THE DYNAMICS OF DISRUPTION: A TOE MODEL FROM ENVIRONMENTAL PRESSURE TO MANAGERIAL COMPETENCIES IN BANKING SECTOR

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Abstract

Research purpose:
This study proposes and validates a cross-level theoretical model, transposing the Technology-Organization-Environment (TOE) framework to explain the pathway from macro-level environmental pressures to the formation of micro-level managerial competencies required to lead digital transformation in Vietnam's banking sector.

Research motivation:
While the Vietnamese banking sector faces an urgent mandate for digital transformation, failure rates remain high. This is not a technological paradox but a strategic one, stemming from a critical knowledge gap: the "black box" mechanism through which macro-level environmental dynamics are translated into a targeted, micro-level managerial competency strategy. This study addresses this gap.

Research design, approach, and method:
This study employs a rigorous, two-stage systematic literature review (SLR) adhering to PRISMA 2020 guidelines. An initial inductive search on the Scopus database identified emergent contextual drivers, which were subsequently validated and structured through a second, deductive search against the established constructs of the TOE framework.

Main findings:
This study makes two primary theoretical contributions. First, it finds that environmental pressures from competitors, government, and customers interact to create an "Environmental Pressure Spiral," a reinforcing feedback system that acts as the primary catalyst for the digital transformation imperative. Second, this process is mediated by a "Competency-Technology Feedback Loop," a co-evolutionary mechanism between human capital and technological assets. These dynamics drive the need for a hierarchical competency set, where a foundational Digital Mindset enables the acquisition of Digital Knowledge and the application of Digital Skills.

Practical/managerial implications:
This study provides a diagnostic model for banking executives to translate environmental pressures into a competency development roadmap for leading effective digital transformation. It guides how to build a management team capable of navigating disruption by understanding how external pressures inform the need for specific digital mindsets, knowledge, and skills.

Keywords: Managerial Competencies, Digital Transformation, TOE Framework, Human Capital, Banking Sector, Emerging Economies.

1. INTRODUCTION

The Vietnamese banking industry is at the epicenter of a state-orchestrated digital revolution, characterized by an unprecedented velocity of change, thus acting as a backbone of the Vietnamese economy (Nghiem, 2020; Narayan et al., 2021; Nghiem and Narayan, 2022). This is not merely a market trend but a national strategic mandate, propelled by government policies such as Project 06 on population data application and the State Bank of Vietnam's Decision 810/QD-NHNN on banking sector digital transformation (State Bank of Vietnam, 2021; Comsure, 2025). The results have been explosive: by 2025, nearly 87% of Vietnamese adults have bank accounts, and many credit institutions report digital transaction rates exceeding 95% (Vietnam News, 2025). The interbank electronic payment system processes a staggering average of VND 820 trillion per day, illustrating the sheer scale of the shift. However, this state-supported environment has also created a fiercely competitive arena. Incumbent banks compete not only against traditional rivals but also against a dynamic Fintech ecosystem, which is projected to reach a market size of USD 3.42 billion in 2025 (Mordor Intelligence, 2025). This dual competition—from established players and technological disruptors—compels banks to innovate or risk obsolescence. Digital Transformation has thus emerged as an inescapable strategic imperative, entailing not merely technological adoption but a comprehensive overhaul of strategy, processes, and organizational culture.

In response to these environmental pressures, Digital Transformation has emerged as an inescapable strategic imperative. This is not merely about technological adoption but a comprehensive overhaul of strategy, processes, and organizational culture (Vial, 2019). However, despite massive technological investments, many transformation efforts fail to deliver expected outcomes. This is not a paradox of technology's potential, but a failure of organizational strategy and execution (Hoang, 2024).

Research has consistently affirmed that the decisive factor for success is not technology itself, but a clear strategy and the human capacity to manage change (Kane et al., 2015). The root cause of these failures often stems from neglecting the human and organizational aspects of transformation, where the lack of a managerial competency set fit for the digital era has become a critical bottleneck (Rakovic, 2024).

While scholarly literature has effectively used the Technology-Organization-Environment (TOE) framework to explain firm-level technology adoption (e.g., Abdurrahman et al., 2024; Tornatzky & Fleischer, 1990) and another stream has worked to catalog the competencies of digital leaders (e.g., Živković, 2022), these conversations have largely occurred separately. Existing models fail to capture the dynamic, multi-level mechanisms through which macro-level environmental shocks—particularly in state-influenced emerging economies—are translated into micro-level human capital requirements. This transformation process remains a "black box." This paper aims to illuminate that box by proposing an integrated theoretical model that explains not only what drives the demand for competencies but how these pressures are translated into specific competency requirements.

To address this gap, this paper aims to systematically review, analyze, and synthesize scholarly research on the factors influencing managerial competencies in digital transformation. To achieve this, we will answer the following research questions:

RQ1: How has the research landscape on managerial competencies in the banking sector's digital transformation evolved thematically and theoretically?

RQ2: Through which mechanisms do factors within the Technology, Organization, and Environment contexts—particularly environmental pressures—shape the demand for managerial competencies?

RQ3: Based on the review, how can an integrated theoretical model be constructed to explain the formation of digital managerial competencies?

Therefore, this paper expects to make three important contributions. First, we provide a structured overview of a rapidly growing yet fragmented research field. Second, we identify key thematic clusters and knowledge gaps to guide future research. Finally, the paper proposes an integrated theoretical framework, demonstrating a novel application of the TOE theory by transposing it from its traditional firm-level context to the domain of individual competency development, thereby contributing not only to academic knowledge but also offering practical implications for managers.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

To understand the pathway from environmental pressure to managerial competency, this section reviews the foundational theoretical concepts. We first establish Digital Transformation as the strategic response to the disruptive environment outlined in the introduction. We then define Digital Managerial Competencies as the critical human element for this transformation, grounding our hierarchical model in established competency theory. Finally, we propose the Technology-Organization-Environment (TOE) framework as an analytical lens, arguing for its novel application in a cross-level model to explain how contextual factors shape these competencies.

2.1. The Imperative of Digital Transformation in a Disruptive Environment

Digital transformation serves as a critical strategic response to today's rapidly evolving and disruptive business environment, characterized by the digital economy and fast-paced technological advancements (Samsuden et al., 2024). It represents a fundamental shift in organizational functioning, moving beyond mere technology adoption to drive comprehensive restructuring of internal processes and external market strategies (Feliciano-Cestero et al., 2023). This strategic imperative enables organizations to build dynamic capabilities for swift adaptation, strategic renewal, and fostering innovation (Ellström et al., 2022). Ultimately, by enhancing efficiency, productivity, and enabling new business models, Digital transformation secures competitive advantage and sustainable growth for firms in this complex landscape[1] (Thuan et al., 2025). This demonstrates that strategy, not technology, is the primary driver of successful transformation (Kane et al., 2015).

The banking sector, worldwide and especially in Vietnam is navigating an intensely disruptive environment, fundamentally reshaped by the digital economy and rapid technological advancements (Samsuden et al., 2024, Nguyen et al., 2025). Digital transformation in this context extends far beyond mere digitization; it represents a comprehensive strategic restructuring (Abdurrahman et al., 2024; Hoang, 2024). This process is primarily catalyzed by fierce competitive pressures from agile FinTech firms and evolving customer expectations for seamless digital services (Megahed et al., 2022). Digital Transformation necessitates significant organizational shifts, including a fundamental rethinking of business models and processes. However, its success is often hampered by substantial barriers such as the integration of legacy systems, escalating cybersecurity risks, and crucially, a persistent shortage of capable human resources with digital expertise (Phan and Dinh, 2023; Le et al., 2025). Despite governmental support initiatives for DT (Phan and Dinh, 2023; Nguyen, 2024), addressing these human and organizational challenges remains paramount for successful transformation (Kane, 2019; Le et al., 2025) .

2.2. The Human Bottleneck: Digital Managerial Competencies and the Iceberg Model

To lead this transformation, managers require a new set of competencies, defined as **Digital Managerial Competencies**. This is a multidimensional construct reflecting a manager's ability to create sustainable value in a digital business environment. The literature suggests a convergence around three core components: **Digital Knowledge** (an understanding of digital business models and strategies), **Digital Skills** (the ability to apply modern tools and management methods), and a **Digital Mindset** (openness to change, risk appetite, and a belief in continuous development).

However, rather than a mere list, we posit a hierarchical relationship among these components, an argument grounded in the classic **Competency Iceberg Model** by Spencer and Spencer (1993). This foundational model posits that competencies are structured like an iceberg. The visible 'above the waterline' portion comprises Knowledge and Skills, which are relatively easy to observe, measure, and develop through training. Beneath the surface lies the larger, 'hidden' portion, which includes core characteristics such as an individual's motives, traits, and self-concept. We conceptualize this foundational part as the 'Digital Mindset'. The model's central principle is that this hidden 'Mindset' drives and enables the effective acquisition of Knowledge and application of Skills, thereby providing a robust theoretical justification for the proposed hierarchical relationship.

2.3. An Analytical Lens: Transposing the TOE Framework

To explain the contextual factors that shape these competencies, we draw upon the **Technology-Organization-Environment (TOE) framework** by Tornatzky and Fleischer (1990). The TOE theory posits that technology adoption at the firm level is influenced by three contexts: technological characteristics, organizational structure and resources, and the industry and regulatory landscape.

Building on this robust foundation, we argue for **transposing the TOE framework to a new level of analysis**. We posit that the pressures and opportunities from the three TOE contexts are transmitted from the organizational to the individual level, shaping the competency requirements for managers. When an organization confronts technological shifts (Technology), competitive pressures (Environment), and possesses certain resources (Organization), it creates an urgent demand for corresponding knowledge, skills, and mindsets among its managers.

Based on the foregoing argument, we propose an integrated theoretical framework. In this framework, the three contexts of the TOE framework (Technology, Organization, and Environment) act as antecedents that directly influence the formation and development of Digital Managerial Competencies, comprising the components of Knowledge, Skills, and Mindset. This proposed framework, illustrated in Figure 1, will guide the subsequent systematic literature review.

[1] In addition to these effects, digital transformation and digital technologies may offer other significant benefits such as lower energy consumption (Bakry et al., 2023b), lower emissions (Nghiem et al., 2023; Bakry et al., 2023a, 2024; Guo et al., 2023; Nasreen et al., 2023; Wang et al., 2023); inclusive growth (Wen et al., 2025).

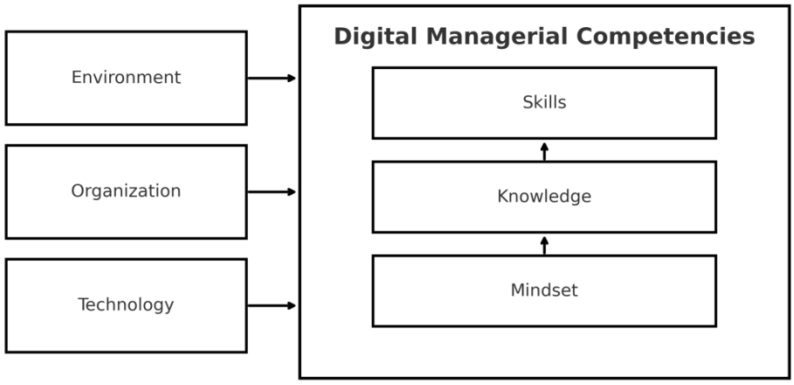


Fig. 1. Integrated TOE and Digital Competencies Framework.

3. METHODOLOGY

3.1. Research Design

To answer the research questions, this paper employs a systematic literature review (SLR) methodology. This design was chosen because it provides a rigorous, transparent, and replicable process for identifying, evaluating, and synthesizing all relevant research evidence on a specific topic. Compared to traditional reviews, SLR helps minimize researcher bias, allowing for a comprehensive overview of the current state of knowledge and the objective identification of research gaps. The entire process strictly adheres to the PRISMA 2020 guidelines.

3.2. Data Collection Process

To ensure comprehensiveness and avoid confirmation bias, we adopted a two-stage data collection process:

Stage 1: Broad Exploratory Search

Objective: To objectively and comprehensively identify all contextual factors influencing managerial competencies in digital transformation, without being constrained by any preconceived theoretical framework.

Data Source: The leading academic database, Scopus, was utilized.

Query String: A Boolean query string was constructed to search titles, abstracts, and keywords, combining two main keyword groups:

Group 1 (Competencies): ("managerial competencies" OR "digital leadership" OR "digital skills" OR "digital mindset") AND

Group 2 (Context): ("digital transformation" OR "digitalization" OR "banking" OR "financial services")

Stage 2: Framework Validation Search

Objective: After key themes emerged from the Stage 1 analysis, a second, more targeted search was conducted to compare and contrast our findings with the existing literature that explicitly applied the TOE framework.

Query String: The query string from Stage 1 was expanded by adding a third keyword group:

AND Group 3 (Theory): ("TOE framework" OR "technology-organization-environment")

Inclusion criteria were: (1) peer-reviewed journal articles; (2) published between 2015 and 2025. Conference proceedings, book chapters, and non-original research were excluded.

3.3. Data Analysis Process

The analysis process was also conducted in two corresponding stages to directly answer the revised research questions:

Bibliometric Analysis: To answer **RQ1** (How has the research landscape evolved?), bibliographic data such as publication trends by year and leading journals were statistically analyzed.

Thematic Analysis and Synthesis:

To answer **RQ2** (Through which mechanisms do factors shape the demand for competencies?), an inductive qualitative

thematic analysis was conducted on the corpus of articles from Stage 1. This process involved careful reading, coding, and categorizing key concepts and findings to allow themes to emerge organically from the data.

To answer **RQ3** (How can an integrated theoretical model be constructed?), these emergent themes were then synthesized and structured. We compared this structure against the constructs of the TOE framework (informed by the literature from Stage 2) to evaluate its fit and explanatory power, thereby building the integrated theoretical model.

The entire process, from searching and screening to the final selection of articles, is visually presented through a PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram, ensuring the transparency and replicability of the research.

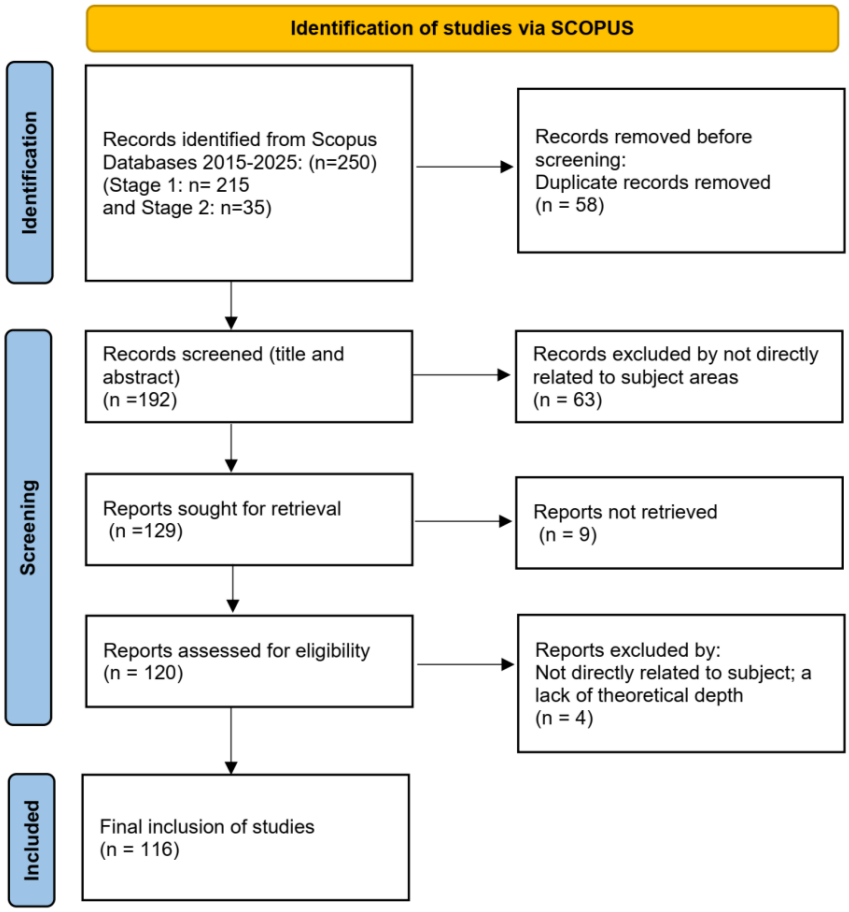


Fig. 2. PRISMA flow chart.

The systematic search process is detailed in the PRISMA flowchart (Figure 2). Our initial query on the Scopus database yielded 215 articles in stage 1 and 35 Article in stage 2. After removing 58 duplicates, the titles and abstracts of the remaining 192 articles were screened for relevance against our inclusion criteria. At this stage, 63 articles were excluded, primarily because they focused on non-managerial employees, were set in non-banking contexts, or discussed technology without a clear link to competency development. This resulted in 129 articles for full-text review, of which 9 were excluded because their full texts could not be retrieved. Following a thorough reading, a further 4 articles were excluded for reasons such as a lack of theoretical depth, methodological weaknesses, or a tangential focus. The final corpus for qualitative synthesis comprised 116 articles.

3.4. Methodological Limitations

This review's primary limitation is its reliance on a single database, Scopus. While Scopus was chosen for its comprehensive coverage of peer-reviewed literature suitable for bibliometric and thematic analysis, we acknowledge that this approach may have excluded relevant studies published in other major databases such as Web of Science, EBSCO Business Source, or regional databases. Furthermore, our exclusion of “grey literature”, such as industry reports and government publications, means that some practitioner-focused insights may not be captured. Future research should aim to triangulate our findings by incorporating these diverse sources to provide an even more holistic view of the phenomenon.

4. RESULTS AND DISCUSSION

This section presents and discusses the findings of the systematic literature review. First, we analyze the research landscape to answer RQ1. Next, we present the thematic analysis findings following a causal flow—from environmental pressure to managerial competency—to answer RQ2. Finally, we synthesize these findings to construct an integrated model and discuss its implications, thereby answering RQ3.

4.1. The Research Landscape: Thematic and Theoretical Evolution (Answering RQ1)

The analysis of publication data reveals an exponential growth trajectory, evidencing the rapid emergence of managerial competencies in banking's digital transformation as a field of study. This research stream, which was nascent before 2020, experienced a clear inflection point and subsequently expanded dramatically, mirroring shifts in both industry and academic priorities. The inflection point around 2020 is not coincidental; it aligns with the onset of the COVID-19 pandemic. The pandemic acted as an exogenous shock, forcing organizations to urgently adopt digital technologies for survival, particularly in service industries like banking where face-to-face interaction was curtailed. The subsequent surge in academic literature is a direct response to this crisis-driven transformation. This urgency is clearly reflected in the data, with approximately 60% of all analyzed articles having been published from 2023 onwards. This explosive phase indicates the field is at its highest stage of maturation, with the most significant and influential contributions being very recent.

Regarding the sources of knowledge dissemination, the research is not confined to a niche set of journals but is distributed across diverse academic fields. The journals with the most publications in the sample include *Sustainability (Switzerland)*, *Administrative Sciences*, and the *Journal of Business Research*. This diversity signifies that the topic of digital managerial competencies has transcended the traditional boundaries of business management, becoming a critical intersection that attracts scholars from sustainability, organizational science, and information systems.

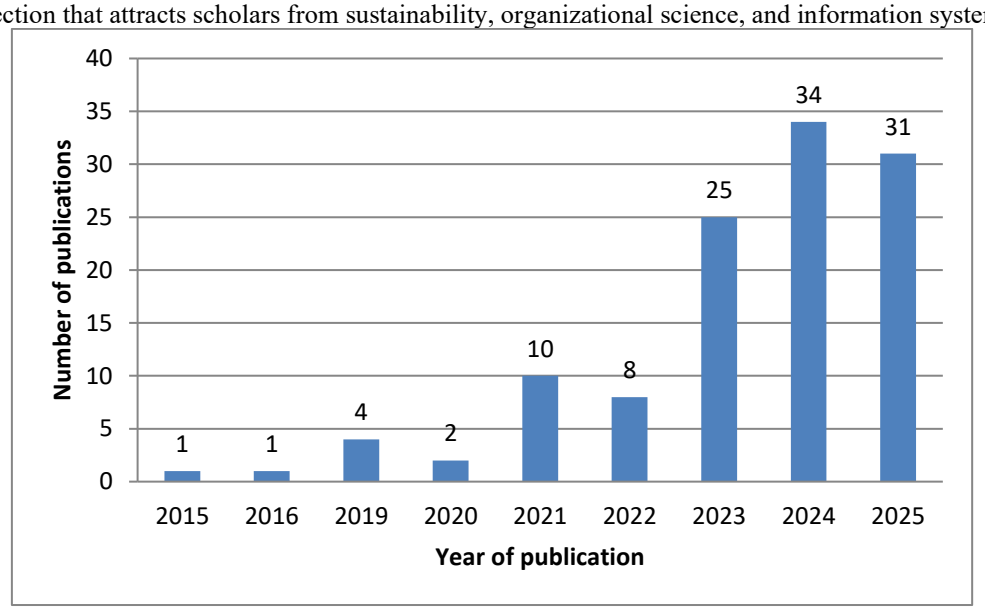


Fig. 3. Number of Publications per year between 2015 and 2025.

4.2. From Pressure to Competency: The Causal Mechanisms (Answering RQ2)

This section synthesizes the qualitative findings from the literature, organized into a causal flow that corresponds to the components of the TOE framework and the core structure of managerial competencies. The analysis reveals that these factors are not static; rather, they interact with each other to create important dynamic mechanisms.

4.2.1. The Catalyst: The Environmental Context

In today's volatile and competitive business environment, external environmental factors act as powerful drivers, compelling managers to constantly adapt and develop the necessary competencies to ensure organizational survival and success. The analysis reveals three key factors that serve as catalysts for this transformation: competitive pressure, government policy support, and customer readiness.

(1) Competitive Pressure: Competitive pressure is identified as a major driving force for organizations to innovate and undergo digital transformation (Min & Kim, 2024; Hoang, 2024). Successful businesses are those that maximize their competitive capabilities in a constantly shifting market (Orellana et al., 2025). This pressure compels firms to enhance their competitiveness (Nguyen et al., 2025) and is a critical factor influencing digital transformation decisions (Thuan et

al., 2025). Even in the education sector, competitive pressure drives the adoption of new technologies (Le et al., 2025). However, a study by Nguyen et al. (2025) notes an interesting nuance in the Vietnamese banking sector, where market competition did not significantly influence social customer relationship management implementation, possibly due to stable macroeconomic conditions encouraging internal innovation rather than external reaction.

(2) Government Policy Support: Government policy support is also an indispensable driver. The Vietnamese government has demonstrated strong determination for a comprehensive digital transformation of the economy through key programs and decisions (Phan & Dinh, 2023; Nguyen et al., 2025). Continuous policies and regulations have strongly encouraged digital transformation activities across various sectors (Nguyen et al., 2025). This support, encompassing policy, technology, technical expertise, and training, is an essential factor driving digital transformation decisions (Thuan et al., 2025; Li et al., 2025) and positively impacts enterprise financial digital transformation (Zhang et al., 2025). This support has also been confirmed to play a significant role for transforming firms (Min & Kim, 2024; Bounfour et al., 2022) and in the education sector (Le et al., 2025).

(3) Customer Readiness and Pressure: Shifts in customer behavior generate significant transformation impetus. Customer behavior has shifted substantially towards digital platforms, with tens of millions of people in Vietnam using digital banking services (Nguyen et al., 2025). This creates a strong "pull" from the market, compelling organizations to adopt digital solutions to meet demand (Phan & Dinh, 2023). Meeting customer expectations in the digital environment is critical (Nguyen et al., 2025), and environmental factors such as clients and partners have a significant positive impact on Digital Transformation adoption (Hoang, 2024). However, Thuan et al. (2025) offer a contrasting perspective, showing that pressure from partners and consumers can negatively affect technology adoption in SMEs due to limited resources.

Within Vietnam's unique context, these factors resonate to create a distinct acceleration effect. The government is actively driving digital transformation through strategic plans such as the "Plan for Digital Transformation of the Banking Sector by 2025, with a vision to 2030" (State Bank of Vietnam, 2021). The subsequent proliferation of digital solutions, in turn, elevates customer expectations for seamless services. To capture this dynamic, we propose the theoretical construct of the "Environmental Pressure Spiral" in Vietnam: a self-reinforcing feedback system where government policy, market competition, and customer behavior mutually amplify one another, creating an environment of hyper-accelerated change. This concept enriches the traditional TOE framework by introducing a system dynamics perspective, an approach particularly relevant to the context of emerging economies and aligned with the ICECH2025 conference theme.

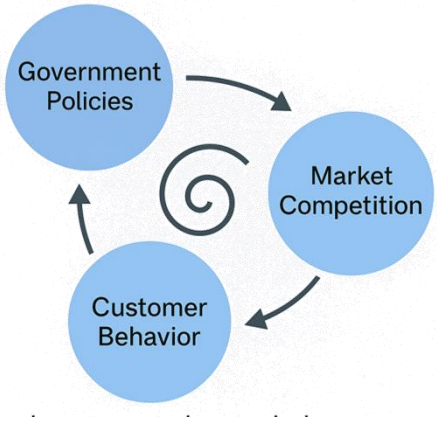


Figure 4. Environmental Pressure Spiral.

4.2.2. The Response: The Organizational Context

While technology creates the demand for new competencies, the organization itself provides the environment where they either flourish or wither. The analysis reveals that success hinges on two key factors: the presence of decisive internal support elements and a clear division of roles between management tiers. The first of these dynamics is the cultivation of a supportive internal environment. The literature consistently points to three factors that profoundly influence the development of managerial competencies:

(1) Top Management Support: This is consistently identified as a primary prerequisite. The involvement and enabling strategies of senior executives are crucial for directing and driving digital transformation (Hoang, 2024; Nguyen et al., 2025; Thuan et al., 2025). The competencies of top leaders, demonstrated through "vision and imagination," "critical analysis," and "strategic perspective" (Wang et al., 2023), along with skills like motivation and entrepreneurial thinking (Klus and Müller, 2021), are foundational to defining an organization's digital transformation strategy (Ravesteijn et al., 2024). This support is highlighted by Hoang et al. (2025) as one of the most critical elements.

(2) Organizational Culture: An innovative and open culture plays a significant role in an organization's readiness and adaptability (Hoang, 2024). Digital transformation requires concerted efforts across the entire organization, including adjustments to strategies and processes, and the cultivation of a culture that encourages new ideas. Cultural characteristics can either facilitate or hinder this process, as seen in Taiwanese family businesses (Hoang et al., 2025; Le et al., 2025).

(3) Organizational Resources: Adequate resources, especially financial ones, are a necessary condition. Digital transformation demands substantial investment, which poses a significant barrier for many businesses, particularly SMEs (Hoang et al., 2025; Nguyen et al., 2025; Thuan et al., 2025). The ability to deploy and manage IT platforms, along with management's capacity to envision and leverage IT resources, is intrinsically linked to organizational resources (Putri et al., 2025).

The second critical factor concerns the division of roles between top and middle management. In this regard, the analysis by Le et al. (2025) provides a nuanced view of the distinct yet complementary responsibilities of these two management tiers:

(1) Top Management Team Competencies (TMTCs): The role of top management is primarily strategic, focusing on setting direction and creating an organizational environment that is ready for technology adoption. The research shows that TMTCs do not have a significant *direct* impact on adoption intention; instead, their effect is mediated by the organization's readiness level.

(2) Middle-Tier Managers' Competencies (MMCs): Conversely, the competencies of middle managers have a *direct* influence on both the "perceived usefulness" and the "adoption intention" of technology. This highlights the practical role of middle management in bridging strategic vision and operational execution (Henderikx and Stoffers, 2022). They are the ones who translate strategic objectives into concrete actions, ensuring that digitalization initiatives are effectively implemented and aligned with operational realities. Their competencies encompass a comprehensive set of technical, thinking, social, and personal skills, such as data analytic skills and business process understanding (Le et al., 2025).

4.2.3. The Enabler: The Technological Context

The analysis reveals a two-way, co-evolutionary relationship between the characteristics of technology and managerial competencies. New technology not only demands new competencies to be effectively adopted, but the competencies of managers are themselves a decisive factor in identifying, selecting, and maximizing the potential of that technology. This reciprocal relationship, termed the **"Competency-Technology Feedback Loop"** is evident across three core technological characteristics: relative advantage, compatibility, and complexity.

(1) Relative Advantage: A technology's relative advantage can only be exploited when managers possess strategic recognition capabilities. On one hand, a technology with a clear relative advantage, identified by Luu et al. (2025) as a highly influential driver, necessitates that managers have the digital acumen to discern, evaluate, and strategically deploy it. The perceived usefulness, which is closely linked to relative advantage, has been shown to significantly influence adoption intentions across various sectors (Le et al., 2025; Putri et al., 2025). This directly requires managers to possess the knowledge and skills to understand and leverage these benefits (Thuy et al., 2025). On the other hand, it is managers who possess digital leadership competencies, demonstrated through strategic vision and sharp analytical skills, who are capable of recognizing and maximizing a technology's relative advantage, thereby enhancing organizational performance during digital transformation (Wang et al., 2023).

(2) Compatibility: The successful integration of new technology is contingent on a manager's competency in ensuring harmony between the technology and the organization. Compatibility, highlighted by Luu et al. (2025) and Giang et al. (2025) as a key determinant, requires managers to possess the strategic and organizational skills to ensure new technologies align seamlessly with existing business processes and cultural environments. For instance, Giang et al. (2025) note that considering synchronous compatibility is crucial for SMEs, underscoring the manager's role in ensuring technology is integrated with human resources and financial environments.

(3) Complexity: Managerial competency acts as a crucial bridge to overcome the barrier of technological complexity. Technological complexity, a significant concern noted by Hoang et al. (2025), places a direct demand on managers for advanced digital knowledge and technical expertise (Klus and Müller, 2021). Complicated and difficult-to-use technologies can deter adoption (Hoang et al., 2025), which underscores the need for managerial competencies to simplify integration and ensure effective utilization. This direct link is further solidified by the consistent finding that digital skills training is key in corporate financial digital transformation (Putri et al., 2025; Phan and Dinh, 2023). Moreover, enhancing human resource quality with digital skills is crucial for operating technology and analyzing data in the banking sector (Le et al., 2025). The importance of developing managerial competencies, including digital skills and leadership capabilities, is consistently identified as vital for successful technology adoption and for navigating the broader digital landscape (Le et al., 2025; Thuy et al., 2025; Wang et al., 2023; Klus and Müller, 2021; Ongena et al.,

2024; Zivkovic, 2022).

We propose the “Competency-Technology Feedback Loop” as a theoretical construct describing the co-evolutionary and reciprocal relationship between managerial capabilities and technological assets. This challenges the linear view that technology simply creates a demand for skills. Instead, the loop posits that managerial competencies (e.g., strategic vision, analytical skills) actively shape the organization's technological trajectory by influencing the selection, implementation, and exploitation of new technologies. In turn, the experience gained from deploying these technologies refines and deepens the managerial competency base, creating a virtuous cycle of organizational learning and adaptation.

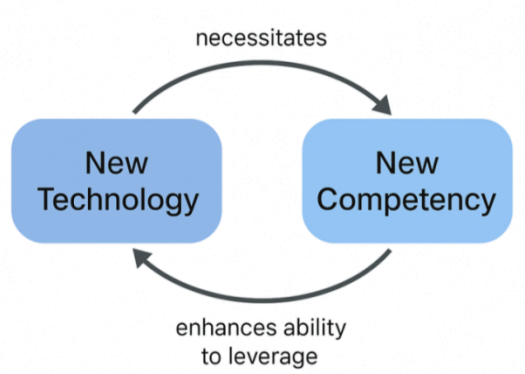


Fig. 5. Competency-Technology Feedback Loop.

4.2.4. The Outcome: The Convergence of Competency Models

The analysis of the literature reveals a clear convergence around a three-component competency model for managers in the digital era. This model comprises Digital Knowledge, Digital Skills, and Digital Mindset, with the latter serving as the core foundation.

(1) Digital Knowledge: This component encompasses a deep understanding of digital technologies, principles of information management, and cybersecurity. Studies emphasize the importance of "understanding of digital technologies" (Živković, 2022), "Knowledge of digital transformation" (Nguyen et al., 2025), and IT capability (Ravesteijn et al., 2024) as essential elements. Furthermore, this knowledge extends to understanding security (Shahim, 2021) and the importance of continuous education and training (Hoang et al., 2025).

(2) Digital Skills: This component refers to the ability to apply knowledge in practice, adapt to technological changes, and perform specific tasks. These skills include innovation and flexibility (Živković, 2022; Giménez-Medina et al., 2023), dynamic capability for crisis adaptation (Khurana et al., 2022; Posen et al., 2023), and the ability to apply knowledge to work through the proficient use of modern tools (Nguyen et al., 2025). Digital skills are also identified as a factor positively influencing digital transformation (Nguyen et al., 2024) and include business plan development, architecture design, and business change management (Ravesteijn et al., 2024).

(3) Digital Mindset: This is identified as the core element, manifested through strategic vision, a willingness to innovate, and continuous adaptability. The literature describes it through various facets: the "why?" dimension (vision, innovativeness, flexibility) that shapes organizational development (Živković, 2022); personal traits like entrepreneurial thinking and openness to the new (Klus & Müller, 2021); "top managerial cognition" which has a moderating role in digital transformation (Li & Fei, 2023); and resilience as a dynamic capability (Khurana et al., 2022). "Digital leadership competency" (Ravesteijn et al., 2024) and "management support" (Hoang et al., 2025) are also manifestations of a strong digital mindset.

4.3. Discussion: Building an Integrated Model and Its Implications (Answering RQ3)

4.3.1. Synthesis and Interpretation: Constructing an Integrated Model

The broad literature review revealed a consistent set of contextual drivers influencing managerial competencies. Through inductive thematic analysis, these drivers were grouped into three overarching categories: factors related to the nature of the technology itself, factors concerning the internal organizational environment, and factors stemming from the external market and regulatory landscape. Notably, these emergent categories align remarkably well with the core constructs of the Technology-Organization-Environment (TOE) framework. This alignment provides a strong, data-driven justification for using TOE as an integrated lens to structure our understanding.

In synthesis, the Digital Mindset plays an indispensable foundational role, guiding and driving the entire process of knowledge acquisition and skill development. Živković's (2022) argument affirms that leaders' values and behaviors are

paramount, with vision and flexibility (the "why?" dimension) serving as the main guiding principle. This vision creates a favorable environment for digital knowledge to be sought and skills to be cultivated. This is clearly demonstrated by the research of Li & Fei (2023), where "top managerial cognition" has a moderating effect, indicating how leadership mindset directly influences the process's success. Moreover, management support (Hoang et al., 2025) and strategic vision (Ravesteijn et al., 2024) are prerequisites for effective implementation, which in turn requires specific knowledge and skills. Therefore, a strong digital mindset is not merely an independent competency but an essential catalyst, laying a solid foundation for the effective acquisition and application of Digital Knowledge and Digital Skills.

To deepen the understanding of the organizational context, the finding of the critical bridging role of middle managers (section 4.2.2) requires an interpretation that moves beyond mere description. We argue this role can be powerfully explained through the lens of organizational ambidexterity. This theory posits that for sustained success, organizations must simultaneously pursue exploitation of existing competencies for operational efficiency and exploration of new opportunities for innovation (March, 1991; Tushman & O'Reilly, 1996). In a digital transformation, top managers set the exploratory vision, while operational teams focus on exploitative efficiency. Middle managers are the critical agents who must navigate this tension. They act as knowledge brokers, performing a process that Wenger (1999) describes as involving the translation, coordination, and alignment between different perspectives. This interpretation provides a clear theoretical mechanism for how middle managers perform their bridging role, thereby enabling the organization to be both efficient today and adaptive for tomorrow.

4.3.2. Comparison with Foundational Theories and the Paper's Contribution

Our findings demonstrate the analytical utility of the TOE framework when applied in a new context. Rather than explaining the technology adoption of an organization, this review shows that the framework can also effectively structure the antecedents to the competency development of an individual within that organization. In developed markets, the primary barrier to digital transformation may be cumbersome legacy systems. Conversely, in frontier markets like Vietnam, where the technological infrastructure can be more agile, the most significant and persistent barrier is human capital. Therefore, transposing the TOE lens from the organizational level to the individual level to focus on managerial competencies is not merely an academic exercise. Instead, it directly addresses the strategic bottleneck of the digital transformation process in these nations.

The bibliometric data reveals a scattered research landscape, with publications spread across a wide array of multidisciplinary journals. Combined with the explosion of publications post-2020, this points to a nascent research field, heavily driven by practical urgency rather than deep theoretical debates. While this confirms the topic's importance, it also suggests a lack of deep theoretical grounding and structured synthesis. This indicates a field where practical urgency has outpaced theoretical development. Our contribution, therefore, is to impose theoretical structure on this emerging conversation by applying a systematic review process and an established analytical lens.

4.3.3. Identification of Research Gaps

Based on the review, several research gaps have been identified that warrant future investigation:

(1) Empirically test the proposed hierarchical relationship, where the 'Digital Mindset' underpins the acquisition of 'Knowledge' and the application of 'Skills'.

(2) Disentangle the TOE framework to identify which specific drivers (e.g., top management support, competitive pressure from Fintechs) most significantly impact each competency component.

(3) Employ longitudinal studies to explore dynamic mechanisms like the "Competency-Technology Feedback Loop" and "Environmental Pressure Spiral" in Vietnam over time.

(4) Conduct multi-level comparative analyses to clarify the distinct roles and competency requirements of top management (strategic direction) versus middle management (operational execution).

5. CONCLUSION

5.1. Summary of Research

This paper conducted a systematic literature review to illuminate how managerial competencies are formed within the context of the Vietnamese banking sector's digital transformation. The review first revealed a fragmented and rapidly maturing research landscape, with a significant surge in publications post-2020, suggesting a field where practical urgency has outpaced theoretical synthesis. Building on this context, the research constructed a dynamic causal model. This model demonstrates that the "Environmental Pressure Spiral" acts as the initial catalyst, compelling an organizational response. This response is shaped by Organizational factors and executed via Technological tools, creating a "Competency-Technology Feedback Loop." This entire process converges on the need for a hierarchical competency model where a Digital Mindset is foundational for acquiring Knowledge and honing Skills.

5.2. Theoretical Implications

Theoretically, this study makes three primary contributions. First, it provides a structured overview of a rapidly growing yet fragmented research field, offering a clear map for future scholarly inquiry. Second, it proposes two new dynamic mechanisms—the "Environmental Pressure Spiral" and the "Competency-Technology Feedback Loop"—that deepen the understanding of business dynamics in a disruptive economy. Finally, and most significantly, it validates the transposition of the TOE framework to the individual level of analysis, offering a powerful lens for understanding human capital development in emerging markets.

5.3. Practical Implications

From a practical standpoint, the proposed model furnishes managers with a strategic framework to navigate disruption by replacing disjointed initiatives with a holistic, sequential process. This process commences with an "outside-in" orientation, wherein a proactive diagnosis of environmental pressures is conducted to forecast future competency demands. The insights from this external analysis then inform the critical task of cultivating a supportive internal ecosystem, which is contingent upon top management commitment, sufficient resource allocation, and an innovative organizational culture. Crucially, the framework culminates in the pedagogical principle that developmental initiatives should prioritize the formation of an agile and visionary digital mindset, positing that this foundation acts as the primary catalyst for the organic acquisition of specific knowledge and skills.

5.4. Limitations and Future Research

This study is limited by the scope of the selected keywords and databases, as discussed in Section 3.4. Based on our findings and these limitations, we propose an expanded agenda for future research to build upon the foundation of this study. An urgent direction is to quantitatively test the proposed model using structural equation modeling (SEM), with survey data from middle and senior managers in the Vietnamese banking sector. Furthermore, longitudinal studies could explore the dynamic mechanisms identified in this paper over time, providing a deeper understanding of how competencies evolve in response to continuous disruption.

In addition, we propose two new, rich avenues for inquiry:

(1) Comparative cross-country analysis: Future research should conduct comparative studies between Vietnam and other emerging economies (e.g., Indonesia, the Philippines) and developed economies. This would help isolate the specific effects of Vietnam's state-led development model on competency formation and determine the generalizability of the "Environmental Pressure Spiral" mechanism.

(2) Mixed-methods approaches: While our review synthesizes the 'what,' it cannot fully capture the 'how' and 'why' from a managerial perspective. A mixed-methods study, combining the quantitative testing of our model via SEM with in-depth qualitative interviews with banking managers in Vietnam, would provide rich, nuanced insights into the lived experience of navigating digital transformation. This could uncover the specific challenges and tactics middle managers use in their role as knowledge brokers for ambidexterity.

Table 1. Comparative analysis of selected articles on Managerial Competencies, Digital Transformation

Reference	Research Objective	Theoretical Framework	Key Findings	Limitations
Abdurrahman et al., 2024	Explore digital transformation (DT) and innovation via dynamic capabilities and TOE in Indonesian banking	Dynamic Capabilities, TOE	Technology and ecosystem capabilities drive DT and innovation, while organizational and strategic capabilities have mixed impacts. Governance, Risk & Compliance enhances DT, with innovation acting as a partial mediator.	Limited empirical evidence on DC- TOE integration; incomplete capability mapping.
Fu et al., 2023	Assess managerial capabilities' impact on DT in Chinese firms	Upper Echelons Theory	Managerial capabilities help overcome strategic inertia and optimize capital allocation; this effect is stronger in younger teams and firms with independent directors.	No analysis of digital outcomes or effective managerial use.
Henderikx & Stoffers, 2022	Examine DT's influence on middle management	Leadership Theories	DT requires human-centric leadership focusing on soft skills and tech literacy; AI supports the manager's	Limited middle management research; grey literature; small

Reference	Research Objective	Theoretical Framework	Key Findings	Limitations
	leader-		coaching role.	sample.
Hoang, 2024	Identify DT adoption factors in SMEs in Danang	TOE, Resource Dependence, Capability Theory	TOE factors all positively impact DT, with the technology context acting as a mediator.	Localized to Danang SMEs; sampling bias; limited empirical depth.
Le et al., 2025	Study competencies driving Industry 4.0 adoption	Readiness and perceived usefulness framework	Readiness and usefulness act as mediators for technology adoption; the competencies of middle managers directly influence this process.	SME-biased sample; tech-centric view; need for tailored competency development.
Nguyen Ha Thach et al., 2025	Integrate SCRM into Customer Lifetime Value (CLV) in Vietnamese banking	TOE, CLV	SCRM improves customer acquisition, retention, and expansion; the technological and organizational contexts are highly influential.	Sector-specific findings; limited generalizability.
Ongena et al., 2024	Link digital leadership and IT capabilities to DT	Digital Leadership, IT Capabilities	Both leadership and IT capabilities positively impact DT; each component of leadership competency has a direct influence.	SME-biased sample; tech-centric DT view; concept validation needed.
Wang et al., 2023	Identify key leadership competencies in financial DT	Multi-criteria decision-making, Strategy, Personality Traits	Vision, critical analysis, and strategic perspective are the top-tier competencies.	Small expert sample; limited cross-sector applicability.
Wang et al., 2025	Model financial DT and optimize transformation paths	TOE, Resource Theory, Systems Theory	TOE factors drive corporate financial DT; training and policy are key.	Unexpected results on tech/organizational contexts; limited generalizability
ZivkoviC, 2022	Develop integrative leadership competency framework for DT	Leadership Theories, Multiple Intelligences	The competency framework is built upon five pillars: vision, innovation, technology, collaboration, and continuous learning.	Limited article access; small number of studies reviewed.

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