



A Holistic Integrated Intellectual Capital Ecosystem Model for Enhancing the Sustainability of Malaysian SMEs: A Conceptual Study

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ABSTRACT

Small and medium enterprises (SMEs) play a critical role in driving economic growth, employment, and innovation, particularly in emerging economies such as Malaysia. Despite their contributions, many SMEs struggle to achieve long-term sustainability due to resource constraints, technological disruption, and increasing competitive pressures. Intellectual capital (IC) has been widely recognised as a strategic intangible resource that enhances innovation capability, operational efficiency, and competitive advantage. However, conventional IC frameworks, typically limited to human, structural, and relational capital, may not sufficiently capture the broader range of intangible resources required in today's complex business environment. This conceptual study proposes a holistic integrated intellectual capital ecosystem (IICE) model that extends traditional IC frameworks by incorporating six key dimensions: Human capital, structural capital, customer capital, technological capital, social capital, and spiritual capital. The model further introduces leadership as a moderating capability that influences the effectiveness of intellectual capital in enhancing SME sustainability. Drawing on intellectual capital theory, resource-based view, and sustainability leadership perspectives, this study develops an integrated conceptual framework explaining how interconnected intangible resources contribute to organizational resilience and sustainable performance. The proposed model advances the intellectual capital literature by offering an ecosystem-based perspective that integrates knowledge resources, technological capabilities, relational networks, and ethical values within a leadership-driven sustainability context. The study provides practical implications for SME managers and policymakers by emphasising the importance of leadership development, enhancing digital capabilities, and fostering stakeholder collaboration. It also provides a foundation for future empirical research examining the relationships among intellectual capital components, leadership practices, and sustainable performance in SMEs.

Keywords: Intellectual Capital, SME Sustainability, Leadership, Knowledge-based Resources, Innovation Capability

JEL Classifications: Q56, O34, M10

1. INTRODUCTION

Small and medium enterprises (SMEs) are a key aspect of economic growth in many nations, especially in developing

countries like Malaysia. Small and medium-sized businesses (SMEs) are very important for the economy because they create jobs, boost innovation, and help entrepreneurs grow. Recent studies indicate that SMEs account for more than 97% of all

businesses in Malaysia. They are very important for making the country's economy more resilient and competitive. Many small and medium-sized businesses (SMEs) still struggle to grow in the long term because they lack sufficient capital, technology, or market knowledge, and they face greater competition as the business world evolves rapidly.

In recent years, scholars and policymakers have increasingly acknowledged the significance of intellectual capital (IC) as a fundamental strategic resource for organizational sustainability. Intellectual capital is the sum of a company's information, skills, connections, and processes that help it make money and stay ahead of the competition. Previous studies indicate that intellectual capital substantially improves innovation capacity, organizational learning, and operational efficiency, which are crucial for the competitiveness of SMEs in knowledge-driven economies (Saeed et al., 2021; Xu and Wang, 2023). Consequently, the management of intangible resources has emerged as a pivotal strategic imperative for SMEs navigating the intricacies of digital transformation and global competition. Conventional intellectual capital frameworks typically delineate IC into three principal components: human capital, structural capital, and relational (customer) capital. This tripartite framework has offered significant insights into the role of intangible assets in organizational performance; however, recent research indicates that it may inadequately capture the intricacies of knowledge-based resources essential to sustainable business development in modern contexts (Musman et al., 2025; Mohammad, 2025). Recent studies show that other intangible resources, such as digital skills, collaborative networks, and organizational principles, are becoming increasingly important in determining an organization's sustainability (Razak et al., 2025).

Moreover, current intellectual capital research has primarily focused on the direct relationship between IC components and organizational success, often neglecting the broader ecosystem in which these intangible resources operate. Small and medium-sized enterprises (SMEs) do not depend primarily on internal knowledge assets; they also rely on external relationships, technological capabilities, and ethical leadership practices, all of which affect the long-term health of the organization. As a result, there is an increasing necessity to embrace a more comprehensive and integrative viewpoint that reflects the interrelated characteristics of intellectual capital within contemporary organizational ecosystems. Another restriction in the current literature concerns the role of leadership in the utilization of intellectual capital. While leadership is acknowledged as a significant factor in organizational performance, limited research has investigated its impact on the efficiency with which SMEs convert intellectual capital into sustainable results. Recent research indicates that sustainable leadership approaches can markedly improve knowledge sharing, innovation capacity, and stakeholder involvement within organizations (Ahmad et al., 2025; Mfarrej et al., 2025). Nevertheless, the moderating influence of leadership on the intellectual capital-sustainability nexus is inadequately examined in SME research.

To fill these gaps, this study proposes a holistic Integrated Intellectual Capital Ecosystem (IICE) model that extends traditional

IC frameworks by encompassing six key areas: human, structural, customer, technology, social, and spiritual capital. This framework also presents leadership as a moderating factor that affects the efficacy of intellectual capital in promoting SME sustainability. There are three main ways that the study adds to the literature. First, it enhances intellectual capital theory by introducing a multidimensional ecosystem-based framework that incorporates growing intangible resources pertinent to contemporary SMEs. Second, it connects studies on IC and sustainability by showing how knowledge assets work together to enable long-term success in organizations. Third, it emphasizes the strategic role of leadership in shaping the link between IC and sustainability, offering novel insights into how managerial competencies affect the effectiveness of intellectual capital utilization. This paper presents the integrated intellectual capital ecosystem (IICE) model, offering a thorough conceptual framework that enhances both scholarly research and practical comprehension of SME sustainability in knowledge-based economies.

2. LITERATURE REVIEW

2.1. Intellectual Capital and SME's Sustainability

In knowledge-based economies, organizational competitiveness increasingly depends on intangible assets rather than traditional physical or financial resources. Intellectual capital (IC) has therefore emerged as a critical strategic resource that enables firms to enhance innovation capability, organizational learning, and long-term sustainability. Intellectual capital refers to the collective knowledge resources embedded within employees, organizational systems, technological capabilities, and stakeholder relationships that contribute to value creation.

From the perspective of the resource-based view (RBV), firms achieve sustainable competitive advantage when they possess valuable, rare, inimitable, and non-substitutable resources that are difficult for competitors to replicate. Intellectual capital components represent such strategic resources because they are deeply embedded in organizational knowledge, capabilities, and relationships (Teece, 2022). In SMEs, intellectual capital plays an even more significant role because smaller firms often lack extensive financial and physical resources and must rely on knowledge-based capabilities to remain competitive.

Recent research suggests that intellectual capital significantly enhances innovation capability, organizational resilience, and sustainable business performance in SMEs (Xu and Wang, 2023; Khaliq et al., 2023). However, traditional intellectual capital frameworks focusing solely on human, structural, and relational capital may not adequately capture the broader range of intangible resources required in modern business ecosystems. As SMEs increasingly operate within digitally connected and sustainability-oriented environments, additional intellectual capital dimensions such as technological capital, social capital, and spiritual capital have become increasingly relevant. Consequently, this study adopts a broader conceptualization of intellectual capital by integrating six key dimensions: human capital, structural capital, customer capital, technological capital, social capital, and spiritual capital, which collectively contribute to SME sustainability.

2.2. Human Capital (HC)

Human capital (HC) comprises employees' knowledge, skills, competencies, experience, and creativity, which contribute to organizational innovation and productivity. Within the RBV framework, HC is considered a strategic organizational resource because employee knowledge and expertise are often unique and difficult for competitors to replicate (Hashim et al., 2025). Highly skilled employees enable organizations to generate new ideas, develop innovative products and services, and respond effectively to changing market conditions. In addition, Elenwo and Tolofari (2024) confirmed that HC is recognized as a constituent of IC and a critical asset across industries such as financial services, management consulting, and software development. In SMEs, where organizational structures are often flexible and less hierarchical, employees play a critical role in driving innovation and knowledge sharing. Empirical studies indicate that firms with strong HC are better able to develop innovation capability and achieve sustainable organizational performance (Zhang et al., 2021).

HC contributes to SME sustainability by enhancing innovation capability, organizational learning, and adaptive capacity. Employees' knowledge, skills, creativity, and experience enable firms to develop innovative products and services, improve operational processes, and respond effectively to changing market conditions. From a sustainability perspective, skilled employees are also essential for implementing environmentally responsible practices, improving resource efficiency, and developing sustainable business strategies. Firms with strong HC are therefore better equipped to maintain long-term competitiveness while adapting to environmental and social expectations (Zhang et al., 2021; Xu and Wang, 2023). SMEs typically operate with restricted resources. Therefore, the presence of a team of knowledgeable and proficient individuals may help them maintain their competitive edge, increase productivity, and remain innovative (Hashim et al., 2023).

2.3. Structural Capital (SC)

Structural capital refers to the organizational systems, processes, routines, databases, intellectual property, and knowledge management practices that support knowledge creation and dissemination within organizations. Structural capital enables organizations to institutionalize knowledge, ensuring that it remains embedded within the firm rather than residing solely in individual employees. Within the RBV framework, structural capital represents an organizational capability that enhances operational efficiency and knowledge integration. Firms with well-developed structural capital can effectively capture, store, and utilize knowledge resources to improve decision-making and organizational learning (Bashir et al., 2022).

SC supports sustainability by providing the organizational infrastructure required to manage knowledge, streamline operations, and maintain organizational continuity. Organizational systems, procedures, databases, and knowledge management mechanisms institutionalize valuable knowledge within the organization rather than leaving it embedded solely in individuals. Effective SC enhances operational efficiency, reduces resource

wastage, and enables firms to standardize sustainable practices across the organization. These capabilities strengthen SMEs' ability to sustain productivity and organizational resilience over time (Bashir et al., 2022; Durst and Zieba, 2024).

2.4. Customer Capital (CC)

Customer capital (CC), also referred to as relational capital, reflects the value derived from relationships with customers, suppliers, and other external stakeholders. These relationships enable organizations to access market knowledge, build customer loyalty, and enhance organizational reputation (Hashim et al., 2025). From the RBV perspective, strong relational networks represent valuable strategic resources because they facilitate access to external information, resources, and opportunities that competitors may find difficult to replicate. SMEs that cultivate strong relationships with customers and stakeholders are more likely to secure repeat business, develop long-term partnerships, and maintain stable revenue streams (Huang et al., 2023).

CC contributes to sustainability by strengthening stakeholder relationships and enhancing organizational reputation. Strong relationships with customers, suppliers, and strategic partners enable firms to build trust, improve customer loyalty, and gain valuable market insights. These relationships support long-term revenue stability and market competitiveness. Furthermore, stakeholder engagement encourages organizations to adopt responsible business practices that meet the expectations of customers and society (Soon et al., 2025). By fostering trust and long-term partnerships, CC enhances both economic sustainability and stakeholder-oriented organizational development (Huang et al., 2023).

2.5. Technology Capital (TC)

Technology capital (TC) refers to an organization's digital skills, technology infrastructure, and its ability to adopt and use new technologies. Through innovation, evolving marketing strategies, and novel product or service offerings, the emergence of digital technology and a robust digital infrastructure has been transforming and continuously reshaping operational workflows, hierarchical structures, and cultural dynamics prevalent in SMEs (Susil, 2025). In the age of digital transformation, TC is a key factor in determining an organization's competitiveness and innovation.

Small and medium-sized businesses (SMEs) that invest in digital technologies, data analytics, and automation tools are more likely to increase operational efficiency and compete in markets where technology is important (Rizky et al., 2025). TC helps small and medium-sized businesses (SMEs) stay in business by making it easier for them to change their business models, generate new ideas, and run their operations more efficiently. Companies can improve their production processes, products, and costs by using digital technology, automation systems, and information technologies. Also, technical capabilities help activities that are good for the environment, such as using less energy, making better use of resources, and throwing away less garbage. SMEs that invest in TC are better able to compete in technology-driven marketplaces while also making the economy and the environment more sustainable (Rizky et al., 2025; Al-Omouh et al., 2023).

2.6. Social Capital (SoC)

Social capital (SoC) refers to the networks of relationships, trust, and collaboration that facilitate knowledge exchange and resource sharing among individuals and organizations (Hashim et al., 2025). SoC enables firms to access external knowledge, build partnerships, and engage in collaborative innovation.

From an RBV perspective, SoC represents a strategic relational resource that enhances organizational capability by providing access to external information and opportunities. SMEs with strong social networks can leverage partnerships with suppliers, customers, government agencies, and research institutions to enhance innovation and organizational learning (Anwar et al., 2023).

SoC contributes to sustainability by facilitating collaboration, knowledge sharing, and access to external resources. These collaborative relationships allow firms to access new knowledge, technological expertise, and financial resources that support innovation and business growth. In addition, SoC strengthens community engagement and stakeholder cooperation, which enhances organizational legitimacy and long-term sustainability (Anwar et al., 2023; Saeed et al., 2021).

2.7. Spiritual Capital (SpC)

Spiritual capital (SpC) represents the ethical values, organizational purpose, and moral principles that guide managerial behaviour and organizational culture. Although SpC is a relatively emerging concept in intellectual capital (IC) research, it has gained increasing attention in the context of responsible leadership and sustainable business practices. This intangible asset, which is profoundly entangled with both individual and collective spirituality within the corporate framework, serves as the foundation for the attainment of not only economic value but also substantial social good (Rocha and Pinheiro, 2021; Taneva-Veshoska et al., 2025). This conceptualization emphasizes that organizations with strong SpC are better able to address complex ethical dilemmas and cultivate a culture of integrity, thereby enhancing societal well-being and long-term viability (Filho et al., 2022). The incorporation of SpC into organizational frameworks has been shown to cultivate a deeper sense of purpose among employees and stakeholders, thereby improving the organization's long-term adaptability and resilience (Sharma and Gulati, 2025).

SpC contributes to sustainability by fostering ethical leadership, organizational integrity, and purpose-driven business practices. SpC encompasses organizational values, ethical norms, and shared beliefs that guide managerial decision-making and influence organizational culture. Firms that promote ethical values and responsible leadership are more likely to prioritize long-term stakeholder welfare, environmental responsibility, and social accountability. Such values-based organizational cultures strengthen employee commitment, stakeholder trust, and organizational legitimacy, thereby supporting sustainable business performance (Giacalone and Jurkiewicz, 2021).

2.8. Leadership as a Moderator

Leadership is increasingly viewed as a strategic capability that shapes organizational adaptation and sustainability. Sustainable

leadership emphasizes long-term value creation, ethical behaviour, and stakeholder engagement rather than short-term profit maximization (Avery and Bergsteiner, 2020). In SMEs, where leadership influence is often concentrated in owner-managers, leadership style directly shapes how knowledge is shared, how technology is adopted, and how sustainability goals are pursued. Leadership serves as a contextual factor that shapes the strength of the relationship between IC and sustainability performance in SMEs. Recent research documents that sustainable leadership serves as a moderator, enhancing business sustainability by enabling effective utilization of intellectual capital (Ahmad et al., 2025). The moderating effect of leadership strengthens the relationships between IC components and SME sustainability. Effective leaders motivate employees, foster innovation, strengthen customer rapport, encourage ethical behaviour, enhance technological adoption, and cultivate collaborative partnerships.

3. METHODOLOGY

This study employs a qualitative research design informed by the Grounded Theory methodology, as defined by Strauss and Corbin (1990), to investigate and develop strategic solutions that address the requirements of the comprehensive integrated intellectual capital ecosystem (IICE) model and improve the sustainability of Malaysian SMEs. The methodology is intended to synthesize existing literature and establish a structured conceptual framework in order to construct and substantiate the proposed integrated intellectual capital ecosystem (IICE) model.

The investigation implements an integrative literature review and a conceptual design. The conceptual design approach is suitable because the primary goal is to develop a novel multidimensional framework that elucidates how SME sustainability is influenced by the various dimensions of intellectual capital. The conceptual design is informed by three fundamental theories: The resource-based view (RBV), intellectual capital theory, and dynamic capabilities theory. These theories provide the foundational logic for identifying pertinent constructs and elucidating their relationships. In the design process, essential constructs are identified, their theoretical relevance to sustainability is defined, linkages between constructs are established, and leadership is introduced as a moderating variable. Therefore, the conceptual design allows this study to transcend conventional models by advocating for an ecosystem-based perspective in which intellectual capital components are interdependent rather than isolated. In the interim, the integrative literature review approach is employed for its ability to integrate findings from various disciplines, resolve inconsistencies across prior studies, and identify emergent constructs and theoretical gaps. This study critically evaluates both classical and contemporary perspectives by employing this methodology, which also allows for the integration of emerging dimensions such as technological, social, and spiritual capital. This ensures the proposed framework aligns with the current business landscape, with particular emphasis on sustainability and knowledge-driven environments. The IICE model is developed in this research by combining both methodologies.

4. THEORETICAL FOUNDATION

The proposed integrated intellectual capital ecosystem (IICE) framework is grounded in three complementary theoretical perspectives: Intellectual capital theory, the resource-based view (RBV), and dynamic capabilities theory. These theories collectively explain how intangible organizational resources contribute to sustainable competitive advantage and long-term organizational performance. By integrating these perspectives, the study provides a robust theoretical foundation for understanding how intellectual capital components interact within an organizational ecosystem to enhance SME sustainability.

4.1. Intellectual Capital Theory

Intellectual capital theory emphasizes the strategic role of intangible assets in creating organizational value and sustaining competitive advantage. Intellectual capital refers to the collective knowledge, skills, organizational processes, and relational networks that enable firms to generate innovation, improve operational efficiency, and strengthen market competitiveness. In knowledge-based economies, intangible assets increasingly outweigh physical and financial resources in determining organizational success (Serenko et al., 2024).

Traditionally, intellectual capital has been conceptualized as comprising three primary components: Human capital, structural capital, and relational capital. Human capital represents employees' knowledge, expertise, and competencies that contribute to innovation and problem-solving capabilities within organizations. Structural capital refers to organizational systems, processes, databases, and routines that facilitate knowledge sharing and organizational learning. Relational capital reflects the value derived from relationships with customers, suppliers, and other external stakeholders (Saeed et al., 2021).

Recent studies highlight that intellectual capital plays a crucial role in enhancing organizational innovation capability and long-term sustainability, particularly in SMEs where intangible resources often compensate for limited financial and physical assets (Xu and Wang, 2023; Khalique et al., 2023). Furthermore, scholars have argued that modern intellectual capital frameworks should incorporate emerging dimensions, such as digital capabilities, collaborative networks, and ethical values, to better reflect contemporary organizational environments (Musman et al., 2025).

Within the context of this study, intellectual capital theory provides the conceptual basis for identifying the key intangible resources that contribute to SME sustainability. The proposed IICE framework extends traditional intellectual capital models by incorporating additional dimensions, namely technological, social, and spiritual capital, to reflect the evolving nature of organizational knowledge assets.

4.2. Resource-based View (RBV)

The resource-based view (RBV) provides another important theoretical foundation for understanding how intellectual capital contributes to organizational performance. RBV posits that firms achieve sustainable competitive advantage when they possess

resources that are valuable, rare, inimitable, and non-substitutable (VRIN) (Barney, 1991). Such resources enable organizations to create superior value and maintain a competitive advantage.

Within the RBV framework, intangible resources such as knowledge, organizational capabilities, and stakeholder relationships are considered critical strategic assets because they are difficult for competitors to replicate. Intellectual capital components, including employee expertise, organizational knowledge systems, and relational networks, represent valuable organizational resources that can enhance innovation and performance (Durst and Zieba, 2024).

Empirical studies have demonstrated that SMEs that effectively leverage their intellectual capital resources tend to achieve higher levels of innovation, productivity, and organizational sustainability (Al-Juboori et al., 2022). In addition, relational resources, such as customer trust and strategic partnerships, contribute to long-term market competitiveness by facilitating knowledge exchange and access to resources (Huang et al., 2023).

From the RBV perspective, intellectual capital represents a set of strategic organizational resources that can generate sustainable competitive advantage when effectively managed and integrated. The IICE framework builds upon this perspective by conceptualizing intellectual capital as a multidimensional ecosystem of intangible resources that collectively influence SME sustainability.

4.3. Dynamic Capabilities Theory

While the resource-based view focuses on the possession of strategic resources, dynamic capabilities theory emphasizes an organization's ability to integrate, build, and reconfigure these resources in response to changing environmental conditions. Dynamic capabilities enable organizations to adapt to technological disruptions, market volatility, and competitive pressures by continuously renewing their resource base (Teece, 2022).

In rapidly evolving business environments, SMEs must continuously develop new capabilities to remain competitive. This requires organizations to effectively combine and reconfigure their intellectual capital resources to support innovation, knowledge sharing, and strategic flexibility. Dynamic capabilities, therefore, play a critical role in enabling SMEs to transform their intellectual capital into sustainable organizational performance.

Recent studies highlight that digital transformation and innovation capability are key dynamic capabilities that enable SMEs to leverage technological and knowledge-based resources to achieve long-term competitiveness (Rizky et al., 2025). Similarly, collaborative networks and stakeholder partnerships enable SMEs to access external knowledge and resources that support organizational learning and innovation (Anwar et al., 2023).

Within the IICE framework, dynamic capabilities explain how SMEs integrate and mobilize multiple intellectual capital components to enhance organizational adaptability and sustainability. By continuously developing and reconfiguring

these intangible resources, SMEs can strengthen their resilience and maintain competitiveness in dynamic business environments.

4.4. Integration of Theoretical Perspectives

Integrating intellectual capital theory, the resource-based view, and dynamic capabilities theory provides a comprehensive theoretical foundation for the proposed IICE framework. Intellectual capital theory identifies the key intangible resources that contribute to organizational value creation, while RBV explains how these resources generate sustainable competitive advantage. Dynamic capabilities theory further emphasizes the importance of organizational adaptability in leveraging these resources effectively.

Together, these perspectives support the argument that SME sustainability depends not only on possessing intellectual capital but also on the organization's ability to integrate, manage, and leverage these resources within an interconnected ecosystem. The proposed IICE framework, therefore, conceptualizes intellectual capital as a dynamic system of knowledge-based resources that collectively enhance innovation capability, organizational resilience, and long-term sustainability.

5. CONCEPTUAL FRAMEWORK

The rapidly evolving business landscape, characterized by digital transformation, knowledge-intensive competition, and sustainability pressures, has compelled organizations to rethink how intangible resources contribute to sustainable performance. Intellectual capital (IC) has emerged as a key strategic resource, enabling firms to generate value through knowledge, innovation, and relational capabilities. Traditional intellectual capital frameworks conceptualize IC as consisting of three primary components: human capital, structural capital, and relational (or customer) capital. While this tripartite model has been widely used to explain organizational performance, contemporary business environments require a broader and more integrative perspective that captures emerging intangible assets relevant to modern organizations.

Recent research emphasizes that intellectual capital operates within dynamic knowledge ecosystems, where multiple intangible resources interact to create sustainable competitive advantage (Musman et al., 2025). In SMEs, these intangible resources play an even more critical role because smaller firms often lack the extensive financial and physical resources of larger firms. Instead, SMEs rely heavily on employee knowledge, organizational learning, technological capabilities, and stakeholder relationships to remain competitive in rapidly changing markets.

In response to these developments, this study proposes the integrated intellectual capital ecosystem (IICE) model, which expands the traditional IC framework by incorporating six key dimensions: human capital, structural capital, customer capital, technological capital, social capital, and spiritual capital. These components collectively represent the knowledge-based assets that influence SMEs' sustainability.

Human capital represents employees' knowledge, competencies, experience, and innovative capabilities that enable organizations to develop new products, services, and operational processes. Prior studies demonstrate that human capital plays a critical role in driving organizational innovation and adaptive capability (Zhang et al., 2021). Structural capital complements human capital by providing the organizational systems, routines, and infrastructures necessary to capture, store, and disseminate knowledge across the organization. Effective structural capital ensures that organizational knowledge remains embedded within the firm rather than residing solely with individual employees (Bashir et al., 2022).

Customer capital reflects the strength of relationships between organizations and external stakeholders such as customers, suppliers, and partners. Strong relational networks enhance trust, loyalty, and information exchange, thereby supporting long-term organizational growth. In increasingly networked economies, relational capital has become a critical source of competitive advantage, particularly for SMEs seeking to expand their market reach (Huang et al., 2023).

Beyond these traditional dimensions, the IICE framework incorporates technological capital, recognizing the growing importance of digital transformation in modern business environments. Technological capital refers to the technological infrastructure, digital capabilities, and innovation tools that enable organizations to enhance operational efficiency and develop innovative products and services. SMEs that successfully adopt digital technologies are better positioned to improve productivity and compete in technology-driven markets (Rizky et al., 2025).

The model also integrates social capital, which refers to the networks of relationships, trust, and collaborative interactions that facilitate knowledge exchange and resource sharing. Social capital enables SMEs to access external knowledge, build partnerships, and participate in innovation ecosystems, thereby enhancing organizational performance (Saeed et al., 2021). Through collaborative networks and community engagement, SMEs can strengthen their resilience and adaptability in uncertain business environments.

Furthermore, the inclusion of spiritual capital reflects the growing recognition of the role of ethical values, organizational purpose, and moral leadership in shaping sustainable business practices. Spiritual capital encompasses organizational values, ethical norms, and purpose-driven leadership that guide decision-making and influence organizational culture. Studies suggest that organizations with strong ethical values demonstrate higher levels of employee engagement, organizational trust, and stakeholder legitimacy (Giacalone and Jurkiewicz, 2021).

In addition to these intellectual capital components, the proposed framework introduces leadership as a moderating variable that influences the relationship between intellectual capital and SME sustainability. Leadership plays a critical role in shaping organizational strategy, fostering innovation, and facilitating knowledge sharing. In SMEs, leadership influence is

particularly significant because decision-making authority is often concentrated among owner-managers. Sustainable leadership practices encourage learning, collaboration, and responsible decision-making, thereby strengthening the impact of intellectual capital on organizational sustainability (Ahmad et al., 2025; Mfarrej et al., 2025).

Referring to Figure 1, by integrating these six intellectual capital dimensions under the moderating influence of leadership, the IICE model provides a comprehensive conceptual framework for understanding how intangible resources collectively contribute to SME sustainability. The framework recognizes that intellectual capital components are not independent resources but rather interconnected elements that operate within an organizational ecosystem. When effectively managed, these intangible assets enable SMEs to enhance innovation capability, strengthen stakeholder relationships, and achieve long-term sustainable performance.

6. DISCUSSION AND IMPLICATIONS

The aim of this conceptual study is to introduce the integrated intellectual capital ecosystem (IICE) model to elucidate the collective impact of several dimensions of intellectual capital on the sustainability of small and medium companies (SMEs). The framework expands conventional intellectual capital theories by incorporating six essential components, which consist of human capital, structural capital, customer capital, technological capital, social capital, and spiritual capital under the moderating effect of leadership. The conversation shows how these parts work together to help small- and medium-sized businesses (SMEs) succeed in the long term.

The results show that intellectual capital should not be seen as just a collection of separate intangible assets. Instead, it should be seen as an ecosystem of knowledge-based resources that work together in organizations. In the realm of SMEs, characterized by constrained financial and physical resources, intangible assets emerge as essential catalysts for competitiveness and resilience. Recent research underscores that knowledge-based competencies empower organizations to respond to market fluctuations, technological advancements, and environmental challenges (Teece, 2022; Musman et al., 2025). Consequently, SMEs that

efficiently integrate and manage their intellectual capital resources are more likely to attain sustained growth.

The broader definition of intellectual capital presented in this study reflects the changing nature of today's business ecosystems. Older IC models mostly looked at human, structural, and relational capital. However, modern studies are increasingly recognizing the significance of supplementary intangible resources, such as technical proficiency, social networks, and ethical principles (Saeed et al., 2021; Huang et al., 2023). The IICE model provides a clearer picture of the resources SMEs need to stay in business in the knowledge economy by incorporating these characteristics.

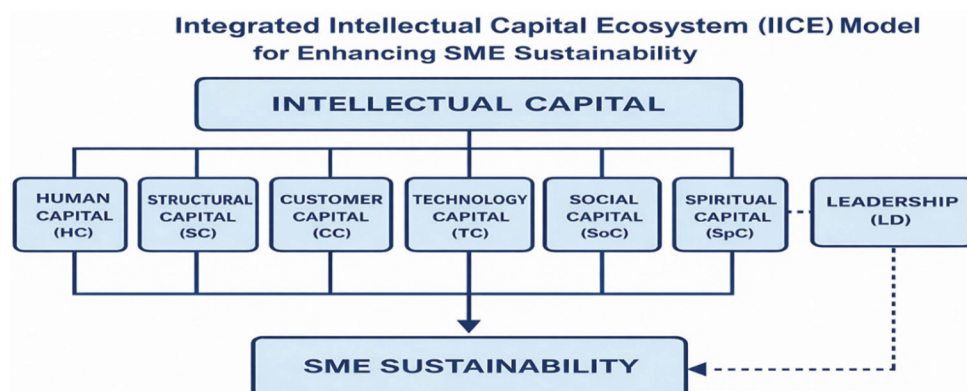
6.1. Theoretical Implications

This research advances the intellectual capital hypothesis in several important dimensions. The proposed IICE framework expands the theoretical scope of intellectual capital by incorporating technological, social, and spiritual capital into the conventional IC framework. This rise indicates that more individuals recognize the importance of digital competencies, collaborative networks, and organizational values for a business's success and sustainability.

Technological capital has emerged as a significant strategic asset in the digital economy. Small and medium-sized enterprises (SMEs) that invest in digital technology, data management systems, and innovation tools enhance their operational efficiency and market competitiveness (Rizky et al., 2025). Similarly, social capital enables businesses to leverage their networks of relationships with consumers, suppliers, and institutional partners to acquire resources, information, and collaborative opportunities (Huang et al., 2023). The integration of these attributes into the intellectual capital framework augments the explanatory power of IC theory in contemporary corporate contexts.

The study introduces a novel theoretical paradigm by characterizing leadership as a moderating variable in the relationship between intellectual capital and sustainability. Leadership is posited to influence the effectiveness with which companies utilize and deploy their intellectual capital, rather than merely serving as an independent predictor of performance. Sustainable leadership approaches, characterized by a long-term outlook, stakeholder engagement, and ethical decision-making, enhance businesses'

Figure 1: Conceptual framework



ability to transform knowledge assets into lasting outcomes (Avery and Bergsteiner, 2020; Ahmad et al., 2025).

The integration of spiritual capital represents a significant progression in the study of intellectual capital. Spiritual capital encompasses the moral convictions, ethical values, and organizational objectives that influence managerial conduct and the organization's overall behaviour. Increasingly, academics assert that organizations with robust ethical principles foster more employee engagement, enhanced organizational trust, and increased legitimacy among stakeholders (Giacalone and Jurkiewicz, 2021). Incorporating this dimension into the IICE framework underscores the significance of values-based leadership and an ethical organizational culture in facilitating sustainable growth for SMEs.

These contributions together augment intellectual capital theory by providing a multidimensional ecosystem view that integrates knowledge assets, technological capabilities, relational networks, and ethical principles within a leadership-oriented sustainability framework.

6.2. Managerial Implications

The proposed IICE framework provides practical insights for SME owners, managers, and organizational leaders seeking to enhance their entities' sustainability and competitiveness. Small and medium-sized enterprises (SMEs) often possess constrained resources and must depend on intangible assets to maintain competitiveness. Effectively managing intellectual capital is a crucial competency for managers.

Initially, SME leaders should prioritize developing human resources. This is due to the significance of employees' knowledge, skills, and creativity in generating innovative ideas and resolving issues. Continuous learning programs, training, and knowledge exchange can enhance workforce capabilities and the organization's adaptability. Studies indicate that small and medium-sized enterprises (SMEs) that employ highly skilled and knowledgeable personnel are more inclined to innovate, improve service quality, and maintain consistent performance over time (Zhang et al., 2021).

Furthermore, it is essential to enhance structural capital to ensure the preservation and institutionalization of organizational knowledge. Organizational routines, knowledge management systems, digital platforms, and operational procedures that facilitate collaboration and information sharing exemplify structural capital. Small and medium-sized enterprises (SMEs) that establish robust structural systems can more effectively leverage their employees' abilities and maintain the organization's capacity for learning (Bashir et al., 2022).

The findings underscore the need for technological capital for small and medium-sized enterprises (SMEs) to remain competitive in the digital economy. Digital transformation has emerged as a fundamental strategic objective for small and medium-sized enterprises (SMEs) seeking to enhance operational efficiency, customer engagement, and market competitiveness. Investing in

digital infrastructure, automation tools, and training in emerging technologies can significantly enhance an organization's productivity and innovation capacity (Musman et al., 2025).

Hence, cultivating customer and social capital is essential for strengthening stakeholder relationships and unlocking new market opportunities. When small and medium-sized enterprises (SMEs) cultivate strong connections with customers, suppliers, and community stakeholders, they acquire trust, loyalty, and valuable market insights. Robust relational networks facilitate collaboration on innovative concepts and knowledge exchange, both of which are crucial for maintaining a competitive advantage in rapidly evolving business landscapes (Huang et al., 2023).

The study underscores the importance of spiritual capital in shaping business culture and ethical leadership practices. Leaders who uphold honesty, trust, and collective business values can enhance the workplace environment, hence increasing employee commitment and stakeholder confidence. Ethical leadership promotes ethical corporate practices, which are increasingly essential for fulfilling stakeholder expectations and legal requirements. Therefore, the study suggests that SME managers should adopt a holistic strategy for managing intellectual capital, recognizing that sustained performance stems from the combination of knowledge assets, technological expertise, relational networks, and ethical leadership.

6.3. Policy Implications

The study also provides important implications for government agencies and policymakers responsible for SME development. In Malaysia and many other emerging economies, SMEs play a critical role in economic growth, employment generation, and innovation. However, many SMEs face challenges in developing intellectual capital due to limited access to financial resources, technological infrastructure, and managerial expertise.

First, policymakers should design capacity-building programs that enhance intellectual capital development among SMEs. Training programs focusing on leadership development, knowledge management, and digital skills can help SME owners strengthen their strategic capabilities and improve organizational performance.

Second, national development policies should encourage digital transformation initiatives among SMEs, particularly in suburban and rural areas where technological adoption may be slower. Providing financial incentives, innovation grants, and support for digital infrastructure can facilitate technology adoption and strengthen SME competitiveness (Rizky et al., 2025).

Third, policymakers should promote collaborative innovation ecosystems that encourage partnerships between SMEs, universities, research institutions, and industry stakeholders. Such collaborations enhance social capital by enabling knowledge exchange, innovation diffusion, and resource sharing.

Finally, SME development policies should incorporate sustainability-oriented strategies that encourage ethical business

practices, environmental responsibility, and community engagement. Integrating sustainability into national SME policies can help create a more resilient and inclusive economic system.

6.4. Implications for Future Research

This conceptual study offers several compelling avenues for future research. Initially, empirical studies are essential to assess and validate the proposed IICE framework using quantitative or mixed-method research approaches. Future research may examine the relationships among components of intellectual capital, leadership styles, and sustainability performance across diverse SME sectors.

Secondly, future research may examine mediating variables, such as innovation capability, information exchange, and organizational learning, to clarify the influence of intellectual capital on sustainability outcomes. Understanding these systems would provide significant insights into the dynamic processes via which intangible resources contribute to corporate performance.

Third, comparative study across nations or sectors may provide substantial insights into the influence of institutional, cultural, and technological factors on the application of intellectual capital in SMEs. This research may identify contextual factors that influence the effectiveness of intellectual capital management.

Ultimately, longitudinal studies may examine the evolution of intellectual capital ecosystems over time, particularly in response to technological advancements, market volatility, or sustainability challenges. This research would enhance our understanding of how small and medium-sized enterprises (SMEs) modify their knowledge resources to maintain competitiveness in evolving circumstances.

7. CONCLUSION

Small and medium-sized enterprises (SMEs) are crucial to Malaysia's economy as they contribute to growth, generate employment, and foster innovation. However, SMEs continue to face significant challenges in maintaining long-term viability due to insufficient resources, evolving technology, and intensifying competition. Intellectual capital has emerged as a crucial asset in addressing these issues. It enables businesses to leverage knowledge, creativity, and interpersonal skills to enhance competitiveness and resilience.

This conceptual study introduces the integrated intellectual capital ecosystem (IICE) model, which augments traditional intellectual capital frameworks by integrating six critical dimensions: human capital, structural capital, customer capital, technological capital, social capital, and spiritual capital, all within a leadership-focused sustainability framework. The proposed method provides a comprehensive view of the role of knowledge-based resources in SME sustainability by conceptualizing intellectual capital as an interconnected ecosystem rather than a simple collection of separate intangible assets. The approach highlights the critical role of leadership in enabling the efficient mobilization and integration of intellectual capital resources inside businesses. Leadership serves as a mediating influence, strengthening the relationship

between intellectual capital and sustainable performance by promoting innovation, facilitating information exchange, and endorsing ethical organizational practices. In the domain of SMEs, characterized by centralized leadership, the ability of leaders to cultivate learning-oriented cultures and collaborative networks is essential for transforming intangible resources into sustainable outcomes.

The incorporation of technological, social, and spiritual capital illustrates the evolving nature of business environments. In the knowledge economy, digital transformation, collaborative networks, and ethical principles have increasingly become essential for organizational success. By incorporating these evolving attributes, the IICE model offers a more holistic perspective on intellectual capital management and its role in promoting sustainable SME development. This study provides a robust theoretical basis for future empirical research. Subsequent studies should assess the proposed paradigm across multiple SME sectors and national contexts to examine the relationships among intellectual capital components, leadership behaviours, and sustainability outcomes. The empirical validation of the IICE model would improve understanding of how SMEs might leverage intangible resources to achieve sustained competitiveness and resilience.

This study contributes to the literature on intellectual capital and sustainability by presenting a multidimensional ecosystem framework that integrates knowledge assets, technological capabilities, relational networks, and ethical values within a leadership-oriented model of SME sustainability. The proposed framework improves theoretical understanding and offers practical insights for SME managers and policymakers seeking to strengthen the sustainability and competitiveness of SMEs in a progressively knowledge-based global economy.

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