Intellectual capital, innovation performance and competitive advantage: Evidence from SMEs in Vietnam

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Abstract

Drawing on the Knowledge-Based View, this study examines the impact of intellectual capital components, including human capital, social capital, and organizational capital, on innovation performance and competitive advantage among SMEs in Vietnam. Using the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach, this study focuses on answering two questions: (1) Do the components of intellectual capital significantly influence innovation performance? (2) Does innovation performance mediate the relationship between components of intellectual capital and competitive advantage? Data were collected through a structured survey administered to a sample of 274 respondents from SMEs in Vietnam. The results reveal that all three dimensions of intellectual capital have a direct and statistically significant influence on both innovation performance and competitive advantage, with human capital playing the most critical role in driving these outcomes. Additionally, innovation performance is found to mediate the relationship between human capital, social capital, and competitive advantage. Based on these findings, the study provides relevant discussions and practical implications.

1. Introduction

In an era characterized by globalization and the emergence of knowledge-based economies, enterprises are increasingly prioritizing the development of sustainable competitive advantages (CA). A growing body of literature highlights the strategic shift from reliance on tangible assets to the cultivation of intangible assets as a means of enhancing firm competitiveness [1]. Within this context, knowledge-based theory identifies intellectual capital (IC) as a critical

intangible resource that significantly contributes to the creation and maintenance of a firm's competitive advantage [2]. Recent studies underscore the imperative of strengthening IC and innovation performance (IP) as key drivers of long-term competitiveness and sustainable development in the knowledge economy. Nevertheless, firms in emerging and developing markets, most of which are small and medium-sized enterprises (SMEs), face substantial challenges in becoming innovators and sustaining growth. These challenges stem primarily from limitations in different kinds of resources and managerial expertise. Consequently, both scholars and practitioners have increasingly focused on identifying the antecedents and developing novel strategies to enhance the CA of SMEs in these regions. Accordingly, this study aims to examine the impact of intellectual capital (IC) on competitive advantage (CA) [3] with a particular focus on the mediating role of innovation performance (IP). The findings are expected to contribute significantly to the theoretical advancement of IC, innovation management, and CA.

IC encompasses the intangible assets of an organization, and this study examines three core components of IC: human capital, social capital, and organizational capital [4]. IP is widely recognized as a critical determinant of organizational success and is conceptualized as a firm's relative capacity to achieve its innovation objectives in comparison to its competitors [5]. The ability to innovate is generally acknowledged to be intrinsically linked to an organization's IC, particularly its capacity to effectively mobilize and apply knowledge-based resources. Although IC has frequently been identified as a key driver of firm performance [6], existing literature remains limited in its capacity to disentangle and measure the distinct impacts of each IC component on IP. While the foundational relationship between organizational knowledge and innovation is well supported, the nuanced mechanisms through which this relationship operates remain insufficiently explored. Therefore, this study seeks to investigate the individual and combined effects of human capital, social capital, and organizational capital on IP, addressing the primary research question: *Do the components of IC significantly influence IP?*

CA is defined as a distinctive capability, technology, or resource that enables an organization to deliver a product, service, or benefit that is perceived by customers as different from what is offered by competitors within the same industry [7]. IC represents one of the critical organizational capabilities that serves as a potential source of CA. According to Amiri et al. [8], research on the management of IC has steadily increased over the past decades, reflecting its growing recognition among both academics and practitioners as a fundamental factor in achieving CA. While there is broad consensus on the role of IC in shaping a firm's CA across various industries, much of the existing literature has focused predominantly on firms operating in Western contexts, and limited attention has been given to understanding the influence of IC on SMEs in emerging and developing markets [9]. According to Cabrilo and Dahms [5] an organization's ability to survive in competitive environments depends significantly on its capacity to innovate and learn. Innovation is also regarded as a vital source of CA and is often considered a prerequisite for organizational success and long-term survival. The distinct and combined effects of IC on IP, given that IP is a critical pathway through which firms achieve CA. Although IC components are widely recognized as enablers of CA, relatively few studies have explored the direct and indirect pathways through which these components influence CA, particularly through the mediating role of IP. To address these theoretical gaps and provide a more nuanced understanding of the mechanisms linking IC and CA, this study proposes the following research question: *Does IP mediate the relationship between components of IC and CA?*

To address the two aforementioned research questions, this study employs the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach to examine the relationships among the proposed constructs. Data were collected through a structured survey administered to a sample of 274 respondents from SMEs in Vietnam. The findings of this study are expected to offer meaningful practical implications for organizational strategy and management, as well as contribute valuable theoretical insights into the role of IC in enhancing IP and achieving CA.

2. Litterature Review and Hypotheses Development

2.1. Intellectual Capital

IC has been widely recognized as a vital source of organizational wealth, comprising intangible resources such as information, knowledge, and experience [1]. It can be seen that IC, encompassing knowledge, skills, and innovative solutions that enhance organizational productivity, can be converted into market value and contribute to sustained competitive advantage. Several studies that conceptualize an organization's knowledge resources as its intellectual capital have emphasized that knowledge is mobilized through diverse approaches within organizational contexts [4]. In the context of the knowledge-based economy, knowledge is increasingly regarded as a strategic asset and a fundamental driver of competitiveness. Organizations play a pivotal role in facilitating the development and integration of individual knowledge [10]. Through continuous interactions among individuals and between individuals and the organization, as well as the dynamic exchange between tacit and explicit knowledge, intellectual resources can be systematically transformed and embedded within organizational processes. IC can be defined as the aggregation of intangible assets that confer relative advantages and hold the potential to generate future value. Accordingly, IC can be understood as the comprehensive sum of intangible knowledge resources including individual and organizational knowledge, skills, and capabilities that firms can strategically mobilize to achieve and sustain competitive advantage [1, 10].

For enterprises, in order to build and sustain CA, it is essential to understand and measure IC effectively. Edvinsson and Malone [11] suggests that IC can be classified into two major categories: human capital (HC) and structural capital. Structural capital can be further divided into two subcategories: organizational capital (OC) and customer capital. Kalkan et al. [12] suggest IC comprises three fundamental components: HC, structural capital and relational capital. Youndt et al. [13] Suggest IC consists of human, social, and organizational capitals. It means that IC comprises three categories of intangible assets: individual competence, such as the skills of R&D personnel and factory workers; external structure, such

as relationships with customers and suppliers, as well as corporate image; and internal structure, such as patents and systems. Previous research has identified three prominent aspects of IC: human, organizational, and social capital (SC) [4] and this study considers three aspects of IC, namely human capital; social capital; and organizational capital. In general, HC refers to the knowledge, skills, and abilities possessed and applied by individuals, OC encompasses institutionalized knowledge and codified experience that are embedded within and utilized through various organizational artifacts such as databases, patents, manuals, structures, systems, and processes [13] and SC is defined as the knowledge embedded in, accessible through, and leveraged by interactions among individuals and their networks of relationships [14].

HC is the most fundamental element of intellectual capital [6, 15]. HC refers to individuals working within the organization, as well as internal and external stakeholders such as suppliers, partners, and customers. HC encompasses the collective attributes of employees, including their skills, competencies, experience, innovative capacity, commitment, and intellectual agility, which represent the organization's internal reservoir of knowledge aimed at achieving goals [16]. HC refers to the collective attributes of employees, such as their skills, competencies, experience, innovative capacity, commitment, and intellectual agility, which represent the organization's internal reservoir of knowledge directed toward goal achievement. More broadly, HC encompasses the knowledge, professional expertise, and experience of organizational members, which can be leveraged to achieve strategic goals and drive organizational growth and efficiency [1, 17].

Refer to SC; it consists of a network of individuals, each of whom retains the capacity to exit the organization. As SC is rooted in shared norms of collaboration, interaction, and the exchange of ideas, it tends to remain largely intact within organizational settings despite turnover among specific individuals [18]. SC plays a crucial role in enabling firms to establish and maintain strong relationships with their stakeholders, thereby enhancing long-term value and competitive positioning.

Lastly, OC is characterized by its codified nature, with its development, maintenance, and enhancement occurring through structured and repetitive organizational activities. Such codification is manifested in the various manuals, databases, and patents that organizations use to accumulate and retain knowledge. It is also reflected in an organization's time-honored structures and processes, or clearly mandated procedures and rules for retrieving, sharing, and utilizing knowledge [4].

2.2. The Positive Effect of Intellectual Capital on Innovation Performance

Innovation is commonly conceptualized as a cognitive process that results in the emergence of novel ideas, methods, or processes aimed at delivering meaningful improvements across individual, organizational, or societal levels [19, 20]. It involves the systematic generation and application of new knowledge to solve specific organizational challenges, often through iterative learning and experimentation. Innovations can manifest in diverse forms, including product and service innovations, changes in production techniques, or shifts in business model configurations. It is widely regarded as a pivotal driver for value creation and the maintenance of competitive advantage, particularly within the context of increasingly complex and rapidly evolving market environments. Innovation encompasses the ideation, development, and market deployment of new offerings, operational processes, managerial practices, marketing strategies, and business models. IP, therefore, is conceptualized as a firm's relative ability to meet its innovation objectives compared to its competitors, particularly through the strategic utilization of human-driven intellectual capital and internal learning capabilities [5]. Embracing innovation in response to environmental shifts can foster the development of new capabilities, thereby enhancing organizational performance.

IP of organizations is strongly influenced by the depth of knowledge, competencies, and experiential insights possessed by employees. HC drives the emergence of new ideas and contributes significantly to enhancing innovation outcomes [21]. HC also serves as a key differentiator in competitive markets, given that the specialized expertise and tacit knowledge of employees can generate innovative outputs that are challenging for rival firms to imitate [22]. The heterogeneity of skills, perspectives, and experiential backgrounds within a workforce constitutes a powerful enabler of innovation, particularly when supported by comprehensive training and development initiatives. Effective management of HC plays a vital role in fostering innovation by enabling the formulation and implementation of novel strategies and solutions [23]. Therefore, the following hypothesis is developed:

H_1: *Human capital has a positive effect on innovation performance.*

SC encompasses the resources, particularly knowledge and information, that are embedded within, accessible through, and derived from networks of interpersonal and interorganizational relationships. When employees within a firm demonstrate strong capabilities in interaction, collaboration, and the exchange of knowledge and information both internally among colleagues and externally with stakeholders such as suppliers, customers, and strategic partners, the organization is more likely to foster conditions conducive to innovation [6]. External collaboration, particularly with customers, suppliers, and strategic allies, provides access to complementary capabilities and resources that can accelerate innovation, enhance flexibility, and distribute risks and costs more effectively. The quality of information exchange and knowledge co-creation with customers hinges on the firm's ability to capture and utilize market insights through its relational networks [21]. Moreover, the firm's absorptive capacity to leverage knowledge from external actors such as customers, competitors, and partners enables the generation of innovative concepts. These relational dynamics encourage organizational learning and facilitate the exploration of novel technologies and solutions, thus reducing the uncertainties associated with innovation [24]. In light of these arguments, the following hypothesis is formulated:

H_2: *Social capital has a positive effect on innovation performance.*

Organizational knowledge systems, including databases and information infrastructure, are essential for facilitating innovation, particularly in the development of new products [25]. An organization's preserved knowledge influences its

propensity to reinforce its knowledge [4]. Retained organizational knowledge facilitates its reinforcement by enabling firms to recall prior learning and effectively apply existing expertise. Preserved knowledge often emerges from routine tasks performed by employees, thereby promoting its consistent application through habitual practices. OC comprises institutionalized knowledge, routines, cultural norms, and technological assets, which enhance a firm's capacity to support decision-making and streamline innovation processes. Firms that invest in maintaining robust knowledge systems and updated information repositories are better equipped to respond to innovation demands [26]. Since innovation often requires systemic transformation across products, services, or operational models, it depends on the organization-wide dissemination of relevant knowledge [27]. Retained knowledge contributes to the enhancement of employees' technological competencies and supports the assimilation of novel and heterogeneous knowledge into the firm's existing knowledge base [28]. Accordingly, the following hypothesis is proposed:

H3: Organizational capital has a positive effect on innovation performance.

2.3. The Positive Effect of Intellectual Capital on Competitive Advantage

Multiple theoretical frameworks have been developed to explain the foundations of competitive advantage in organizations. For example, the VRIN framework posits that sustainable competitive advantage arises from resources that are valuable, rare, inimitable, and non-substitutable, ensuring they cannot be easily replicated or replaced by competitors. The Resource-Based View (RBV) argues that organizational competitiveness is contingent not only on the unique attributes of internal resources, such as their value, rarity, and resistance to imitation, but also on the firm's capacity to deploy these resources effectively [29]. The Knowledge-Based View (KBV) extends the RBV by emphasizing knowledge as the most strategically significant resource, distinguishing between the nature of knowledge and the processes through which it is created, shared, and applied within the organization [30]. The process of value creation has undergone a significant transformation as competitive advantage increasingly stems from intangible assets, particularly those embedded in a firm's activities and knowledge base. Traditional sources of advantage, such as natural resources, proprietary technologies, or economies of scale, have become less sustainable due to their susceptibility to imitation. In contrast, contemporary CA is primarily derived from internal organizational resources that are valuable, rare, and difficult to replicate, positioning knowledge and firm-specific capabilities as critical drivers of long-term strategic success [31]. According to the resource-based view, resources that contribute to sustained competitive advantage must possess four key attributes: they must be valuable, rare, difficult to imitate, and non-substitutable. These resource characteristics are particularly critical in fostering innovation, enabling firms to leverage their unique capabilities to achieve and maintain a superior market position [32]. Consequently, CA is viewed as the outcome of aligning internal capabilities with external opportunities, leveraging knowledge-based assets to respond dynamically to market demands.

Scholars have been providing much attention to examining the relationship between CA and IC [22]. IC serves as a critical driver of sustainable CA by equipping firms with unique resources and capabilities that are difficult to replicate. Organizations that fail to leverage their IC are unlikely to secure or maintain a strong market position, thereby limiting their long-term viability. IC, when viewed holistically, surpasses HC alone in fostering economic growth, wealth creation, and sustained competitive advantage. From the perspective of the RBV, enduring competitiveness is achieved through the effective use of intangible, valuable, and inimitable intellectual assets embedded within the organization [33]. Empirical evidence has consistently demonstrated a strong link between HC and organizational performance across sectors [31, 34, 35]. HC encompasses the accumulated knowledge, experience, skills, and creative capabilities of employees, contributing to an organization's knowledge base, adaptability, and competitive advantage. Accordingly, the following hypothesis is proposed:

H4: Human capital has a positive effect on competitive advantage.

SC is a critical component of IC that reflects the value embedded in an organization's relationships, including connections within the organization and with customers, suppliers, strategic partners, and other key stakeholders. It enables people to collaborate and reap the benefits of social ties [36]. These relationships not only serve as the entry point for value creation but also as a strategic means to sustain competitive advantage. SC acts as a catalyst, linking other IC components to external environments and enhancing value creation through networked collaboration. On this basis, the following hypothesis is proposed:

H5: Social capital has a positive effect on competitive advantage.

OC refers to the institutionalized and codified knowledge assets embedded in organizational routines, systems, and processes. These assets serve as the backbone for knowledge retention and internal efficiency [37]. OC plays a critical role in enhancing a firm's overall performance by facilitating effective coordination. This form of intangible asset contributes not only to operational efficiency but also to strategic outcomes, such as revenue growth, expansion of profit margins, and cost optimization [38]. Its value lies in the capacity to institutionalize knowledge, streamline processes, and support sustained competitive advantage in dynamic business environments. In line with this conceptualization, the following hypothesis is proposed:

H6: Organizational capital has a positive effect on competitive advantage.

2.4. Innovation Performance and Competitive Advantage

A substantial body of theoretical and empirical research has been dedicated to identifying the determinants of CA, with innovation emerging as a critical factor [39]. A firm's competitive advantage is characterized by unique capabilities or strategic efforts that are difficult for competitors to replicate, both in the present and over time. In particular, innovation has been shown to significantly influence competitive advantage, especially within the context of a knowledge-based economy

[40]. Some scholars argue that innovation represents the most effective pathway for firms seeking to attain and sustain a competitive advantage [41]. The pursuit of competitive advantage frequently drives innovation, particularly through the development of products and services that effectively address evolving customer demands [42]. In increasingly dynamic and competitive markets, the implementation of innovative strategies has become vital for firms seeking to maintain a superior position. Scholars have emphasized that key enablers of competitive advantage among small businesses include their capacity to produce differentiated offerings and their adaptability in leveraging new technologies. The strategic relevance of innovation is further underscored by its frequent inclusion as a key dimension in frameworks assessing competitive advantage [28]. These insights suggest that engaging in innovation-oriented activities is essential for small enterprises striving to achieve and sustain a competitive advantage in uncertain market conditions [43]. Accordingly, the following hypothesis is proposed:

H₇: Innovation performance has a positive effect on competitive advantage.

2.5. Mediating Effect of Innovation Performance

The above arguments demonstrate the positive influence of IC on IP, which, in turn, induces significant impacts on CA. IP serves as a mediator in the IC-CA relationship. Prior works also support the mediating role of IP in bridging the correlation between IC and CA of organizations [7, 22, 44, 45]. Research shows that IC is significant for improving services or products to develop new ones in the future. IC plays important roles in developing innovative capabilities and gaining CA, which leads to increased firm performance through innovation. Innovation positively mediates the impact of IC on three components and the competitive advantage. Hence, the following propositions are presented to determine the mediating effect of innovation performance between IC and CA.

H₈: Innovation performance positively mediates the impact of the relationship between human capital and competitive advantage.

H₉: Innovation performance positively mediates the impact of the relationship between social capital and competitive advantage.

H₁₀: Innovation performance positively mediates the impact of the relationship between organizational capital and competitive advantage.
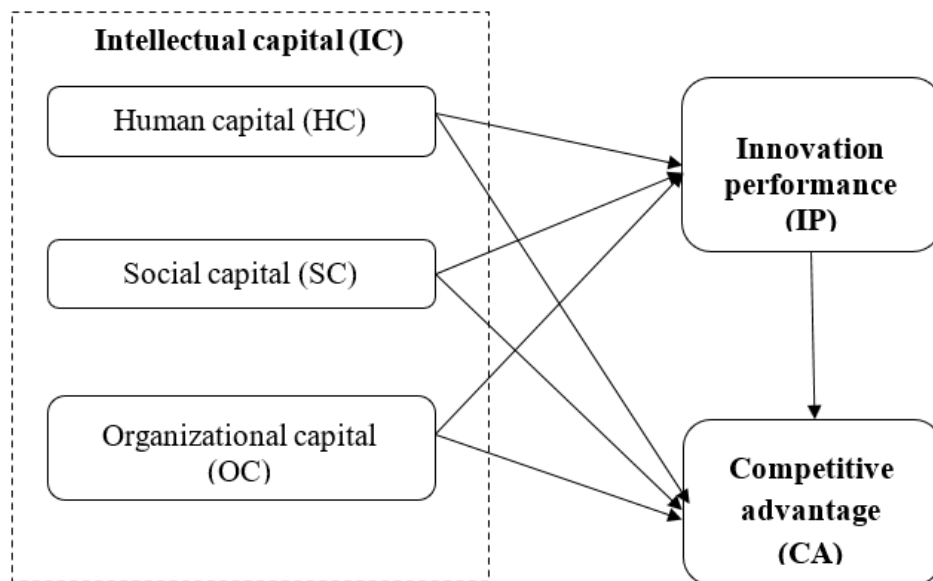

Figure 1.
Proposed research model.

3. Methodology

3.1. Scale

This study employed validated measurement scales sourced from prior empirical research. Human Capital and Organizational Capital were measured using items adapted from Youndt et al. [13]. Social Capital was developed by Su [10] and Youndt et al. [13]. Innovation Performance was assessed using five items adapted from Martinez-Conesa et al. [46], focusing on new or improved products, processes, and R&D orientation. Competitive advantage was measured using six items adapted from Chang [32].

All constructs were measured using multi-item reflective scales and rated on a 7-point Likert scale ranging from 1 ("Strongly disagree") to 7 ("Strongly agree"). The questionnaire consisted of two parts: the first covered the main constructs, and the second captured demographic information about the respondents and firm characteristics.

To ensure both linguistic accuracy and conceptual equivalence, the questionnaire was initially translated from English into Vietnamese and subsequently back-translated into English by two independent bilingual translators. The back-translated version was then carefully compared with the original English version to identify and resolve any inconsistencies

or semantic discrepancies. This back-translation procedure was implemented to enhance measurement equivalence across languages and to minimize potential sources of linguistic bias.

3.2. Sampling and Data Collection

The target population for this study comprised senior executives at small and medium-sized enterprises (SMEs) in Vietnam, including board members and heads of departments (HR, R&D, production, and sales). To enhance the robustness and generalizability of the structural model, the sampling strategy aimed to capture a heterogeneous mix of firms across key characteristics, including industry sector, firm age, legal structure, number of employees, and annual revenue. Each participating enterprise contributed a single completed questionnaire.

The required sample size was determined based on the 10-times rule guideline for Partial Least Squares Structural Equation Modeling (PLS-SEM), as recommended by Barclay et al. [47]. This rule posits that the minimum sample size should be at least ten times the largest number of indicators used to measure a single latent construct or ten times the highest number of structural paths pointing to an endogenous construct. In this study, the construct with the highest number of indicators, Competitive Advantage, comprised six items, implying a minimum sample size requirement of 60 observations to meet the criteria for model estimation.

Data collection was conducted through direct, in-person distribution of questionnaires to SMEs, facilitated by a professional survey agency. Of the 300 questionnaires distributed, a total of 274 valid responses were received, resulting in a response rate of 91.3%.

3.3. Data Analysis

The data analysis process was conducted using SmartPLS 4, employing the Partial Least Squares Structural Equation Modeling (PLS-SEM) technique. The evaluation process followed a two-step approach: (1) Measurement Model Assessment: Validity and reliability of the constructs were assessed through outer loadings, Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE). Discriminant validity was verified using both the Fornell–Larcker criterion and HTMT ratios; (2) Structural Model Assessment: Path coefficients, t-statistics, and p-values were calculated to test the proposed hypotheses. R^2 was computed to assess the explanatory power of the model.

4. Results

4.1. Demographic Characteristics

Table 1 presents the demographic characteristics of the 274 valid responses collected from SMEs in Vietnam.

Table 1.
Sample demographics.

Characteristics	Frequency	Percentage (%)
Gender		
Male	145	52.9
Female	129	47.1
Education		
Undergraduate degree	249	90.9
Master's degree	25	9.1
Job position		
Board of Directors	10	3.6
Department head	264	96.4
Work experience (year)		
Below 5	125	45.6
5 – 10	108	39.4
10+	41	15
Sector of operation		
Manufacturing	95	34.7
Trade	92	33.6
Services	54	19.7
Agriculture, forestry and fisheries	33	12
Firm age		
Less than 3 years	5	1.8
3 to 5 years	36	13.1
5 to 10 years	105	38.3
10 to 15 years	84	30.7
More than 15 years	44	16.1
Legal entity type		
Joint stock company	22	8.0
Limited liability company	249	90.9
Partnership company	3	1.1

Staff size		
Fewer than 10 employees	40	14.6
10 to 50 employees	30	10.9
50 to 100 years	104	38
100 to 200 employees	100	36.5
Revenue (VNĐ)		
Less than 10 billion	11	4.0
10 – 50 billion	99	36.1
50 – 100 billion	115	42
100 – under 300 billion	49	17.9
Total	*274*	*100*

The sample was relatively balanced in terms of gender, with 52.9% male and 47.1% female participants. Most respondents held departmental leadership roles (96.4%), and a large majority held undergraduate degrees (90.9%). In terms of work experience, 85% of participants had fewer than 10 years of experience, reflecting a relatively young and dynamic managerial cohort.

Regarding the sectors of operation, respondents represented a diverse range of industries, including manufacturing (34.7%), trade (33.6%), services (19.7%), and agriculture, forestry, and fisheries (12%). In terms of legal structure, most firms were limited liability companies (90.9%).

The size of participating firms was primarily concentrated in the medium range, with 74.5% employing between 50 and 200 workers. Notably, the distribution of annual revenue further supports the sample's representation of SMEs: 42.0% of firms reported revenues between 50 and 100 billion VND, 36.1% between 10 and 50 billion VND, and 17.9% between 100 and 300 billion VND. Only a small proportion of firms (4.0%) had annual revenue below 10 billion VND.

4.2. Measurement Model Evaluation

Following the guidelines proposed by Hair et al. [48], the evaluation of a reflective measurement model begins with the examination of outer loadings. A threshold of 0.708 is commonly recommended, as it indicates that the construct explains more than 50% of the variance in the corresponding indicator, thereby ensuring adequate indicator reliability. In this study, items with loadings below this threshold were carefully reviewed and subsequently removed to enhance the measurement quality. As presented in Table 2, the retained items exhibit outer loadings above 0.708, confirming the reliability of the measurement model.

Table 2.
Measurement statistics of construct scales.

Factor	Items	Mean	Factor loading	CA	CR	AVE
Social capital	SC2: Our employees share information and learn from one another.	5.102	0.780	0.771	0.853	0.591
	SC3: Our employees interact and exchange ideas with people from different areas of the company	5.099	0.765			
	SC4: Our employees partner with customers, suppliers, alliance partners, etc., to develop solutions	4.916	0.771			
	SC5: Our employees apply knowledge from one area of the company to problems and opportunities that arise in another.	5.201	0.760			
Organizational capital	OC1: Our organization uses patents and licenses as a way to store knowledge.	5.624	0.838	0.888	0.923	0.750
	OC2: Much of our organization's knowledge is contained in manuals, databases, etc.	5.595	0.900			
	OC3: Our organization's culture (stories, rituals) contains valuable ideas, ways of doing business, etc.	5.624	0.894			
	OC4: Our organization embeds much of its knowledge and information in structures, systems, and processes.	5.518	0.830			
Human capital	HC1: Our employees are highly skilled	5.464	0.829	0.832	0.888	0.664
	HC2: Our employees are widely considered the best in our industry	5.288	0.842			
	HC3: Our employees are creative and bright	5.299	0.797			
	HC5: Our employees develop new ideas and knowledge	5.405	0.791			
Competitive advantage	CA1: The quality of the products or services that the company offers is better than that of the competitor's	5.416	0.746	0.861	0.895	0.588

	products or services					
	CA2: The company is more capable of R&D than its competitors	5.704	0.750			
	CA3: The company has better managerial capability than its competitors	5.613	0.755			
	CA4: The company's profitability is better	5.588	0.756			
	CA5: The corporate image of the company is better than that of the competitors	5.653	0.787			
	CA6: The competitors find it difficult to take the place of the company's competitive advantage	5.715	0.805			
Innovation performance	IN1: The number of new or improved products/services launched to the market is above the average of your industry	5.635	0.810	0.841	0.887	0.612
	IN2: The number of new or improved internal processes is above the average of your industry	5.442	0.838			
	IN3: Top management emphasizes research and development	5.365	0.808			
	IN4: In the last five years, new product lines have been introduced	5.383	0.736			
	IN5: Changes introduced in our products during the last five years are important	5.405	0.714			

Note: * Item SC1 "Our employees are skilled at collaborating with each other to diagnose and solve problems",

HC4 "Our employees are experts in their particular jobs and functions" was eliminated

All constructs exhibited Cronbach's alpha and CR values exceeding 0.7, confirming internal consistency reliability. The AVE values ranged from 0.588 to 0.750, exceeding the 0.5 threshold, thus confirming convergent validity [48].

4.3. Discriminant Validity Results

Discriminant validity was confirmed using the Fornell–Larcker criterion and HTMT. As suggested by Fornell and Larcker [49], discriminant validity is supported when the square root of each construct's AVE exceeds its correlations with other constructs. Table 3 confirms this condition, as all bold diagonal values are greater than the corresponding inter-construct correlations. HTMT ratios were also below the recommended threshold of 0.85, ensuring discriminant validity as suggested by Henseler et al. [50].

Table 3.
Discriminant validity results.

Fornell–Larker criterion						HTMT				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
1. Competitive advantage	**0.767**									
2. Human capital	0.584	**0.815**				0.671				
3. Innovation performance	0.588	0.713	**0.782**			0.670	0.849			
4. Organizational capital	0.481	0.401	0.444	**0.866**		0.543	0.468	0.515		
5. Social capital	0.536	0.563	0.573	0.384	**0.769**	0.632	0.694	0.702	0.458	

Source: Smart PLS 4

4.4. Structural Model

The structural model, as illustrated in Figure 2, was analyzed using the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach to examine the relationships between human capital, social capital, organizational capital, and competitive advantage, as well as the mediating role of innovation performance in the links between intellectual capital components and competitive advantage. The results of the hypothesis testing are summarized in Table 4.

Table 4.
Results of the hypothesis

Relationship	Hypothesis	Original sample	Label
Human Capital -> Innovation Performance	H1	0.532***	Supported
Organizational Capital -> Innovation Performance	H3	0.147*	Supported
Social Capital -> Innovation Performance	H2	0.216***	Supported
Human Capital -> Competitive Advantage	H4	0.234**	Supported
Organizational Capital -> Competitive Advantage	H6	0.217***	Supported
Social Capital -> Competitive Advantage	H5	0.201**	Supported
Innovation Performance -> Competitive Advantage	H7	0.209**	Supported
Organizational Capital -> Innovation Performance -> Competitive Advantage	H10	0.031!	Not supported
Social Capital -> Innovation Performance -> Competitive Advantage	H9	0.045*	Supported
Human Capital -> Innovation Performance -> Competitive Advantage	H8	0.111**	Supported

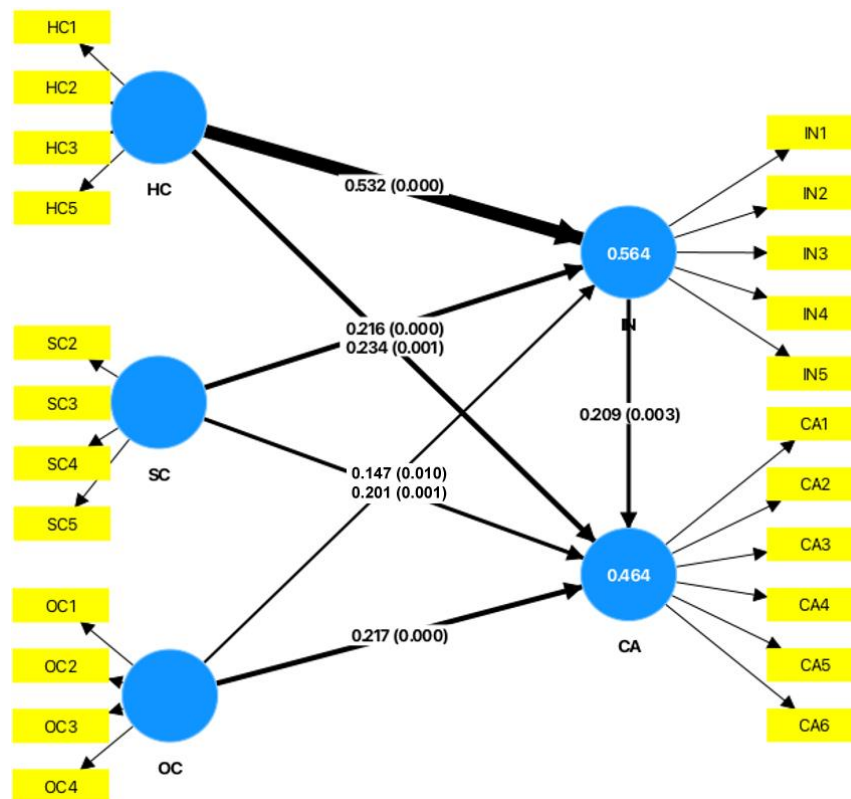**Note:** $! <0.1$, $* < 0.05$, $** < 0.01$, $*** < 0.001$.

Figure 2.
Structural model estimation.
Note: The value outside the parentheses is the path coefficient, the value in parentheses is the p-value, and the value in the blue circle is the R-squared.

The results of hypothesis testing, as presented in Table 4, indicate that all direct relationships in the model were statistically significant and positive. Specifically, Human Capital had a direct and significant effect on Innovation Performance ($\beta = 0.532$, $p = 0.000$), and Organizational Capital also positively affected Innovation Performance ($\beta = 0.147$, $p = 0.010$). Similarly, Social Capital demonstrated a significant positive effect on Innovation Performance ($\beta = 0.216$, $p = 0.000$). These findings provide empirical support for hypotheses H1, H3, and H2.

Innovation performance positively and significantly impacts competitive advantage ($\beta = 0.209$, $p = 0.003$) (H7 supported). Furthermore, each dimension of intellectual capital also has a direct and significant influence on competitive advantage (H4, H5, H6 supported).

Regarding mediation effects, Innovation Performance was found to partially mediate the relationships between Human Capital and Competitive Advantage ($\beta = 0.111$, $p = 0.005$), and between Social Capital and Competitive Advantage ($\beta = 0.045$, $p = 0.017$). However, the indirect effect from Organizational Capital to Competitive Advantage via Innovation Performance was not statistically significant ($p > 0.05$). Therefore, H8 and H9 are supported; H10 is not supported.

Figure 2 indicates that R2 values for competitive advantage and innovation performance are 0.464 and 0.564, respectively, which means that intellectual capital explains 46.4% of the variation in innovation performance and 56.4% of the variation in competitive advantage.

Figure 2 reports the R² values for the two endogenous constructs in the model. Specifically, the R² value for Innovation Performance is 0.464, indicating that the three components of intellectual capital collectively explain 46.4% of its variance. Similarly, the R² value for Competitive Advantage is 0.564, suggesting that intellectual capital and innovation performance together account for 56.4% of the variation in firms' competitive advantage.

5. Discussion and Implication

This study investigated the influence of IC on IP and CA, as well as the mediating effect of IP in the IC–CA relationship within the context of SMEs in Vietnam. The structural model confirms that all three dimensions of intellectual capital (human capital, social capital, and organizational capital) positively and significantly influence innovation performance and competitive advantage. Specifically,

Firstly, the empirical findings strongly support H1, H2, and H3, confirming that all three dimensions of intellectual capital, human capital (HC), social capital (SC), and organizational capital (OC), positively influence innovation performance. Enterprises with high levels of IC possess superior capabilities, enabling them to enhance their IP. This reinforces the theoretical stance that intellectual capital constitutes a vital foundation for innovation, particularly within knowledge-intensive and dynamic environments such as SMEs. Human capital contributes through employees' creativity, problem-solving skills, and tacit knowledge, consistent with Cabrilo and Dahms [5] and Bontis et al. [15], who emphasized the central role of individual competencies in idea generation and implementation. HC facilitates the encoding and storage of knowledge, the development of both internal and external relationships, and contributes significantly to a firm's learning capacity and the renewal of its knowledge base, all of which positively influence IP.

Social capital facilitates innovation by enabling trust-based collaboration and knowledge exchange across internal departments and external partners, echoing the findings of Mention and Bontis [24]. Finally, organizational capital manifested in codified processes, databases, and shared norms provides the structural foundation for firms to retain, share, and apply knowledge effectively in innovation activities [4]. Together, these three forms of intellectual capital function synergistically to foster a firm's innovation performance.

Secondly, the findings also confirm H4, H5, and H6, demonstrating that the three components of intellectual capital positively influence competitive advantage.

These results reaffirm the Resource-Based View (RBV) and Knowledge-Based View (KBV), suggesting that IC constitutes a strategic bundle of intangible, valuable, and difficult-to-imitate assets that enable Vietnamese SMEs to establish and sustain competitive differentiation.

There have been many empirical studies concentrated on the influence of IC on overall business performance across various industries and institutional contexts, but limited empirical attention has been given to the direct relationship between IC and CA in the context of SMEs in Vietnam. The present study has investigated and verified the significant and positive effects of each IC component (HC, SC, OC) on enterprise CA. Confirming the pivotal role of the three core components of IC in generating competitive value for enterprises is consistent with other studies [22, 31, 35].

Third, the study also confirms the positive impact of IP on the CA of enterprises. Innovation enables firms to introduce differentiated products, optimize processes, and respond to market shifts more rapidly than competitors. This aligns with the findings of Zahra and George [28] and Ramadani and Gerguri [41], who argued that innovation serves as a core driver of strategic renewal and market leadership. For SMEs operating in fast-changing or uncertain environments, such as in Vietnam, innovation becomes a critical enabler of resilience and long-term value creation.

Regarding the mediating effect, this study has found that innovation performance mediates the relationship between human capital and competitive advantage, and between social capital and competitive advantage. These results provide evidence to support other studies [7, 22, 44, 45]. Contrary to our expectations, IP did not serve as a mediator in the relationship between OC and CA. This indicates that while OC has a direct impact on CA, it does not significantly promote CA through innovation pathways.

One plausible explanation is that organizational capital in SMEs, such as routines, manuals, or databases, may function more as enablers of operational efficiency rather than sources of novel innovation. Unlike human and social capital, which are dynamic and externally oriented, organizational capital may lack the flexibility or creative stimulus necessary to drive innovation that results in a competitive advantage. This finding diverges from prior studies, Zahra and George [28] and invites further investigation into how SMEs structure and leverage their internal systems for innovation-driven outcomes.

For both managers and policymakers, the findings of this study provide several actionable insights to strengthen innovation performance and competitive advantage among SMEs. First, human capital development should be a strategic priority. Investment in employee training, creativity enhancement programs, and continuous professional development can foster a workforce that is adaptable, innovative, and capable of driving organizational growth. Creating an internal culture that values learning, experimentation, and knowledge sharing is essential for sustaining innovation.

Second, strengthening social capital is equally important. SMEs should proactively build and maintain strong relationships with external stakeholders, including customers, suppliers, academic institutions, and strategic partners. These networks facilitate knowledge exchange, collaborative innovation, and access to complementary capabilities. Government-led initiatives that promote SME networking, cluster development, and public-private partnerships can further enhance these connections. Third, organizational capital must be institutionalized and optimized.

Firms should develop robust internal systems such as IT infrastructure, knowledge management platforms, and clearly defined standard operating procedures that enable consistent knowledge retention and application. Embedding innovation-supportive structures and routines can improve process efficiency and ensure that knowledge is reused systematically across the organization. Finally, from a policy perspective, national innovation frameworks should be designed to support

SMEs in overcoming structural constraints. This includes expanding access to R&D infrastructure, offering targeted innovation grants, and providing intellectual property protection services. In emerging economies like Vietnam, where SMEs often operate with limited resources, such policy support is critical to fostering an innovation-driven business ecosystem.

6. Conclusion

This study provides robust empirical evidence on the interconnections among intellectual capital, innovation performance, and competitive advantage in the context of Vietnamese SMEs. The results confirm that intellectual capital, comprising human, social, and organizational capital, significantly contributes to innovation performance, which in turn drives competitive advantage. Notably, innovation performance serves as a critical mediating mechanism, emphasizing its role as a strategic capability that enables the transformation of intangible resources into market success.

Theoretically, the study reinforces the relevance of the Resource-Based View (RBV) and Knowledge-Based View (KBV) in understanding how internal capabilities, especially knowledge-based assets, translate into superior organizational outcomes. It adds to the literature by providing empirical insights from an emerging economy, where SMEs play a pivotal role in economic development but face resource limitations.

Practically, the findings offer valuable implications for SME managers and policymakers aiming to enhance competitiveness through knowledge and innovation strategies. By cultivating intellectual capital and institutionalizing innovation practices, firms can improve their adaptability, performance, and long-term viability in an increasingly dynamic global marketplace.

However, this study has certain limitations. The sample size, while sufficient for PLS-SEM, may constrain the generalizability of findings across industries. Additionally, although the mediating role of innovation performance was supported in most pathways, its role between human capital and competitive advantage was relatively modest, suggesting that other mechanisms may also be at play. Future research should further investigate this indirect relationship using larger and more diverse samples and consider alternative mediators or moderators to capture better how human capital translates into sustained competitive advantage.

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