

RECONCEPTUALISING INTELLECTUAL CAPITAL IN THE ERA OF ARTIFICIAL INTELLIGENCE

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Abstract: *The rapid advancement of Artificial Intelligence (AI) is redefining the architecture of organizational knowledge and challenging traditional conceptualizations of intellectual capital (IC). While IC has long been recognized as a key driver of firm performance, its conventional framework that centered on human, structural, and relational capital remains largely static and insufficient in capturing the dynamic, data-driven realities of modern organizations. This paper develops a conceptual perspective that positions AI as an embedded and transformative capability that reconfigures the foundations of IC. Drawing on the Resource-Based View (RBV) and Knowledge-Based View (KBV), the paper argues that AI enhances the scalability, adaptability, and productivity of intellectual resources. By critically contrasting traditional and AI-enabled IC, this study advances a more integrative framework that reflects the evolving nature of knowledge ecosystems. The paper concludes by outlining future research directions and highlighting implications for SMEs in emerging economies.*

Keywords: *Intellectual Capital, Artificial Intelligence, Resource-Based View, Knowledge-Based View, SMEs*

Introduction

The transition toward a knowledge-based economy has significantly shifted organizational priorities from tangible assets to intangible resources as the primary drivers of value creation. Intellectual capital (IC), encompassing human expertise, organizational systems, and relational networks, has been widely recognized as a critical determinant of firm performance and sustained competitive advantage (Bontis, 1998; Bontis et al., 2000). However, the rapid advancement of Artificial Intelligence (AI) is fundamentally reshaping how knowledge is generated, processed, and utilized within organizations, thereby challenging traditional conceptualizations of IC.

AI has emerged as a globally transformative force and an increasingly important area of academic inquiry (Dwivedi et al., 2025). Recent developments in machine learning, big data analytics, and natural language processing have enabled organizations to process complex information, generate predictive insights, and support data-driven decision-making at unprecedented scale and speed (Dwivedi et al., 2021). Consequently, AI extends beyond its conventional role as an automation tool and increasingly functions as an active participant in organizational knowledge creation and strategic decision-making. Recognizing this transformative potential, organizations are investing heavily in AI technologies to enhance innovation, operational efficiency, and long-term competitiveness (Davenport & Ronanki, 2018).

Despite these developments, the integration of AI into IC literature remains conceptually limited. Existing studies largely position AI as a technological enabler that supports operational efficiency, automation, and organizational processes rather than as an embedded component within the IC system itself (Dwivedi et al., 2021; Yilmaz & Tuzlukaya, 2024). Consequently, traditional IC frameworks continue to treat human, structural, and relational capital as relatively static organizational resources, with limited consideration of how AI dynamically reshapes the creation, integration, and application of knowledge within digitally transformed environments. This limitation reduces the ability of existing IC models to explain the increasingly interconnected and data-driven nature of organizational learning and decision-making processes. Furthermore, the growing reliance on intelligent systems, predictive analytics, and real-time knowledge processing suggests that AI is no longer merely a supporting technological infrastructure, but an active capability that continuously influences how intellectual resources are generated, coordinated, and leveraged for competitive advantage.

Problem Statement

Intellectual Capital (IC) has long been recognized as a critical source of organizational value creation and competitive advantage, traditionally comprising human capital, structural capital, and relational capital. Existing IC frameworks were developed in an era where knowledge creation, storage, and application were largely dependent on human expertise and organizational routines. As a result, these frameworks conceptualize knowledge assets as relatively stable and human-centered resources embedded within organizational structures and stakeholder relationships. While these models have provided valuable insights into organizational performance, they may no longer adequately reflect the realities of digitally transformed organizations.

The rapid advancement of Artificial Intelligence (AI) has fundamentally altered how knowledge is generated, processed, integrated, and utilized within organizations. AI systems increasingly perform functions that extend beyond automation, including predictive analysis,

pattern recognition, decision support, and continuous learning (Raisch & Krakowski, 2021). These capabilities enable AI to actively participate in organizational knowledge processes rather than merely supporting them. Despite this transformation, existing IC literature largely treats AI as a technological tool or a component of structural capital, overlooking its broader role in shaping and amplifying intellectual resources. Such positioning creates a theoretical limitation because traditional structural capital primarily represents organizational processes, systems, databases, and knowledge repositories developed and controlled by humans. In contrast, AI possesses adaptive, generative, and learning capabilities that allow it to continuously create, enhance, and transform knowledge within organizations (Mikalef & Gupta, 2021). Therefore, treating AI merely as an extension of structural capital may fail to capture its evolving role as an active contributor to intellectual resource development and organizational value creation. Consequently, traditional IC frameworks remain limited in explaining the dynamic interactions between human intelligence and machine intelligence in contemporary organizations.

This situation creates a significant theoretical ambiguity regarding the position of AI within the intellectual capital framework. It remains unclear whether AI should be viewed solely as part of structural capital, as a distinct organizational capability, or as an embedded component that fundamentally reconfigures the relationships among human, structural, and relational capital. The absence of a clear theoretical perspective restricts the ability of existing IC models to explain knowledge creation and value generation in AI-driven environments.

Therefore, there is a need to reconceptualize intellectual capital by incorporating AI as a transformative capability that actively enhances and integrates the core dimensions of IC. Such a reconceptualization is necessary not only to address the theoretical limitations of existing IC frameworks but also to provide a more comprehensive understanding of how organizations, particularly SMEs, can leverage hybrid human-machine intelligence to achieve innovation, adaptability, and sustainable competitive advantage in the digital economy (Dellermann et. al., 2019).

Accordingly, this study seeks to reconceptualize intellectual capital by positioning AI as a transformative component within the IC system rather than as an external technological support mechanism. The proposed AI-enabled Intellectual Capital (AIC) framework aims to address the unresolved conceptual ambiguity surrounding the role of AI by explaining how AI interacts with and enhances the traditional dimensions of intellectual capital. By contextualizing this reconceptualization within the operational realities of Small and Medium Enterprises (SMEs), this study provides a more comprehensive theoretical perspective on how organizations can leverage hybrid human-machine intelligence to strengthen innovation capability, organizational adaptability, and sustainable competitive advantage in an increasingly AI-driven economy.

Literature Review

Intellectual Capital

IC has become one of the most important ideas in understanding how organisations create value today. In a knowledge-driven economy, it is no longer enough for firms to rely on physical assets alone. Instead, long-term success depends heavily on how well they manage and use knowledge, experience, and relationships. From the Resource-Based View (RBV), IC is seen

as a strategic resource that is valuable, rare, difficult to imitate, and not easily replaced, which makes it a key source of competitive advantage (Barney, 1991; Wernerfelt, 1984; Bontis, 1998).

Most researchers agree that IC can be understood through three main components: human capital, structural capital, and relational capital (Bontis, 1998; Nahapiet & Ghoshal, 1998; Subramaniam & Youndt, 2005). Together, these three elements explain how knowledge is created, stored, and shared within and outside an organisation. Human capital refers to the knowledge, skills, experience, and creativity that individuals bring into an organisation. It is often considered the most important part of IC because it drives learning, innovation, and problem-solving (Bontis, 1998; Edvinsson & Malone, 1997). However, one key limitation is that human capital is tied to individuals. When employees leave, part of this knowledge can be lost if it is not properly captured or transferred. Structural capital addresses this limitation by capturing the institutionalised knowledge embedded within organisational structures, processes, databases, routines, and technological systems (Edvinsson & Malone, 1997; Youndt et al., 2004). Unlike human capital, structural capital stays within the organisation even when employees leave. It acts as the “organisational memory” that helps ensure knowledge is not lost and can be reused over time. The third component, relational capital, focuses on the value created through relationships with external parties such as customers, suppliers, partners, and other stakeholders. It includes trust, reputation, and long-term relationships that help organisations access external knowledge and opportunities (Nahapiet & Ghoshal, 1998; Bontis, 1998). Strong relational capital allows organisations to stay connected to their environment and respond more effectively to market changes.

Collectively, these three components of IC are not independent constructs but are deeply interdependent and mutually reinforcing. Their interaction forms a dynamic knowledge system that underpins organisational capability, innovation performance, and strategic adaptability. Despite their conceptual clarity, recent scholarship suggests that traditional IC frameworks may be insufficient in capturing the increasing complexity of digital and AI-driven environments, where knowledge creation and utilisation are becoming more automated, data-intensive, and algorithmically mediated. Human capital now emphasizes digital skills and innovation, while structural capital incorporates AI-enabled systems, cloud infrastructure, and data analytics (Zhang & Yao, 2025). Furthermore, relational capital has expanded into multi-stakeholder ecosystems that strengthen legitimacy, collaboration, and sustainable performance (Badraoui et al., 2025).

Limitations of Traditional Intellectual Capital Framework

Traditional IC frameworks have long provided a foundational lens for understanding how intangible resources contribute to organizational performance. By categorizing IC into human, structural, and relational capital, prior research has offered a structured and widely accepted approach to examining knowledge assets within firms (Bontis et al., 2000). However, despite its enduring relevance, this framework is increasingly challenged by the realities of digital transformation and the rapid advancement of AI, which are reshaping how knowledge is created, processed, and utilized in organizations (Hussinki et al., 2020).

One of the key limitations of traditional IC frameworks is their inherently static orientation, where knowledge is conceptualized as a stock of resources that can be accumulated, stored, and measured over time (Stewart, 1997). This perspective assumes relatively stable knowledge structures, which is increasingly inconsistent with contemporary digital environments characterized by continuous data generation and real-time learning systems. Recent studies

emphasize that IC is becoming more dynamic and fluid due to algorithmic processing and AI-enabled knowledge flows, which continuously reshape organizational knowledge structures beyond static measurement models (Martins & Lopes, 2024; Cosa et al., 2024).

In addition, traditional IC frameworks exhibit a strong human-centric bias, positioning human capital as the primary driver of knowledge creation and innovation. While human expertise remains critical, this view underestimates the increasing role of AI in generating insights, recognizing patterns, and supporting decision-making processes. AI systems are now integrated into organizational knowledge processes, enabling what has been described as hybrid intelligence, where humans and machines jointly contribute to knowledge creation (Caputo, 2024; Davenport & Ronanki, 2018). This shift challenges the assumption that knowledge is primarily embedded in individuals and highlights the need for a more integrated conceptualization of IC.

Another limitation concerns scalability. Human cognitive capacity is inherently constrained by attention, time, and information-processing limits, which traditional IC models implicitly reflect. In contrast, AI technologies enable large-scale, real-time processing of vast and complex datasets, significantly enhancing the scalability of knowledge creation and utilization. Empirical evidence suggests that organizations leveraging AI and digital transformation can significantly enhance their knowledge-based capabilities and performance outcomes through scalable analytics and automated learning systems (Duan et al., 2019; Dwivedi et al., 2021). However, these scalability dynamics remain underrepresented in traditional IC frameworks.

Taken together, these limitations indicate that while traditional IC frameworks remain relevant, they are no longer sufficient to explain knowledge dynamics in digitally transformed and AI-driven organizational environments. Recent literature strongly supports the need to extend IC theory by incorporating AI as an enabling and transformative capability that reshapes how intellectual resources are created, combined, and deployed (Dwivedi et al., 2021; Caputo, 2024). Therefore, a shift toward a hybrid, dynamic, and technology-integrated intellectual capital framework is essential for advancing both theory and practice.

Competing Perspectives on Artificial Intelligence and Intellectual Capital

The growing adoption of AI has generated divergent perspectives regarding its role within organizational knowledge systems and intellectual capital. Despite increasing scholarly interest in the relationship between AI and organizational performance, consensus has yet to emerge regarding the conceptual position of AI within IC theory. Existing literature can broadly be categorized into three competing perspectives.

The first perspective views AI as a technological infrastructure embedded within structural capital. From this standpoint, AI is considered an extension of organizational databases, information systems, and technological resources that support knowledge storage and dissemination (Edvinsson & Malone, 1997; Yilmaz & Tuzlukaya, 2024). This interpretation preserves the traditional IC framework by treating AI as another organizational asset within existing structural capital. While conceptually parsimonious, this view is increasingly criticized for underestimating the adaptive and generative capabilities of contemporary AI systems. Unlike traditional information technologies, AI continuously learns from data, generates new insights, and actively influences organizational decision-making processes, suggesting a role that extends beyond passive knowledge repositories.

A second perspective conceptualizes AI as an organizational capability rather than an intellectual resource. Scholars within the dynamic capabilities tradition argue that AI capability enables firms to sense opportunities, process information, and reconfigure resources in response to environmental changes (Mikalef & Gupta, 2021; Teece, 2018). This perspective highlights the strategic value of AI and explains performance differences between firms with varying levels of AI maturity. However, while AI capability literature successfully explains organizational adaptation and innovation, it tends to treat knowledge resources and AI as separate constructs. Consequently, it provides limited insight into how AI transforms the nature and interaction of intellectual capital components themselves.

A third and more recent perspective proposes a hybrid intelligence view, where human and machine intelligence jointly contribute to knowledge creation and organizational learning (Jarrahi, 2018; Raisch & Krakowski, 2021; Caputo, 2024). This perspective challenges the traditional assumption that knowledge creation is exclusively human-driven and suggests that AI increasingly participates in cognitive and analytical processes that were previously performed only by individuals. The emergence of human–AI collaboration implies that knowledge is becoming distributed across socio-technical systems rather than residing solely within people or organizational structures.

Critical literature on AI capability further reinforces this argument. Recent studies emphasize that AI should not be viewed merely as a technological artefact because its value emerges through its interaction with organizational knowledge processes, human expertise, and learning mechanisms (Mikalef & Gupta, 2021; Grover & Lyytinen, 2023). AI systems derive effectiveness from data quality, organizational routines, and human interpretation, while simultaneously reshaping these elements through continuous feedback and learning. This reciprocal relationship blurs traditional boundaries between human capital, structural capital, and technological resources. Consequently, AI cannot be adequately explained through conventional IC classifications that assume clear distinctions between knowledge creators and knowledge repositories.

Against this backdrop, the proposed AI-Enabled Intellectual Capital (AIC) framework offers a theoretically superior interpretation because it integrates the strengths of these competing perspectives while addressing their limitations. Unlike the structural capital view, AIC recognizes that AI actively contributes to knowledge creation and utilization rather than merely storing information. Unlike the AI capability perspective, AIC explicitly explains how AI transforms the configuration and interaction of intellectual resources within the organization. Finally, unlike broader hybrid intelligence perspectives that often remain conceptually abstract, AIC provides a structured framework grounded in the established dimensions of human, structural, and relational capital.

By positioning AI as an embedded and transformative capability that amplifies, integrates, and reconfigures intellectual resources, AIC extends both the Resource-Based View and Knowledge-Based View beyond their traditional human-centric assumptions. The framework therefore provides a more comprehensive explanation of organizational value creation in environments where competitive advantage increasingly depends on the effective integration of human and machine intelligence. In this sense, AI is neither merely a technological asset nor solely a dynamic capability; rather, it functions as a central mechanism through which intellectual capital is continuously created, enhanced, and leveraged in the digital economy.

Emergence of AI-Enabled Intellectual Capital and Knowledge Multiplier Role of AI

AI is increasingly being adopted across organisations, enhancing data-driven decision-making, improving predictive capabilities, and transforming business models and customer experiences as its strategic importance continues to grow (Duan et al., 2019). The emergence of AIC reflects a fundamental shift from viewing knowledge as a static organizational asset to understanding it as a dynamic, continuously evolving system shaped by digital technologies. In this new paradigm, knowledge is co-created through the interaction between human expertise and machine intelligence, resulting in more adaptive, responsive, and learning-oriented organizational capabilities. AIC is characterised by the integration of intelligent technologies into core knowledge management processes, including knowledge creation, storage, integration, and application. Traditional organizational memory, previously dependent on human cognition and static repositories, is now extended through AI systems capable of real-time data processing, continuous learning, and predictive analytics. This transformation enhances organizational decision-making by enabling firms to anticipate changes, identify hidden patterns, and respond proactively to environmental uncertainty.

Within this context, AI reshapes the overall architecture of IC by strengthening the interconnection between human, structural, and relational capital. Rather than functioning as isolated components, these dimensions become increasingly interdependent within a digitally enabled knowledge ecosystem. AI acts as a facilitating mechanism that enhances knowledge flow, coordination, and integration across organizational domains, thereby improving overall organizational responsiveness and learning capability.

Empirical evidence supports this transformation. AI has been shown to enhance human capital through improved workforce planning, skills alignment, and labour efficiency, while strengthening structural capital through better data integration, communication analysis, and scenario-based decision-making, and enhancing relational capital through improved stakeholder management, customer personalization, and market intelligence (Al-Romeedy & Alharethi, 2024). Similarly, AI improves organizational IC by strengthening internal systems, enabling collaborative learning, and enhancing data-driven decision-making across all IC dimensions (Lu et al., 2026).

Beyond this structural transformation, AI functions as a knowledge multiplier that amplifies the value of existing intellectual resources. Through advanced analytics and intelligent systems, AI enhances the depth, speed, and scalability of knowledge utilisation, allowing organizations to derive greater value from their existing IC base (Grover & Lyytinen, 2023; Duan et.al., 2024). However, the effectiveness of this transformation is contingent upon organizational readiness, including digital infrastructure, data quality, and employee competencies. Overall, AIC represents a shift toward a more dynamic and integrated knowledge system in which human intelligence and machine intelligence jointly contribute to organizational adaptability, innovation, and performance.

Proposed Framework

The proposed AIC Framework as depicted in Figure 1 is developed based on the integration of the Resource-Based View (RBV) and Knowledge-Based View (KBV), which collectively explain how organizations achieve sustainable competitive advantage through strategic resources and knowledge capabilities. RBV suggests that firms gain superior performance when they possess valuable, rare, inimitable, and non-substitutable resources (Barney, 1991), while

KBV emphasizes knowledge as the most strategically important organizational asset within the firm (Grant, 1996). Guided by these theories, the framework conceptualizes IC as a strategic organizational capability consisting of human capital, structural capital, and relational capital that collectively contribute to organizational competitiveness and long-term performance.

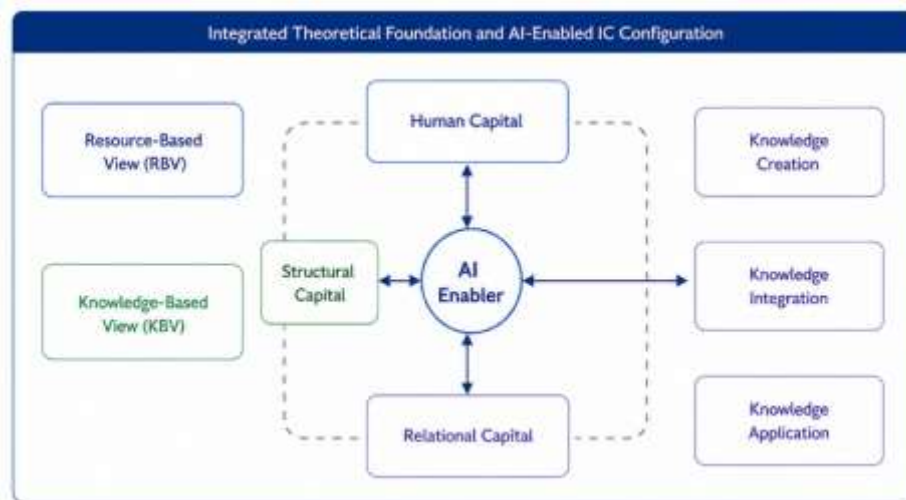


Figure 1: Proposed Model for AI-Enabled IC

Within this framework, IC is conceptualized as comprising three interrelated dimensions: human capital, structural capital, and relational capital, which collectively represent the organization's core knowledge-based resources (Bontis, 1998; Edvinsson & Malone, 1997; Nahapiet & Ghoshal, 1998). AI is positioned at the centre of the framework as an enabling capability that enhances and connects all dimensions of intellectual capital. Rather than functioning as a standalone construct, AI operates as a dynamic capability that strengthens the utilization and integration of organizational knowledge resources (Dwivedi et al., 2021).

As shown in the model, AI facilitates knowledge creation, knowledge integration, and knowledge application through intelligent data processing, predictive analytics, and real-time decision support systems. These knowledge processes are consistent with the Knowledge-Based View, which emphasizes knowledge as the primary driver of organizational performance (Grant, 1996). AI also enhances human capital by improving workforce capabilities and decision-making support systems (Jarrahi, 2018), strengthens structural capital through intelligent knowledge systems and automation (Brynjolfsson & McAfee, 2017), and improves relational capital through data-driven stakeholder engagement and customer intelligence (Huang & Rust, 2021).

Overall, the proposed framework explains that AIC represents a dynamic and evolving strategic capability within digitally transformed organizations. By integrating RBV and KBV with AI-enabled organizational capabilities, the model extends traditional IC perspectives beyond static intangible assets toward a more adaptive, intelligent, and technologically integrated framework. The model therefore provides a contemporary explanation of how organizations reconfigure intellectual resources and knowledge capabilities to sustain competitiveness, innovation, and long-term organizational performance in the digital economy.

Methodology

This paper adopts a conceptual approach to examine and reconceptualise intellectual capital in the era of artificial intelligence (AI). Rather than relying on primary data collection, the study draws on existing scholarly literature to explore how AI is reshaping the nature, development, and strategic value of intellectual capital within organisations. A narrative review of the literature was conducted using peer-reviewed journal articles, books and other relevant academic sources obtained from databases such as Scopus, Web of Science, and Google Scholar. The review focused on studies related to intellectual capital, AI capability, the Resource-Based View (RBV), and the Knowledge-Based View (KBV). Literature addressing SMEs and digital transformation was also considered to provide contextual understanding of the changing business environment in which intellectual capital is created and utilised.

The selected literature was critically analysed to identify recurring themes, theoretical perspectives, and emerging issues concerning the interaction between AI and intellectual capital. Insights from these studies were then synthesised to develop a revised conceptual understanding of intellectual capital that reflects the growing role of AI in knowledge creation, knowledge management, and organisational value generation. The proposed framework integrates perspectives from RBV and KBV to explain how AI capability may complement and enhance traditional intellectual capital resources in the digital era.

Implications for SMEs in Emerging Economies

For SMEs, particularly in emerging economies, AIC offers significant potential to enhance competitiveness, especially by optimising how limited knowledge-based resources are utilised. From a RBV, AI functions as a capability that strengthens the value, rarity, and usability of intellectual assets by improving data processing, pattern recognition, and decision-making speed (Barney, 1991; Teece, 2018). In practical terms, AI tools such as predictive analytics, chatbots, and intelligent automation allow SMEs to streamline operations, reduce cognitive workload, and improve strategic decision-making despite resource constraints. This is particularly important in volatile and competitive markets where SMEs often lack scale but can compensate through agility and knowledge efficiency. Studies also show that digital technologies, including AI, can significantly enhance productivity and innovation capacity in small firms when effectively integrated into their operations (OECD, 2021; Dwivedi et al., 2021).

However, the adoption of AIC among SMEs is not without challenges. Key barriers include high implementation costs, limited digital skills, resistance to technological change, and inadequate digital infrastructure, particularly in developing economies (World Bank, 2020; OECD, 2021). Many SMEs also struggle with absorptive capacity, meaning their ability to recognise, assimilate, and apply new knowledge is limited, which slows down AI integration (Cohen & Levinthal, 1990). As a result, without external support, the digital divide between large corporations and SMEs may widen. Policymakers therefore play a crucial enabling role by providing targeted financial incentives, capacity-building programmes, and investment in digital infrastructure. In addition, public-private partnerships and SME-focused digital transformation initiatives have been identified as effective mechanisms to accelerate AI adoption and strengthen national innovation ecosystems (World Bank, 2020; OECD, 2024).

Conclusion

This paper reconceptualises IC within SMEs by AI as a core transformative capability within the IC framework. It moves beyond the traditional view of IC as a static, human-centred construct and introduces a more dynamic and hybrid intelligence perspective. In this framing, AI is not treated merely as a supportive tool, but as an embedded capability that actively reshapes how knowledge is generated, stored, shared, and applied within organisations. The integration of AI strengthens the interaction between human, structural, and relational capital, enabling organisations to enhance learning processes and respond more effectively to rapidly changing digital environments.

This paper contributes to the IC literature by extending the RBV and KBV within the SME context. It argues that the competitiveness and sustainability of SMEs are increasingly influenced by their ability to integrate AI with existing intellectual capital resources. Rather than relying solely on traditional knowledge assets, SMEs can leverage AI-enabled systems to strengthen organisational learning, optimise knowledge management processes, and enhance customer and stakeholder relationships. As such, the paper positions AIC as a strategic mechanism that can support SMEs in navigating digital transformation and maintaining competitiveness in the digital economy.

Future research should empirically validate the proposed framework among SMEs across different industries and economic settings. Further studies should also investigate contextual factors such as digital maturity, technological readiness, organisational culture, and government support, as these factors may significantly influence SMEs' ability to integrate AI into their IC systems. Longitudinal and comparative studies are also recommended to examine how AI-enabled IC evolves over time and contributes to SME resilience, innovation, and long-term performance, particularly in emerging economies and rapidly changing digital markets.

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