selected because it constitutes a documented, standards-compliant instance of DMA implementation at the association level. Enabling a framework proposal for other industry level DMAs. Conducting a DMA at the association level differs significantly from conducting one at the company level in that the main stakeholders, all of the companies

represented in the association are also individual members of the association. This study also outlines a procedure that enables association members to conduct a simplified DMA in which they can and should involve their individual stakeholders.

Table 1 Data Source

Source type	Subdomain	Content
Impact research	Academic and practitioner literature	Peer reviewed studies and sector reports on environmental and social impacts in the housing sector
Regulatory analysis	External standards and sector regulation	CSRD, ESRS, DNK, TCFD, GRI, SASB and housing specific regulation such as GEG, WPG, EED
Status quo analysis	Internal and publicly available VdW member documentation	Existing sustainability reporting and website analysis
Environment Analysis	Comparable organizations	Housing companies and Associations outside the VdW

The resulting long list was reduced, clustered and grouped by the project team into an IRO grounding shortlist mapped to ESRS 1, Annex A/AR16 to serve as input for the expert assessment phase.

1. Stakeholder Consideration

Because the assessment was conducted at association rather than company level, primary stakeholder interviews were not repeated by VdW. Instead, the project drew on a reference stakeholder survey conducted at sector level in December 2023 by the CSRD working group of the GdW Bundesverband and regional housing associations (GdW Referenzbefragung, 21.12.2023), in which external stakeholders including a state ministry, industry chambers, tenant associations, and financial sector representatives were interviewed on materiality perceptions relevant to the housing sector. This reference survey was used as the basis for stakeholder mapping (criteria: *concern* and *interest*) in the VdW process. Direct stakeholder consultation at the level of individual tenants or municipalities remains a task to be completed by member companies at company level, as outlined in Phase 3.

2. Limitations of the Design

The assessment instrument was not formally piloted before deployment; the standardized briefing served a comparable calibration function but did not constitute a pilot test in the methodological sense. The expert assessment window (five weeks) was relatively short for the number of topics covered, which may have limited the depth of individual reflection. A Delphi-style, multi-round design was considered but not adopted given resource constraints. Because the VdW process was conducted under the ESRS 1 processing status of July 2023, subsequent regulatory developments the Omnibus Regulation (European Commission, 2025) and the EFRAG draft revision of ESRS 1 (November 2025) are not reflected in the assessed topic scope; this is addressed further in the Discussion.

Results

Phase 1 – Analysis: The first phase of the VdW process was a structured desk research conducted between May and June 2024. Based on four source types. First type was an impact

research review of academic (Churkina et al.; 2020; Schadow; 2022; Mina et al.; 2021) and practitioner literature (EPRA Green Governance report, Building Transparency (2021): (Bundesamt für Wirtschaft und Ausfuhrkontrolle, 2023) a regulatory analysis (e.g. CSRD, ESRS, DNK, TCFD, GRI, SASB). Continuing with a status quo assessment of publicly available and internally provided VdW sustainability documentation, and a peer analysis of comparable housing organizations and associations. The aim of that phase was to produce a comprehensive, sector specific topic collection subsequently mapped to the ESRS thematic structure. The long list was subsequently reduced and structured through a clustering and grouping process conducted by the project team, yielding an IRO-grounding shortlist mapped to ESRS 1 Annex A / AR16 (European Commission; 2023b) and serving as the analytical input for the upcoming expert assessment phase.

Phase 2 – Assessment: The second phase was conducted between July and August 2024. Experts across the whole association got selected n=29 and assigned to the thematic chapters corresponding to ESRS E1–E5, S1–S4, and G1. Selection criteria were mostly the person responsible for sustainability in the association member. All of them received a standardized briefing prior to scoring to ensure uniform understanding of the assessment criteria and a consistent application of the scale (1–6) with the criteria of scale, scope, irremediability and likelihood. All of them assessed each topic quantitatively from both perspectives of the DMA, meaning impact materiality (inside out) and financial materiality (outside in) (European Commission; 2023; EFRAG, 2024). After their quantitative questionnaire they got interviewed to justify their assessment. Concluding in a consolidation workshop held on 30 August 2024 derived a cross-cutting threshold value of an average 60 from the cluster distribution of expert scores, applicable to both perspectives and across all ESRS topics. This threshold has been selected within the based on the specifications of the Association Member Discussion. Eight sustainability topic areas were ultimately identified as material: climate change (E1), circular economy (E5), own workforce (S1), workers in the value chain (S2), affected communities (S3), consumers and end-users (S4), and corporate governance (G1). The absence of material topics under E2, E3, and E4 reflects the specific operational profile of the housing sector, in which direct environmental impacts are concentrated in energy use and resource flows rather than in pollution, water, or biodiversity (Deutscher Nachhaltigkeitskodex, 2022; IIÖ & CRREM Initiative, 2024). Using a dedicated online assessment tool ("OMA") and subsequently provided a qualitative justification for each score. Scoring and justification were captured together, allowing IROs to be derived directly from the expert reasoning.

Table 2 summarizes the scoring ranges for the seven ESRS topics ultimately identified as material at association level, applying the threshold of 60 derived in the Methodology section.

ESRS topic	Sub-topic	Financial risk	Negative impact	Financial opportunity	Positiv impact
E1 – Climate change	E1.1; E1.2; E1.3; Adaptation, mitigation, energy	66-73	68-70	48-50	36-41
E5 – Circular Economy	E5.1; E5.2; E5.3; Resource inflows, outflows, waste	47-66	42-56	26-40	15-26
S1 – Own Workflows	S1.1; S1.2; Working conditions, equal treatment	42-58	25-28	67-75	41-52

ESRS topic	Sub-topic	Financial risk	Negative impact	Financial opportunity	Positive impact
S2 – Workers in the value chain	S2.1; S2.2; S2.3; Working conditions, equal treatment, other labour rights	20-68	45-50	63-78	10
S3 – Affected communities	S3.1. Economic, social and cultural rights	10	80	60	30
S4 – Consumers and end-users	S4.1; S4.3. Information related impacts, social inclusion Additional added in consultation workshop G.1.1; G1.4. and G1.5	39-67	67-69	75-79	39-73
G1	Corporate Cluture, Political engagement, supplier relationship management	24-49	10-32	6-53	6-35

Illustrative IROs. For each material topic, experts derived concrete IROs alongside their quantitative scores. Examples include (paraphrased and anonymized from the underlying expert documentation):

- E1 – Climate change: Building production and use account for an estimated 10% and 40% of the sector's CO₂ emissions respectively (Expert A); physical risks such as urban heat islands raise maintenance costs and tenant health concerns, while transitional risks include regulatory restrictions on letting non-compliant properties (Expert B, Expert C).
- E5 – Circular economy: New construction consumes substantial virgin resources (aggregate, timber, cement), with particular concern around non-certified timber and composite insulation systems that resist material separation at end-of-life (Expert D); reuse of demolition material was identified as a financial opportunity constrained by regulatory and warranty barriers.
- S1 – Own workforce: Collective agreements and works council structures were identified as a positive baseline (opportunity), while the shortage of skilled technical staff, compounded by demographic change, was identified as a material risk to organizational capacity.
- S3 – Affected communities: The creation of socially oriented housing was identified as a primary positive impact channel, with limited but present risk exposure around neighbourhood-level social tension.
- S4 – Consumers and end-users: Tenant data protection was identified as a high-priority risk area, given the sensitivity of tenancy-related personal data and dependency on IT security controls.

Note on G1: Unlike the other six topics, no individual G1 sub-topic clears the 60-point threshold on the negative-impact/risk perspectives in the scoring data (highest values: company culture, risk 45 / opportunity 53). Governance was nonetheless carried forward as materially relevant based on qualitative validation in the consolidation workshop rather than the quantitative threshold alone.

Phase 3 – Starterkit Transfer: The third phase involved the consolidation of the validated materiality results, including the shortlist of material topics dedicated to the relevant

ESRS and the associated IROs. This starterkit got provided to all of the VdW member organizations to serve them as a starting point for their own DMA implementation incl. a structure of a framework which ensured transferability to their own value chain, business relationships, and operational context.

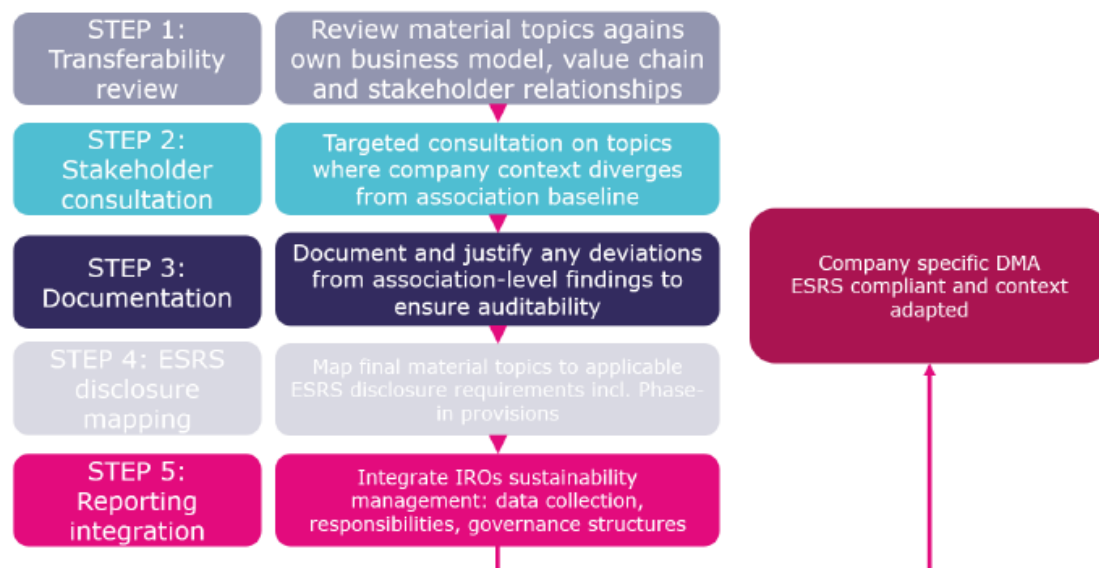


Figure 1. ASSOCIATION STARTERKIT
Source: (Author)

Discussion

Conducting this study within the VdW demonstrates that each of the three phases gained further insights that would not be apparent without the other phases. The desk research phase generated a standards-compliant, multi-source topic inventory, meaning individual member companies do not need replicate a DMA themselves (Henry et al., 2023; Setyaningsih et al.; 2024). The expert assessment phase produced a calibrated materiality threshold grounded in sector-specific expert knowledge rather than an externally imposed numerical stakeholder questionnaire and the starterkit transfer a structured, transferable reference document that reduces the effort required to initiate a company level DMA (European Commission; 2023). This process is, in principle, replicable for other associations conducting a DMA at a higher level, which is also replicable and defensible. The findings support the argument that association level DMA provides a qualified contribution for a sustainable strategy and reporting ecosystems. On an individual level conducting a DMA with the help of the association is helpful. However, a tailored sustainability strategy must be developed based on the results of the company's own materiality analysis (León et al., 2023). This strategy should address issues that are, of course, material and a DMA grow awareness for those topics, as well as the areas the company wishes to pursue strategically. This is recommended for every company, as a lack of a strategy built upon the materiality analysis often leads to a rush to take action that loses sight of the company's core focus (Galpin et al. 2015). On an association level standardized KPIs also could be discussed to really follow the overall goal to lower impact (Hristov und Chirico 2019).

Conclusions and Implications

In light of the findings regarding key IROs in the housing construction sector, it is proposed that the use of a comprehensive DMA be further developed into cross-sector, target-specific guidelines for companies, thereby providing a clearer overview of the sector's

performance in relation to Germany's holistic ESG goals and global climate reduction targets. Furthermore, an association can provide its members with further support in achieving these goals and also counter concerns such as greenwashing (or 'rainbowwashing'), as an industry-wide standard can be established in this way (Henry et al., 2023). The presented study also has some limitations that should be acknowledged. First, the analysis is based on a single association, which limits the generalization. Therefore, the three-phase model needs to be tested in other association contexts or the starterkit needs to be adapted in other housing associations to see if the results are useful to other single companies that the ones who have been conducted as well. (León et al., 2023) said that "sector-specific frameworks for materiality could help companies determine the content of their reports. By employing guidance that identifies the environmental, social and governance issues that are material to a sector." Moreover, the expert assessment phase is relatively short and changes in the ESRS have been made over the last years. Multiple rounds might have strengthened the findings or even found out different ones. And lastly the VdW process was conducted under the ESRS 1 processing status of July 2023; the November 2025 EFRAG draft revision of ESRS 1, future applications of the model will need to take the new regulatory development into account (European Mission, 2025; European Commission, 2026). Also if the scope of the companies who has to perform a sustainability reporting is narrowed down a lot of housing companies don't have to provide a DMA or a reporting so the question remains why it is still necessary to perform a DMA or a sustainability reporting for a company's long term strategy (European Mission, 2025; European Commission, 2026).

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THE IDEAS ENGINE: AN EXPLORATORY STUDY OF A STRUCTURED IDEA-COLLECTION CYCLE

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Abstract

Curiosity, divergent thinking, and exploration are core intellectual skills for handling complex, open-ended problems in academic, professional, and civic life. Yet in many university and training programs these skills are treated as secondary, or isolated within stand-alone creativity or critical thinking courses. Even though they are recognized as essential modern competencies, they are often overshadowed by technical skills that are easier to teach and measure. This study reports an initial, exploratory test of a structured teaching model, called the Ideas Engine, designed to make sustained idea generation a visible, repeatable classroom practice.

The model was implemented with 100 first-year undergraduate students over a single 15-week term. Each week, students followed a three-stage cycle: (1) collecting observations and ideas, (2) organizing and reviewing what they had gathered, and (3) writing a short summary statement describing what they had learned and how they intended to proceed the following week. Engagement was measured through concrete indicators, such as the quantity of ideas collected, and the number of consecutive days in which a student remained active, and related to performance on graded course assessments.

Participation was uneven. Students fell into three tiers, based on the quantity of submitted ideas: a small group of consistent contributors who collected ideas in volume and sustained the practice across most weeks, a larger group of moderate contributors, and a substantial group of low contributors who engaged infrequently. Idea collection was positively associated with academic performance: correlations with two assignments and a quiz were statistically significant, while the correlation with final-project performance was positive but did not reach significance.

These findings are preliminary. They suggest that a structured collection cycle with regular reflection can sustain ideation for some students, and that such engagement tracks with academic outcomes. Student commitment varied considerably, and the results do not yet establish that the cycle leads to improved creativity. This study offers an initial foundation for further empirical investigation into how iterative structures influence the development of curiosity and exploratory reasoning across disciplines. Follow-on research should seek to develop a practical instructional model.

Keywords: *Divergent Thinking, Creativity Training, Experimental Learning*

Introduction

As educators of business students, we observe a regular pattern. The real-world problems faced after graduation are messy, uncertain, and open-ended, while the problems students work on in the classroom are often carefully structured, with clear steps and expected answers. The same contradiction appears in innovation education. Organizations expect graduates to think creatively and entrepreneurially, yet creativity is often taught as a collection of tools or stand-alone activities rather than as a sustained practice. Going further, nearly everyone calls for people to "think outside the box, " and yet courses, organizations, and even students themselves, often reward predictable processes and certain outcomes instead. In Thailand, as in other countries, there is continuing concern that students at undergraduate, graduate, and executive levels are not developing skills that transfer effectively to practical work.

This study examines one possible response to these gaps through the implementation of a repeated learning cycle called The Ideas Engine. The cycle consists of three steps: collecting ideas, organizing them to identify patterns, and reflecting on them before repeating the process in the next cycle. Collecting ideas is a concrete activity with a measurable outcome, the quantity of ideas generated. Weekly repetition creates a consistent structure for practice. The central question was whether repeatedly performing these concrete activities would produce noticeable improvement in the more qualitative and abstract thinking required during reflection. The results of this study are intended to support further development of the Ideas Engine as a practical learning tool and to contribute to learning outcomes better aligned with real-world problem solving.

Literature Review

Karl Popper argued that "all life is problem solving" (Popper, 1991). The phrase was an important conclusion from a lifetime of work and a substantial body of work concerned with how scientific knowledge develops. It is the title of both a chapter and the book in which it appears, reflecting its central place in Popper's philosophy of science. After more than six decades studying how scientific knowledge develops, Popper concluded that progress, whether in science or everyday life, comes through identifying problems, proposing solutions, and learning from the results.

In the same chapter, Popper offers a sharp criticism:

"One thing I am willing to admit: that we are more stupid than ever before... The worst of it is that we learn nothing from these mistakes" (Popper, 1991).

He argues that education plays a central role in this failure. Poor teaching produces poor problem-solving habits. If problem solving is a fundamental human activity, then understanding why people struggle to develop it becomes an important educational question.

This literature review examines four connected themes. First, problem solving is difficult because many real-world problems are ill-structured rather than well-defined. Second, formal education often emphasizes well-structured problems with clear answers, creating a mismatch between classroom learning and practical application. Third, creativity and divergent thinking are commonly associated with stronger problem-solving capacity. Finally,

practitioners often rely on iterative learning cycles that include reflection, experimentation, and revision as part of effective problem-solving practice.

Most real-world problems are ill-structured. Simon (1973) illustrates this through the example of an architect designing a house. At the outset, neither the exact specifications nor the “right” outcome are fully defined. Multiple design styles, materials, and construction approaches remain possible. Success is not determined by applying a fixed procedure, but is discovered gradually as the work unfolds. Even with drawings and models, the architect cannot fully predict or demonstrate how the completed building will perform in practice.

By contrast, a well-structured problem begins with a known starting point and a clearly defined goal. There are explicit criteria for judging whether a solution is correct, and the intermediate steps can be represented, tested, and evaluated systematically (Simon, 1973). These problems are common in education, where learners are taught established rules and principles within stable knowledge domains. Schön (1987) uses a topographical analogy, describing high, hard ground overlooking a swamp. On the hard ground, problems are clearly defined and manageable, and the tools to solve them are known. In the swamp, however, the situation is messy and confusing. The irony, according to Schön (1987) is that the problems of the hard ground are desirable to work on only because they lend themselves to clear and interesting technical solutions. The problems of greatest human concern, however, lie in the swamp.

This creates an important gap. Educational systems often assume that success in solving well-structured problems will transfer directly to real-world performance. In reality, such transfer is limited, because everyday professional and social challenges are typically ill-structured, requiring judgment, adaptation, and exploration rather than the application of fixed procedures (Jonassen, 1997).

Creativity is central to problem solving because useful solutions must be both effective and novel. It depends on two related abilities: generating many possible ideas and reshaping existing ones into new possibilities. Osborn (1953) argued that generating many ideas increases creativity. Producing more ideas increases the range of possibilities and improves the chance of finding a valuable solution. To encourage this process, he developed brainstorming, which has since become one of the most widely used techniques for idea generation (Sutton & Hargadon, 1996). As creativity research became more systematic, *fluency*, or the number of ideas produced, became one of the standard measures of creative performance (Guilford, 1968; Runco, 2007).

Generating ideas is only part of the process. Good problem solving also requires judging which ideas deserve further development. Convergent thinking is the ability to evaluate, compare, and select the most promising ideas from a larger pool (Runco, 2007).

Overall, solving ill-structured problems requires an iterative process. People must make sense of situations that are initially unclear, establish criteria for evaluating solutions, act, learn from the results, and continually reframe both the problem and the solution. Problem solving therefore becomes a cycle of framing, action, feedback, and reappraisal (Schön, 1983).

If this is how ill-structured problems are solved, then learning environments should be designed to develop these same capabilities. Jonassen (1997) argues that assessment should extend beyond the final solution to consider the reasoning used to reach it. Learners should demonstrate how they framed the problem, explored alternative perspectives, applied relevant knowledge, and justified their decisions. Because understanding develops through reflection and revision (Schön, 1983), assessment should also capture evidence of how learners refine

both their thinking and their solutions over time.

Objectives

The objective of this study is to investigate patterns of learner engagement using The Idea Engine (continuous idea collection, organization, and distill) throughout a university course and examine how engagement varied among students, and assess whether higher levels of engagement are associated with academic performance. Our research questions are:

1. What patterns of engagement emerged as learners collected ideas continuously throughout the course, and how did that engagement vary across students?
2. Was engagement in continuous idea collection associated with academic performance?

Outcomes were evaluated using two sources: 1) quantitative measures of engagement, including the total number of ideas collected and the number of active weeks, and 2) performance in graded course activities, comprising two assignments, a quiz, and a final project. A post-course participant survey was also administered; its analysis will be reported separately.

This study was exploratory. Its purpose was to investigate whether a structured cycle of collection, organization, and reflection could increase learner engagement with exploratory problem solving. The findings are intended to guide refinement of the Ideas Engine and inform future research into the teaching and assessment of exploratory problem-solving capability.

Methodology

The literature shows a persistent gap between the kinds of problems learners typically encounter and the kinds of problems they will face in practice. Classroom activities often emphasize well-structured problems with clear answers and measurable outcomes, while innovation and professional practice require learners to navigate uncertainty, frame ambiguous problems, and refine their understanding through exploration and reflection.

To address this gap, this study designed and evaluated a structured learning process, called *The Ideas Engine*. The process consists of three recurring states, Collect, Organize, and Distil, that combine concrete, measurable activities with regular reflection while working through ambiguous and evolving problems. The objective was to help learners develop exploratory problem-solving capability through a repeatable and measurable learning process.

1. Collect

Participants continuously collected ideas, observations, questions, and potential problem areas throughout the course. Progress was measured using two objective indicators:

- Total number of ideas collected
- Number of active weeks, defined as the number of weeks in which at least one note was recorded

A visible leaderboard displayed both measures throughout the term, providing learners with immediate feedback on their level of engagement.

2. Organize

Participants regularly grouped their collected notes into themes, categories, or emerging problem areas. No predefined classification system was provided. Instead, learners developed and revised their own organizational structures as their understanding of the problem evolved.

3. Distil

Each week, participants submitted a written *Distil Statement*. The statement required them to:

- Reflect on the ideas collected during the week

- Identify patterns, themes, or emerging insights
- Evaluate the potential value of those insights
- Critique their own collection process
- Decide whether exploration in the next cycle should focus more narrowly or broaden exploration into new areas

This phase was designed to support reflection, reframing, and iterative learning, consistent with the exploratory problem-solving process described in the literature.

4. Cycle Duration

The Collect–Organize–Distil cycle was repeated weekly over 15 weeks.

Results

Across the 15-week term, 100 first-year university students produced a total of 5,145 recorded text and image notes, an average of 52 ideas per student, or 3.43 ideas per week. The most active student collected 249 notes, while the median number of ideas collected was 35.5.

Table 1 reports descriptive statistics for total notes collected and other variables examined in this study. Engagement with the Ideas Engine varied widely across students. Total notes collected showed a large standard deviation ($SD = 48.22$) relative to the mean. Assignment 1 ($M = 7.23$, $SD = 0.98$) and Assignment 2 ($M = 7.04$, $SD = 0.57$) showed comparatively little variation across students, whereas quiz scores were more widely distributed ($M = 8.35$, $SD = 5.71$). Final project scores showed intermediate variability ($M = 8.30$, $SD = 2.39$).

Table 1 Descriptive statistics for engagement and academic performance variables. ($n = 100$ students)

Variable	Mean	SD
Total notes collected	51.45	48.22
Assignment 1 score	7.23	0.98
Assignment 2 score	7.04	0.57
Quiz score	8.35	5.71
Final project score	8.30	2.39

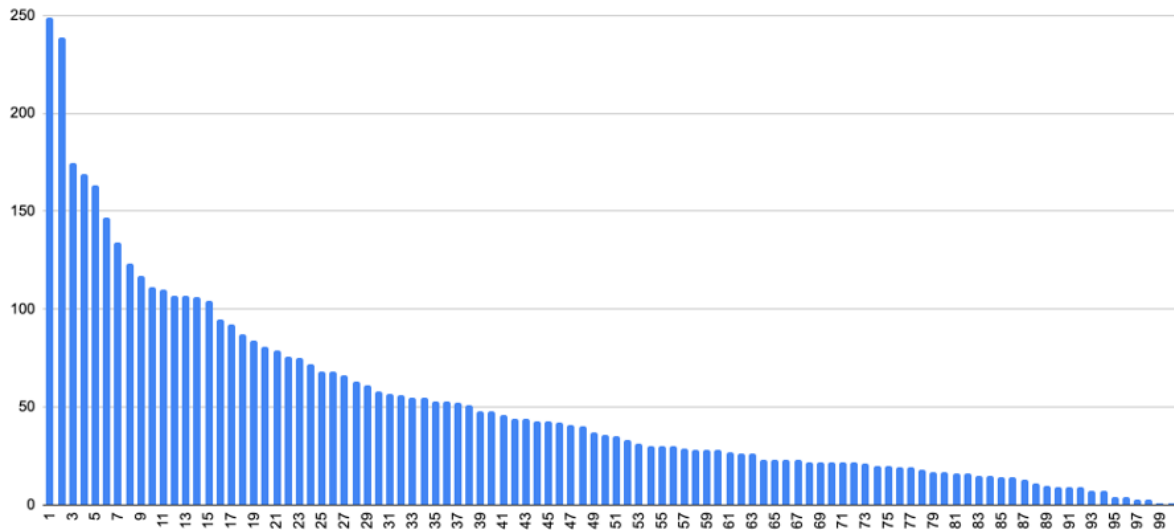


Figure 1 Distribution of student output by quantity of notes collected.

To examine patterns of participation, students were grouped into three participation profiles based on their average weekly idea production: consistent contributors (≥ 7 ideas per week), moderate contributors (2–6.99 ideas per week), and low contributors (< 2 ideas per week). Fourteen students (14%) were classified as consistent contributors, 42 students (42%) as moderate contributors, and 44 students (44%) as low contributors.

Table 2 Categories of contributors based on quantity of ideas. (n = 100)

Group	Criteria	n	%
Consistent contributors	≥ 7 ideas/week	14	14%
Moderate contributors	2–6.99 ideas/week	42	42%
Low contributors	< 2 ideas/week	44	44%

All students contributed at some point during the course, although participation differed substantially, as shown in Figure 2. Consistent contributors were active during an average of 12.4 of the 15 course weeks. Moderate contributors were active for an average of 9.2 weeks, while low contributors were active for an average of only 4.5 weeks. Students in the consistent contributor group collected an average of 147 ideas across the semester (nearly 10 per week), compared with 56 ideas (just under 4 per week) among moderate contributors and 17 ideas (approximately 1 per week) among low contributors.

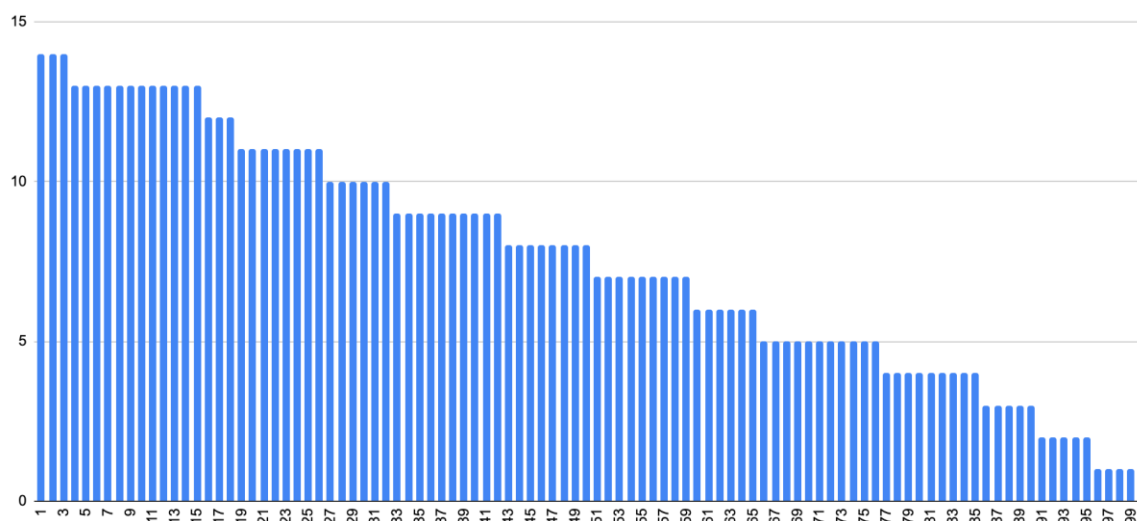


Figure 2 Distribution of student output by number of active weeks (at least one idea per week).

The relationship between idea collection and academic performance was examined using Pearson correlations. Total number of ideas collected was positively correlated with Assignment 1 performance ($r = 0.224$, $p = 0.027$), Assignment 2 performance ($r = 0.326$, $p = 0.002$), and quiz performance ($r = 0.319$, $p = 0.001$). The correlation with final-project performance was also positive ($r = 0.185$), although it did not reach statistical significance ($p = 0.064$).

Table 3 Academic performance correlated with the total number of ideas collected. ($n = 100$)

Outcome	Correlation with total ideas	Interpretation
Assignment 1	$r = 0.224$, $p = 0.027$	Weak positive relationship
Assignment 2	$r = 0.326$, $p = 0.002$	Moderate positive relationship
Quiz	$r = 0.319$, $p = 0.001$	Moderate positive relationship
Final project	$r = 0.185$, $p = 0.064$	Positive but not statistically significant

Discussion

The study addressed two research questions: whether distinct patterns of engagement emerged as students participated in continuous idea collection, and whether engagement was associated with academic performance.

The results demonstrate that participation in the Ideas Engine was far from uniform. Although every student contributed ideas during the semester, only a small proportion developed a sustained pattern of participation. Fourteen percent of students became consistent contributors, while nearly half of the class remained low contributors throughout the course. This uneven pattern suggests that although the structured cycle was readily adopted by some learners, maintaining regular engagement presented a challenge for many others.

The observed participation profiles suggest that sustained engagement may be as important as overall output. Consistent contributors not only generated substantially more ideas than other students but also remained active throughout most of the semester. Their engagement was characterized by repeated participation rather than isolated periods of high productivity. This distinction is noteworthy because the Ideas Engine is intended to develop exploratory habits through continual observation, collection, organization, and reflection rather than through occasional bursts of idea generation.

Positive relationships between engagement and academic performance were observed across all assessed outcomes. Three of the four academic measures showed statistically significant positive correlations with the quantity of ideas collected, while the final project showed a positive but non-significant relationship. Although the observed correlations were modest, they were consistent across multiple assessment types, suggesting that students who engaged more actively with the collection process also tended to perform better academically.

These findings are consistent with the theoretical perspective presented in the literature review. Prior work argues that exploratory problem solving develops through repeated cycles of observation, reflection, and revision rather than through the application of fixed procedures alone. The results do not demonstrate that the Ideas Engine develops exploratory capability directly, but they do suggest that sustained participation in such a cycle is associated with stronger academic performance.

At the same time, the direction of causality remains uncertain. Because this study was exploratory and observational, it is not possible to determine whether students performed better because they participated consistently in the Ideas Engine, or whether stronger students were simply more likely to engage with the process. Both explanations remain plausible, and the present data cannot distinguish between them.

This uncertainty highlights an important direction for future research. Educational research has frequently identified Matthew Effect patterns in which early success produces cumulative advantages over time. If exploratory learning follows a similar trajectory, students who begin with weaker exploratory habits may become progressively less willing to engage in activities such as idea collection and reflection. An important question, therefore, is whether a structured learning cycle can alter that trajectory by helping learners gradually develop stronger exploratory habits through repeated practice.

Conclusions and Implications

This exploratory study examined whether a structured cycle of idea collection, organization, and reflection could support learner engagement with exploratory problem solving. Participation varied considerably across students, but higher levels of engagement were consistently associated with stronger academic performance across several assessment measures.

The study provides initial evidence that the Ideas Engine can function as a practical instructional framework for making exploratory practice visible, repeatable, and measurable within a university course. At the same time, the findings should be interpreted cautiously. The study measured only the quantity of ideas collected, did not evaluate the quality of those ideas, and cannot establish causal relationships between participation and academic outcomes.

Future research should examine whether sustained participation leads to measurable improvements in exploratory capability over time. In particular, the weekly Distil statements provide an opportunity to investigate how learners' reflective thinking develops across repeated

cycles. Longitudinal studies and experimental interventions will also be needed to determine whether structured idea collection can strengthen exploratory problem-solving capability rather than simply reflecting pre-existing differences among learners.

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TELLING THAILAND'S STORY: A CASE STUDY OF THAI INFLUENCERS AS CULTURAL INTERMEDIARIES IN MICE SOFT POWER

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Abstract

The Thailand Convention and Exhibition Bureau (TCEB) launched the “One Influencer One MICE Soft Power” initiative in May 2025, recruiting thirty influencers nationwide, briefing them, and selecting five winners across food, festival, music, wellness tourism and sport to translate Thai cultural resources into soft power stories for the MICE (Meetings, Incentives, Conventions and Exhibitions) sector. Soft power research and influencer research have each attracted sustained attention, but rarely brought together, and almost never on the question of how individual communicators execute national policy. The five winning videos were produced under a common brief and selected by TCEB. This paper treats them as institutionally endorsed exemplars, one in each of five soft power domains, and identifies the narrative strategies they share. Two research questions (RQ) are posed: how the five winning MICE influencers tell soft power stories that translate cultural resources into MICE attraction (RQ1), and how they function as cultural intermediaries within the policy ecosystem surrounding Thailand's business-events sector (RQ2). Structural narrative analysis, supported by thematic coding, is applied to three sets of material: the five winning videos and their 201 audience comments; the launch press conference and panel discussion, documented on site by the author; and campaign documents and industry reporting. Every video performs one narrative move, revaluing a familiar Thai resource as national soft power, and each foregrounds a distinct soft power currency aligned with its creator's established brand. The study advances two propositions. First, the soft power currency a story activates is not fixed by the cultural resource but selected in the telling: Thai cuisine ranks seventh worldwide and could have been presented as national excellence, activating brilliance through admiration; the food influencer instead presented it as warm and open to all, activating benignity through participation and gratitude. This qualifies account, which treats currencies as attributes of the country itself. Because the videos and comments are almost entirely in Thai, the audience response recorded in this study is domestic.

Keywords: *Creativity, Soft Power, Cultural Intermediaries, MICE Tourism, Influencers*

Introduction

A cultural resource and an attractive story about it are not the same thing. Thailand's temples, festivals, street food and classical instruments existed long before any of them was described as soft power. What converts a resource into attraction is an act of communication performed by someone an audience already trusts, and it is that act, rather than the resource, which this study examines. The distinction lies at the heart of Nye (2004) theory, and it is what the Thailand Convention and Exhibition Bureau (TCEB), a state agency under the Office of the Prime Minister responsible for Thailand's business-events industry, designed its “One Influencer One MICE Soft Power” initiative to operationalise. Launched on 14 May 2025, the

initiative aims to combine the strengths of influencers and MICE activities to create contemporary content that reflects Thainess in a way that is inspiring, accessible and genuinely extendable (9 Conversations, 2025). Influencers nationwide submitted short videos on the theme "Thai soft power through MICE, from your own perspective," across five soft power domains set by TCEB: food, festival, music, wellness tourism and sport. Five were recognised as MICE Soft Power Influencers, one per domain, at the Thailand Influencer Awards 2025. The initiative responds to government soft power policy, using MICE activities as a platform for expressing Thai capability, creativity and identity internationally, with the longer-term aim of establishing MICE Influencer Communities: a network of creators with expertise in the business-events industry able to communicate Thai soft power on a continuing basis

The initiative matters because destination competition in business events no longer turns on venue infrastructure alone. According to Dr. Jaruwan Suwannasat, Chief Information Officer of TCEB, organisers can host almost anywhere; what decides the choice is which destination offers participants an experience they will retell (Suwannasat, launch press conference, 14 May 2025). Thailand's creator economy, valued at 45 billion baht, supplies the infrastructure for producing such experiences (Tellscore & FutureTales Lab, 2025), while the Brand Finance Global Soft Power Index 2026 ranks the country seventh worldwide for both "food the world loves" and "fun" (Brand Finance, 2026).

Thailand 4.0 framed national branding as a means of cementing legitimacy and driving an inclusive creative economy (Desatova, 2018), and in 2022 a National Soft Power Development Strategy Committee was established to promote the 5Fs: food, film, fashion, fighting and festival, though the initiative drew its domains from the wider national list. Domestically, narrating everyday Thainess is cultural identity and economic strategy at once. The influencers studied in this paper translate that policy into stories foreign audiences can understand.

The study is significant on three grounds. For soft power scholarship, it addresses a step Nye (2004) identifies but leaves unspecified: the point at which possessing an attractive resource becomes an attraction outcome. That step is a communicative act performed by an identifiable person, and is therefore observable in a way national indices are not. For influencer research, it documents a role beyond commercial endorsement: the influencer as a commissioned agent who extends a nation's soft power while retaining creative control over how the story is told. For MICE scholarship, it shows that destination competition operates through storytelling by individuals.

Literature Review

1. Soft Power: From Resource to Currency

Nye (2004) introduced soft power as an alternative to force and payment: a country's capacity to obtain what it wants by attracting others rather than coercing or buying them. Possessing attractive things, however, is not the same as gaining soft power from them. A cultural asset becomes soft power only when it is effectively communicated and experienced. Thai cuisine illustrates the distinction. The food is a resource with documented global appeal (Brand Finance, 2026), but that appeal becomes an outcome only when it shapes behaviour, as when an organiser selects Bangkok partly for its culinary culture.

Vuving (2009) specifies how that conversion works by distinguishing power resources from power currencies, identifying three that operate through distinct responses in the recipient. Benignity concerns how an actor treats others and generates soft power through gratitude. Brilliance concerns what an actor has achieved and generates it through admiration. Beauty concerns whether an actor's ideals resemble the audience's own and generates it through inspiration. The three are not interchangeable, since an audience that admires a capability is not thereby grateful for it. One actor may deploy more than one at once. Brannagan and Perkin

(2024) show two running simultaneously at Qatar's Aspire Zone: world-class facilities and coaching generate brilliance, while the Football Dreams programme, which trains young players from abroad, generates benignity. Intason (2026) applies the same triad to Bangkok festivals. The distinction matters because one cultural resource can be narrated through any of the three, so which is selected is an analytic finding rather than a property of the resource.

2. Destination Branding and the Business-Events Sector

Lund et al. (2018) document a shift in destination branding, conceptualising storytelling and performativity as technologies of power through which destination brands are increasingly produced by shared stories rather than by marketing strategy. The shift matters particularly in business events, where destination selection is made by organisers rather than travellers, and where marketing has traditionally addressed those organisers through functional attributes: venue capacity, hotel inventory, flight connectivity. TCEB's initiative applies this approach directly: rather than producing promotional content itself, the agency recruited influencers whose audiences already trust them to tell Thailand's story.

3. Influencers as Cultural Actors in Thailand

Influencers are ordinary internet users who accumulate followings through the narration of their personal lives and monetise that following through brand partnerships (Abidin, 2016). Thai influencers have long demonstrated cultural competence, negotiating global influences against culturally specific customs rather than importing foreign trends wholesale. The clearest instance came during the year-long mourning for King Bhumibol Adulyadej in 2016, when beauty bloggers repositioned their content to honour national grief, acting as public educators who preserved cultural tradition at a moment of collective significance (Limkangvanmongkol & Abidin, 2018). More recent work shows family influencers reinforcing Thainess through traditional dress, heritage sites and Buddhist practice, with audiences responding by expressing cultural pride and saying they wanted to visit the places shown (Limkangvanmongkol, 2025). Thai influencers, therefore, already narrate national culture to willing audiences, independently of any state initiative.

4. Intermediaries

To theorise what influencers do when they translate national culture for outside audiences, the study draws on the cultural intermediary, a concept originating with Bourdieu (1984) and developed as an analytic tool by later scholars (Maguire, 2014). Bourdieu locates intermediaries among the occupations of presentation and representation, characterising them as taste makers and need merchants. Later work frames them as mediating between the fields of cultural production and consumption, adding symbolic value by presenting cultural goods as legitimate and desirable (Maguire, 2014). Because their authority rests on perceived taste rather than formal appointment, the influencer is a paradigmatic contemporary instance. From this literature the study derives four functions traceable in data: mediation, bridging a national culture and external audiences; adding symbolic value, reframing a cultural form as legitimate and valuable; trusted authority, credibility derived from accumulated audience trust rather than official appointment; and teaching desire, leading audiences to want a form they might otherwise overlook. The four are sequential rather than parallel: mediation opens the channel, symbolic value makes the claim, trusted authority is why the claim is believed, and teaching desire is the effect on the audience.

5. Narrative Structure

Labov (1972) showed that spoken narratives are built from recurring functional parts, each doing different work. Orientation establishes who, where and when. Complicating action recounts what happened. Evaluation states what the story means and why it is worth telling, the point at which a narrator stops recounting and tells the listener how to understand it. Resolution reports the outcome, and coda returns the listener to the present. A sixth element, the abstract, is optional and does not appear in these videos. The evaluation clause is the

analytic target of this study, because it is where a claim about value is made explicit rather than implied.

6. Research Gap

The three bodies of scholarship this study draws on each leave a different gap. Soft power scholarship concentrates on states and indices rather than on the communicators who carry attraction to audiences. Influencer research rarely examines influencers as agents of national policy. Cultural-intermediary theory has seldom been applied to policy execution. This study addresses the point at which the three intersect: how individuals recognised by a state agency narrate national culture for outside audiences.

Objectives

TCEB recognised five videos, one in each soft power domain. This study decodes those videos, asking what the storytelling that reached recognition has in common. It pursues two objectives expressed as research questions. The first (RQ1) is to determine how the five MICE soft power influencers tell soft power stories that translate Thai cultural resources into MICE attraction. The second (RQ2) is to determine how they function as cultural intermediaries within the policy ecosystem surrounding Thailand's business-events sector.

Conceptual Framework

The framework combines three theories at three levels. At the level of what is communicated, Nye (2004) distinguishes a cultural resource from a soft power outcome and Vuving (2009) supplies the currencies through which resources become attraction. At the level of who communicates, Bourdieu (1984) and Maguire (2014) supply the cultural intermediary, from which this study derives four functions. At the level of how a story is constructed, Labov (1972) model locates the evaluation clause in which a narrator states what the story means. Together they yield the proposition governing the study: a national cultural resource becomes MICE attraction when a trusted intermediary reframes it as nationally valuable and, at that point, activates a specific soft power currency, which audiences may then accept and restate as their own.

Methodology

1. Research Design and Unit of Analysis

This study employs qualitative analysis of a single bounded case: TCEB's "One Influencer One MICE Soft Power" initiative. The unit of analysis is the initiative as a whole. Three sets of material are analysed, each with its own coding unit. The first is the media texts (RQ1): the five winning videos, transcribed in full from Thai by the author, together with all 201 publicly visible audience comments. The coding unit is the narrative clause for videos and the individual comment for audience data. The second is the press conference (RQ2): the launch of 14 May 2025, comprising the keynote by TCEB Chief Information Officer Dr. Jaruwan Suwannasat and the panel "Influencer x MICE: Soft Power Driving Thai MICE to the World Stage," documented on site by the author and translated by the author. The coding unit is the speaker turn. Panellists were Dr. Jaruwan; Boonperm Inthanapasat, Chief Executive Officer of RUNRIO Thailand and organiser of Spartan Race Thailand; Suvita Charunwong, co-founder and CEO of Tellscore and Vice President of the Thailand Content Creator Association; and Pongthep Bunkum, known as Chee, owner of the page and TikTok channel Larkchee. The third is documentary material (RQ2): the public call and voting announcement, campaign materials and industry news reports, coded by document. The first two are collected by the author; the third is secondary.

2. How the Five Videos Were Selected in This Study

Selection was managed by TCEB with its partner platform Tellscore. Influencers nationwide submitted videos of one to one-and-a-half minutes under a common brief, “Thai soft power through MICE, from your own perspective,” in one of five domains set by the agency. Public voting shortlisted ten entries; the shortlisted influencers then took part in a grooming programme and pitched content ideas, from which five were recognised as MICE Soft Power Influencers, one per domain (Ban Muang, 2025).

The criteria applied at each stage were not published, so the study makes no claim about why these five were chosen. It claims only that they carry the agency's recognition, and asks what they have in common. Because each competed within a separate domain rather than against one another, no ranking across domains is implied. These five are analysed because they are the complete set carrying that recognition.

3. Corpus Adequacy

Adequacy in qualitative research is not settled by case count. Malterud et al. (2016) propose information power, the principle that the more relevant information a corpus holds the fewer units are required, and specify five determinants, all pointing the same way in this case: a narrow aim; high case specificity, these being designated national winners; established theory applied rather than built from scratch; high data quality, each video being a purpose-made multimodal text; and in-depth analysis of each case rather than cross-case comparison. Flyvbjerg (2006) reinforces the point: the typical case is often not the richest in information. Each winner produced one video because that is what the initiative asked for, so the number of videos is a property of the object studied rather than a limit on access to it. The generalisation offered is analytical rather than statistical: a mechanism that may transfer to other cases, not a proportion holding across a population. Table 2 specifies the video corpus and its narrative structure.

4. Analytical Strategy and Procedure

The analytic strategy for the media texts is structural narrative analysis, which Riessman (2008) traces to Labov and distinguishes from thematic approaches: it treats language as an object of close investigation rather than a carrier of content, examining the communicative work each clause performs. This suits the present object, since the question is how a claim is constructed rather than what topics recur, and since narrative analysis keeps each video whole rather than breaking it into codes. The music video, which carries no narration, was read using Riessman's visual narrative analysis, its argument reconstructed from on-screen text, musical structure and visual sequence. Thematic coding serves as a supporting technique at two points: classifying evaluation clauses against Vuving's (2009) currencies and analysing the 201 audience comments, following the phased procedure of Braun and Clarke (2021) set out in Table 1.

The press conference requires separate treatment because it is not interview data. A press conference is talk staged for media and industry, in which organisers and participants describe the initiative publicly. The author attended, took notes and asked no questions. This material therefore shows how the initiative is described by those involved in it, which is what RQ2 needs, since the question is how the policy ecosystem represents the influencer's role.

Table 1 Analytical procedure: structural narrative analysis with supporting thematic coding

Phase	Procedure applied
1. Familiarisation and initial	Each video viewed at least three times: for impression; for verbatim Thai transcription of narration and on-screen text; and for visual composition, pacing and musical structure. All 201 comments read in full; memos written after each viewing. First-cycle descriptive and in-vivo codes (labels taken from the speaker's own words) then applied to the whole transcript, not only the key claim (Table 3); comments coded separately as “restates the frame,” “demands recognition,” “asserts national ownership.”

Phase	Procedure applied
2. Structural segmentation	Labov (1972) model segmented each transcript into orientation, complicating action, evaluation, resolution and coda, locating the evaluation clause in which the narrator states the meaning. Codes were then clustered by implied mechanism of attraction and mapped onto Vuving's currencies.
3. Reviewing	Candidates tested against all coded extracts and cross-read against the press conference material. The pattern was first formulated as the Thai construction "not just X but Y," used near-verbatim by three videos. Music and wellness do not use it, which required reformulation from a linguistic formula to a narrative function.
4. Defining and naming	Two patterns defined with written boundaries: revaluation, the move by which a familiar resource is reframed as nationally valuable irrespective of linguistic realisation; and differentiated currencies, the mechanism activated at that point. For RQ2 the four intermediary functions were retained as a priori categories.

5. Trustworthiness, Translation and Reflexivity

Credibility was pursued through triangulation across the three sets of material (Lincoln & Guba, 1985): where the influencers' framing and the press conference account diverge, the divergence is reported rather than reconciled. Every classification is anchored to a verbatim extract (Tables 3 and 4), so readers may assess each interpretation independently. All Thai material was transcribed in Thai and translated by the author, a native speaker. The author is a Thai national researching Thai influencer culture, a position affording cultural competence but risking the over-reading of policy significance into ordinary cultural expression.

Results

1. RQ1: How do the five winning MICE influencers tell soft power stories that translate cultural resources into MICE attraction?

1.1. Finding 1: A Shared Narrative Structure of Revaluation (RQ1)

Read through Labov (1972), the five stories share one structure. Each introduces a referent already familiar to Thai audiences (orientation), signals that it is commonly underappreciated (complicating action), and then, in the evaluation clause, revalues it as national soft power before tying it to MICE (resolution and coda). Revaluation names this move throughout: reframing something ordinary to Thais as valuable to outsiders.

The five elements are set out in the Literature Review: orientation establishes who, where and when; complicating action recounts what happened and what is at stake; evaluation states what the story means; resolution reports the outcome; and coda returns the listener to the present. Table 2 shows each video moving through the sequence. The evaluation clause is the third element and the only one carrying the soft power claim in every video, so segmentation of the full narrative served to locate it, and that clause is the unit carried into the coding reported in Table 3.

Table 2 The five videos through Labov (1972)'s narrative elements.

Case	Orientation	Complicating action	Evaluation (the claim)	Resolution	Coda
Festival: Peemwong	"Welcome to Ubon Ratchathani... the Candle Festival, held continuously for 124 years"	Held once a year; the months of community labour behind each candle go unseen	"not only for an important Buddhist day, but a living tradition that has not disappeared... this is truly Thai soft power"	Cafés sell candle-shaped cakes; local businesses take inspiration	International exhibitions and conventions draw on that soft power

Case	Orientation	Complicating action	Evaluation (the claim)	Resolution	Coda
Food: Nampeungvoicereview	One year of food reviewing; walking Khao San Road	Foreign visitors drawn to street food; pad kaprao ranked first in the world	“Thai food is not just food but a representative of Thai culture”	Food expos and cooking workshops connect the claim to MICE	“we can all be part of Soft Power by sharing what we love”
Sport: Girl Runs Far	Asks what a Spartan Race means to the viewer	Frame expands beyond the obstacles: training, local purchases, public–private cooperation, foreign entrants, clean-up	“not just a racetrack... but a field that shows the capability of Thai people”	A field of economic opportunity as well as sport	Thai readiness and standards for world-level events
Music: New Thitipat	Ranat performance of the classical piece Khangkhao Kin Kluay	“from familiar melodies to rhythms the world has never heard”	“the sound of Thai music was never old, it had just never been told for the world to hear”	Mapped onto each MICE pillar in turn	Thailand as a MICE destination the world watches
Wellness: Samathi360	A three-hour “My Fu Trip” for the meeting-weary delegate	Tired after long meetings; the need for restoration	Enacted rather than stated: the claim rests on the visual sequence	Meditation at Wat Pak Nam, a canal-side craft workshop, feeding fish	“in just three hours we rested body and mind”

Source: Compiled by Author

1.2. Finding 2: Differentiated Soft Power Currencies (RQ1)

While the structure is shared, the currency each video foregrounds differs. Each video was coded to one currency only, the dominant mechanism of attraction in its evaluation clause; secondary traces were noted but not coded.

Nampeungvoicereview (food) foregrounds benignity, framing Thai cuisine as warm, shareable and open to all. Samathi360 (wellness) also foregrounds benignity, through care rather than invitation. Girl Runs Far (sport) foregrounds brilliance, marshalling cooperation, international participation and standardised delivery to produce admiration for event-management capability. Peemwong (festival) foregrounds beauty, anchoring inspiration in community devotion and 124-year continuity. New Thitipat (music) likewise foregrounds beauty, through creative renewal.

Table 3 Influencers’ profile and coding processes

Case (followers; length; words; comments)	Creative identity and campaign theme	Evaluation clause (Thai verbatim)	Cycle 1: open codes	Cycle 2: category	Currency
Festival — Peemwong (152.8K followers)	Festival and tradition storytelling. Theme: Thai festivals	“ไม่ใช่แค่...นี่แหละคือ soft power อย่างไทยอย่างแท้จริง” (Video 1:27 minutes) (69 comments)	“not just a Buddhist day”; “124 years continuous”; “many months	Collective devotion over time as living heritage	Beauty: inspiration

Case (followers; length; words; comments)	Creative identity and campaign theme	Evaluation clause (Thai verbatim)	Cycle 1: open codes	Cycle 2: category	Currency
Food — Nampeungvoicereview (29.3K followers)	through shared experience Warm, sincere food storytelling. Theme: elevating local food through MICE	“อาหารไทยไม่ใช่แค่อาหาร แต่เป็นตัวแทนของวัฒนธรรมไทย” (Video 1:30 minutes) (38 comments)	to make”; “a priceless exhibition” “not just food”; “representative of Thai culture”; “we can all take part”; “convey what we love as stories”	Open invitation to shared participation	Benignity: sympathy
Sport — Girl Runs Far (5,946K followers)	Running and travel. Theme: Thai sport events as a global MICE stage	“Spartan จึงไม่ใช่แค่สนามแข่ง... แต่เป็นสนามที่แสดงศักยภาพของคนไทย” (Video 1:26 minutes) (2 comments)	“not just a racetrack”; “shows Thai capability”; “world-class standards”; “post-event clean-up”	Organisational competence evidenced externally	Brilliance: admiration
Music — New Thitipat (133.3K followers)	Contemporary reinterpretation of Thai music. Theme: Thai music on the world stage	“เสียงดนตรีไทย ไม่เคยเก่า แต่ยังไม่เคยถูกเล่า ให้โลกฟัง” (Video 1:27 minutes) 85 comments)	“never old”; “never told”; “rhythms the world has not heard”; M–I–C–E mapping	Tradition alive and globally worthy through renewal	Beauty: inspiration
Wellness — Samathi360 (27.8K followers)	Mindful travel. Theme: recharging on a post-meeting wellness trip	No spoken claim; enacted. Closing line: เพียงแค่สามชั่วโมงเราก็ได้พักกายพักใจ” (Video 1:13 minutes) (6 comments)	“tired from meetings”; “walk slower”; “sit, close eyes, meditate”	Restorative care for the meeting-weary delegate	Benignity: care

Source: Compiled by the author from the five winning videos and award biographies (Tellscore, & FutureTales Lab, 2025). Total corpus: 1,504 transcribed words and 200 audience comments. Translations by the author; English renderings of each evaluation clause appear in Table 2.

1.3. Finding 3: Audience Response (RQ1)

Comments indicate that viewers received the message as framed and frequently amplified it; extracts are from the videos’ public comment sets, translated by the author. For Nampeungvoicereview (food)’s video, viewers adopted the frame in their own words, writing that “Thai food IS soft power, really” and that Thai food is “second to none in the world.” For Peemwong (festival)’s video, viewers endorsed his authority, suggesting that “a cultural ambassador must watch this channel” and that he should “hurry and copyright this before others claim it.” The first calls for official recognition of a person; the second for legal protection of a cultural form. Samathi360 (wellness)’s comment set includes a message from the food influencer pledging to follow the trail, indicating that the influencer community envisaged by TCEB was beginning to form. Comment sets range in size from 2 to 85, and nearly all comments are written in Thai.

2. RQ2: How do they function as cultural intermediaries within the policy ecosystem surrounding Thailand's business-events sector?

Finding 4: Influencers as Cultural Intermediaries (RQ2)

All four intermediary functions are evidenced in the press conference material. (1) Mediation appears in the keynote, where the influencers are placed between Thai cultural production and audiences abroad. (2) Adding symbolic value appears in the panel discussion, where Thai hospitality and problem-solving are reframed as assets “not every country has.” (3) Trusted authority is articulated in two forms: the “credit” each influencer holds with a fanbase, so that their statements are believed, and the conversion of that credit into action, where a view leads to a registration. Because a business event has a registration point, interest becomes traceable in a way general destination promotion does not allow. (4) Teaching desire appears in a single panelist's account, inviting audiences to see secondary provinces, not only major cities, as places worth hosting events. Table 4 presents the coding; translations are the author's.

There is a remark on language corresponded to none of the four functions and is reported rather than reconciled. He observed that limited English among Thai influencers constrains international reach relative to Indonesia, the Philippines and Singapore, and that for MICE, where organisers need clear information to decide, “English is a key.” Affective storytelling can cross a language boundary, as the wordless ranat performance shows, but the information a business decision requires does not.

Table 4 Press conference and documentary material coded to the four intermediary functions

Function	Indicative evidence (translated verbatim)	Source
1. Mediation: standing between national culture and external audiences	Soft power extends beyond familiar images of food or tradition “to the power of a new generation of Thais who tell Thailand's story to the world”; the initiative elevates MICE “beyond a venue for organising events into a space for telling the nation's story.” By 2030 Generation Z and Millennial business travellers will form the largest market share and will themselves be content creators.	Suwannasat, keynote, One Influencer One MICE Soft Power press conference, Keynot speaker, 14 May 2025
2. Adding symbolic value: reframing a cultural form as legitimate and valuable	“We take up small things each person has a perspective on... Thailand has a foundation of Thai professionalism — hospitality, helpfulness, problem-solving — these are things not every country has.” Retold impressions are described as “more powerful communication than paid media.”	Suwannasat, One Influencer One MICE Soft Power press conference, panel discussion, 14 May 2025
3. Trusted authority: credibility from accumulated audience trust, in two forms	Credibility: each influencer works within a “pillar” of their own and carries “credit” built with a fanbase through long co-presence, “so that what they say is believed”; TCEB positions itself as “platform as a service” and frames business events as “a Blue Ocean” for creators. Conversion: performance goes “beyond follower” counts, views tracked to a registration point where a prospective attendee leaves details indicating intent to attend, one example given being that 0.03 per cent of views becomes purchasing power.	Suwannasat and Charunwong (Tellscore), One Influencer One MICE Soft Power press conference, panel discussion, 14 May 2025
4. Teaching desire: leading audiences to value a form they might overlook	The project is “a door for small people to become part of driving the economy.” Business events are “not only in big cities” but happen “anywhere there are people ready to pick up the stories of their own area” and invite others to visit their hometown.	Bunkum (Larkchee), One Influencer One MICE Soft Power press conference, panel discussion, 14 May 2025

Source: Author's analysis. Translations by the author.

3. A Model of Intermediation

The four findings describe a sequence of intermediation in the context of Thai influencers promoting Thai soft power through TCEB's initiative: influencers draw on trust accumulated with their own audiences to make claims about national culture, while the state provides training, access and endorsement rather than speaking in its own voice. Table 5 sets out its four stages, offered as a model open to testing rather than an established regularity.

The study advances two propositions. First, the soft power currency a story activates is not fixed by the cultural resource but chosen by the influencer who tells it. Thai cuisine ranks seventh worldwide and could have been presented as national excellence, activating brilliance through admiration; the food influencer instead presented it as warm and open to all, activating benignity through participation and gratitude. Vuving (2009) treats currencies as attributes of the country: what a nation is or has done. This case suggests they can also be attributes of the telling, since the same resource yielded a different currency depending on who narrated it. Second, audiences may go beyond accepting an influencer's valuation to seek institutional recognition for it, suggesting that influencers serve as cultural ambassadors and that the cultural forms they present be protected.

Table 5 The four stages of commissioned intermediation

1. State brief	2. Structural revaluation	3. Currency activation	4. Audience endorsement
Agency recruits and briefs influencers, sets themes, supplies an event platform.	Influencer reframes a resource familiar to Thais as valuable to outsiders, in the evaluation clause.	One currency is activated — benignity, brilliance or beauty — matched to the influencer's brand.	Audiences restate the claim and call for the influencer to be formally recognised.

4. Relation to Previous Research

For soft power scholarship, the first proposition refines a mechanism Vuving (2009) theorises at state level. Brannagan and Perkin (2024) found currencies distributed across sub-projects of one state complex; this case suggests currencies distributed across individual intermediaries. It complements Intason (2026): where that analysis takes the festival as its unit, this one takes the communicator, finding that a regional festival can be revalued as national soft power by a narrator holding no official position. For influencer research, the findings extend Limkangvanmongkol and Abidin (2018), who documented Thai beauty bloggers repositioning content to honour national mourning, competent but self-initiated work. In this case the same competence enters a state initiative: influencers narrate national soft power on their own terms and are then recognised for it, carrying Abidin (2016) account of visibility work into national-political value.

For cultural-intermediary theory, Maguire (2014) describes intermediaries adding symbolic value to consumer goods in commercial fields; in this case the good is a national cultural repertoire and the commissioning field is the state. The four functions carry different weight in this material. Trusted authority is the most fully articulated, appearing both as the "credit" an influencer holds with a fanbase and as the conversion of that credit into action, where a view leads to a registration. Mediation and adding symbolic value are performed by TCEB itself as well as by the influencers, since the agency reframes Thai hospitality as an asset "not every country has" in the same breath as it invites others to tell that story. Teaching desire is evidenced by Bunkum, a panelist at the "One Influencer One MICE Soft Power" press conference, who invites audiences to see secondary provinces as places worth hosting events. What the policy ecosystem articulates most fully, when it describes influencers, is trust and its conversion.

For MICE and destination-marketing scholarship, the findings identify the pre-arrival narrative that makes a destination's cultural offer legible. Desatova (2018) argues that Thai nation branding under Thailand 4.0 was oriented inwards despite its global address; Sirirak's account of the English-language constraint gives that argument concrete communicative form, since an initiative designed to carry Thailand's story abroad rests on an influencer base whose organic reach is predominantly domestic.

Conclusions and Implications

This study examined how five Thai influencers in TCEB's "One Influencer One MICE Soft Power" initiative translate cultural resources into MICE soft power, and how they function as cultural intermediaries within the policy ecosystem. All five videos share one move: each revalues a resource familiar to Thais into something globally desirable, three stating this outright and two expressing it through style, each foregrounding a distinct currency. Across the press conference material all four intermediary functions are evidenced, with trusted authority the most fully articulated. The contribution is the model of intermediation set out in Table 5 and the two propositions it supports.

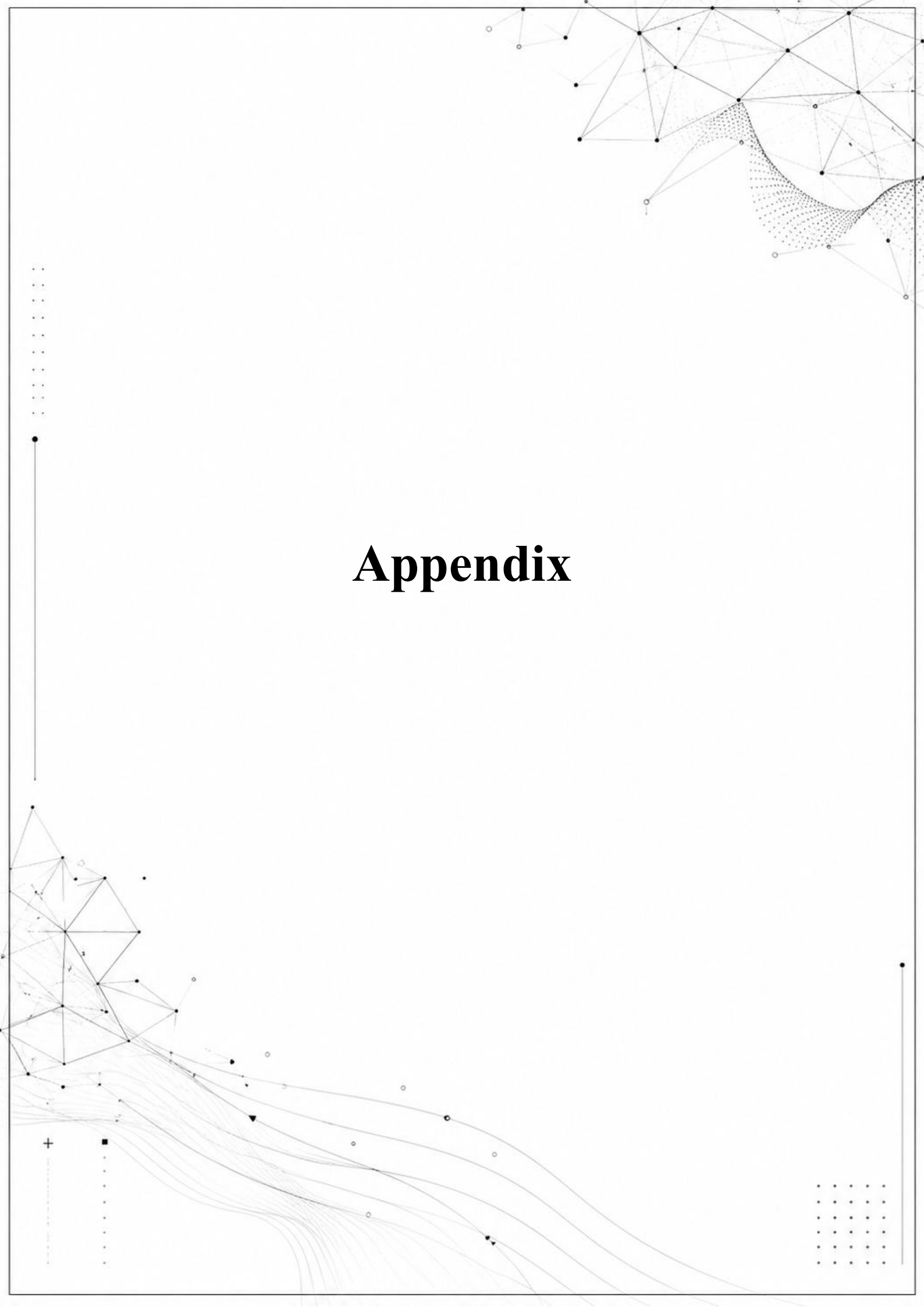
Four implications follow. For policymakers and TCEB, the first proposition implies that selection should consider currency fit alongside domain coverage. For tourism authorities, tracking the proportion of comments that reproduce the intended frame, and the language they are written in, would gauge narrative uptake and its reach from data already collected. For practitioners and bid teams, the revaluation structure is portable: a familiar local asset can be reframed as evidence of a capability the client values. For influencers, currency diagnosis and English-language capacity are the developments indicated, the latter functioning as career infrastructure.

Being exploratory and confined to a single case, these findings are not broadly representative. The video corpus is a complete enumeration of the winning entries in one initiative; the press conference material derives from that initiative; and the comments are illustrative rather than systematically sampled, drawn from sets of unequal size and written overwhelmingly in Thai. The reception data are therefore Thai-language and cannot speak to international reception. This paper reports the first phase of a longer project. Four directions follow: audience studies with international MICE delegates to test whether these strategies influence destination choice; comparison of winning with non-winning entries to isolate what institutional endorsement selects for; examination of how influencers are recruited, trained and supported; and comparison of the model across ASEAN MICE destinations.

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The page features a minimalist, abstract geometric design. In the top right corner, there is a complex network of thin black lines connecting various points, some of which are open circles. A shaded, wavy area composed of many small dots is also present in this region. The bottom left corner contains a series of thin, curved lines that sweep across the page, along with a small cluster of points and a few solid black shapes, including a plus sign and a square. The bottom right corner is marked by a vertical line and a grid of small dots. The word "Appendix" is centered in a large, bold, black serif font.

Appendix

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