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The Impact of Human Capital, Capabilities, and Innovation on Success: A Study of Greek SMEs

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Abstract

Greek SMEs extensively seek to enhance firm innovativeness and competitive advantage, but these efforts have yet to achieve optimal effectiveness. This study explores the relationships between human capital, structural capital, relational capital, and digital business competence, examining their influence on competitive advantage and firm innovativeness. The study also identifies the mediating role of digital business model innovation within these relationships. Using SmartPLS 3.0 to analyze 167 responses covering 42 items, the findings reveal that human, structural, and relational capital have a direct influence on digital business model innovation. Furthermore, digital business capabilities exhibit a moderating effect, while digital business model innovation acts as a mediator. However, the results indicate that structural and relational capital, moderated by digital business capabilities, have an insignificant impact on firm innovativeness and competitive advantage.

Keywords

Human Capital, Structural Capital, Relational Capital, Digital Business Capabilities, Digital Business Model Innovation, Firm Innovativeness, Competitive Advantage, Resource-Based View Theory.

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1. Introduction

To achieve competitive advantage, businesses must maximize both internal and external resources aimed at fostering innovations that enhance their competitiveness and overall success (Kryscynski et al., 2021). Competitive advantage reflects an organization's ability to outperform its industry peers by leveraging unique capabilities that allow it to offer distinctive products or services (Alkhatib & Valeri, 2024). Striving for optimal performance levels is essential for businesses seeking to maintain an edge over rivals (Agustian et al., 2023). However, launching new ideas or products involves significant risks, especially amid abrupt changes and global market unpredictability (Muazu & Abdulmalik, 2021). The literature highlights innovation as a key outcome, with scholars such as (Prokop et al., 2023) exploring the conditions under which an organization may successfully innovate. Innovation involves introducing novel ideas, practices, and technological advancements within a company (Trivedi & Srivastava, 2022). Under the unstable conditions of the "new normal," innovation remains especially critical for SMEs, though there are ongoing questions about its overall benefits for SMEs (Shouman et al., 2022). Scholars have examined the connection between corporate value and innovation (Pangidoan & Nawangsari, 2022), yet the specific nature of the relationship between innovation and performance remains unclear, even if the notion of innovation as a performance booster is widely acknowledged (Jagódka & Snarska, 2021; Marchiori et al., 2022). Human capital, defined as the knowledge, skills, and experience within an organization, plays a vital role in establishing a firm's unique qualities (Prokop et al., 2023). The significance of human capital has been amplified by recent changes in the global environment. Prior

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research suggests that companies increasingly recognize that managing human capital—rather than relying solely on technology—offers a more stable path to long-term competitive advantage (Pangidoan & Nawangsari, 2022). These resources, held by employees, are essential for a firm's sustained advantage (Wilson & Herceg, 2022).

Structural capital, sometimes described as "what remains in the company when employees go home at night," refers to the systems, structures, and processes that support intellectual performance and organizational success (Beltramino et al., 2020; Pangidoan & Nawangsari, 2022). Even with high intellectual capacity, a firm cannot reach its potential without an effective framework of processes and systems that enable individuals to contribute meaningfully (Ahmad et al., 2019; Azzahra, 2018). Structural capital is thus crucial in managing and organizing resources, ensuring that knowledge is retained and can be effectively reused within the organization. Research indicates that companies with greater digital business capability tend to perform better, as they manage digital transformation effectively, thereby generating sustained value (Marchiori et al., 2022). Evidence from a global study reveals that 85% of executives now regard digital business capability as increasingly crucial for long-term performance (Zhe & Hamid, 2021). Consequently, technological proficiency has emerged as a key element for success, prompting extensive research into the connections between digital capacities and corporate performance. Recent studies, such as (Wielgos et al., 2021), have explored how managerial skills and digital capabilities enhance overall organizational performance. (Alkhatib & Valeri, 2024) suggest that business models serve as essential frameworks for leveraging technological advancements and innovative ideas. This is particularly important in companies influenced by family ties, which often have distinct characteristics such as specialized knowledge management strategies (Collins, 2022); (Mancuso et al., 2023). Additionally, unique knowledge management approaches are integral to such firms, as same citation (Ancillai et al., 2023; Cheng & Wang, 2022), and (Vaska et al., 2021). These firms, often risk-averse, focus on preserving wealth within the organization and approach innovation distinctively due to close managerial influence.

This study proposes that human, structural, and relational capital influence firm innovativeness and competitive advantage. It also posits that digital business capability has a significant role in moderating the effects of human, structural, and relational capital on digital business model innovation. The purpose of this research is to test a model that examines these relationships in the context of Greek SMEs, with a specific focus on how digital business model innovation serves as a mediator among the constructs. Additionally, the study seeks to answer the following research questions:

Research Questions:

- RQ1: What is the relationship between human, structural, and relational capital and digital business model innovation?
- RQ2: How does digital business capability moderate the relationship between human, structural, and relational capital and digital business model innovation?
- RQ3: How does digital business model innovation mediate the relationship between human, structural, and relational capital with competitive advantage and firm innovativeness?

The structure of the article is as follows: Theoretical framework is presented in the next section. Section 3 outlines the methodology. Section 4 discusses research findings, while Section 5 addresses implications and limitations, followed by recommendations for future research in Section 6.

2. Literature review

2.1. Theoretical Background

Various research disciplines, including surveys, resource-based view (RBV) theory, computer technology, and studies on firm innovativeness and competitive advantage, contribute to the

development of an integrative model that links digital capabilities and innovation. The RBV, as discussed citation (Freeman et al., 2021), emphasizes that certain resources within a firm are inherently challenging to replicate, especially when they encompass complex social structures, such as employment or HR systems, deeply embedded within an organization. This makes these resources particularly valuable for competitive advantage. (Freeman et al., 2021) further underscore the importance of complementarity in achieving a firm's full competitive advantage. (Soluk et al., 2021) elaborate that individual practices have a limited ability to drive competitive advantage in isolation. However, when these practices are combined effectively, they can enable a firm to realize its full potential in creating and capturing value. Complementary practices, often more difficult to replicate than isolated best practices, play a critical role in alignment with broader business strategies, amplifying both value creation and capture. The RBV asserts that while resources are central to a company's sustainability, they must also be strategically managed to maximize their value. For instance, the management of human capital, guided by strategic leadership, has significant implications for resource effectiveness and competitive advantage (Soluk et al., 2021). Building on the RBV and human capital literature (Malkawi et al., 2018), identify relational capital as a vital asset that fosters trust among alliance partners, enhances access to external resources, and drives firm innovativeness. This study thus aims to address gaps in understanding the RBV by focusing on the role of relational capital as a resource that can enhance firm innovativeness and competitive edge (Adle & Akdemir, 2019).

2.2. Human, Structural and Relational Capital

The first element of our integrated model focuses on human capital, which has been identified as crucial for motivating employees and fostering a company's creative capacity (Wilson & Herceg, 2022). Human capital encompasses the total knowledge, skills, abilities, and experience possessed by all personnel within an organization (Jagódka & Snarska, 2021). Organizational knowledge, skills, and competencies are key ways in which human capital, an intangible asset, adds value (Collins, 2022). Because of its intangible nature, human capital can be challenging for businesses to retain over time (Pangidoan & Nawangsari, 2022). Three primary factors—special competencies, work experience, and skills—identify human capital (Malik, 2019). Studies of citations (Azzahra, 2018; Kryscynski et al., 2021; Marchiori et al., 2022), and (Minbaeva, 2018) emphasize the role of human capital as an essential factor in building competitive advantages and innovative capacity. Human capital improves organizational performance and drives high outputs and results, setting the business apart from competitors and encouraging corporate innovation (Agustian et al., 2023; Malik, 2019). Highly qualified human resources are essential to achieving digital business model innovation (Wilson & Herceg, 2022). By emphasizing innovation in human resources, businesses gain a competitive edge, differentiating their offerings and positioning themselves ahead of competitors (Soluk et al., 2021). Additionally, optimizing manufacturing processes and reducing waste can enhance competitive positioning, aiding in the development of innovative digital business models (Ancillai et al., 2023). Structural capital has been widely discussed in academia, with (Ahmad et al., 2019) identifying patents, procedures, policies, and databases as its core elements. These elements support businesses in acquiring and applying new knowledge to innovate in ideas, processes, and organizational structures (Beltramino et al., 2020). Structural capital is key for transforming external knowledge into internal routines, enabling effective problem-solving and idea generation (Pangidoan & Nawangsari, 2022). By capturing cumulative knowledge and integrating it into daily business operations, structural capital aligns organizational goals with structures and processes (Pangidoan & Nawangsari, 2022). Structural capital thus transforms employee knowledge into an accessible organizational routine that benefits the firm (Ahmad et al., 2019). Studies of citation (Beltramino et al., 2020) and (Pangidoan & Nawangsari, 2022) reveal the role of structural capital in driving business model innovation by supporting information sharing and retention within an organization. This focus on core competencies aids in enhancing operational efficiency and organizational performance (Mancuso et al., 2023).

Relational capital, or customer capital, is significant for developing long-term business models and reflects a firm's ability to collaborate with suppliers, customers, and stakeholders (Ramírez-Solis et al., 2022; Zahoor & Gerged, 2021). Strategic alliances and connections offer value, expand expertise, and improve operational processes and activities (AlQershi et al., 2020; Ryu et al., 2021). Relational capital builds a network of shared resources based on trust, providing a sustained competitive advantage (Ramírez-Solis et al., 2022). Effective communication with customers and stakeholders enhances business models and strengthens customer relationships, leading to competitive differentiation (Ritala et al., 2021). This form of capital enhances performance by leveraging social connections within and outside the organization (Fernandez-Olmos et al., 2021). Improvements in organizational performance are closely tied to relational capital (Azzahra, 2018; Mubarik et al., 2019). Relational capital facilitates knowledge exchange and broadens access to knowledge sources, enhancing trust in partnerships (Alkhatib & Valeri, 2024). Based on prior findings in the literature, this study proposes the following hypotheses:

- H1: Human capital directly impacts digital business model innovation.
- H2: Structural capital directly impacts digital business model innovation.
- H3: Relational capital directly impacts digital business model innovation.

2.3. Digital Business Capability

In the digital economy, businesses increasingly rely on digital capabilities, which are understood as enhancements in dynamic capabilities enabled by digital applications. Digital business capability aligns with the resource-based view (RBV), which posits that firms possess unique resource bundles that contribute to performance differences (Da Silva Freitas Junior & Gastaud Maçada, 2020). These resources, when effectively managed, transform into capabilities that allow businesses to perform well and adapt to market shifts (Ranta et al., 2021). Digital business capability is reflected in elements such as digital strategy, digital integration, and digital control. Digital strategy encompasses a strategic vision focused on value generation through digital transformation. Digital integration helps to resolve organizational conflicts from resource misallocation and enhances value creation (Wielgos et al., 2021). Through digital control, businesses can assess digitization’s return, cost, and resources, enabling them to respond effectively to emerging risks or opportunities (Vaska et al., 2021). Human capital refers to the experience, knowledge, and skills of a company’s workforce, as well as its role in achieving socio-economic welfare. Organizational innovation fundamentally depends on human resources (Hsu & Chen, 2019; Mubarik et al., 2019). Human capital significantly contributes to innovation success and adds direct value through improved decision-making and productivity (Beltramino et al., 2020). Literature highlights human capital as a critical resource for competitive advantage and a firm’s performance, often linked to the educational attainment of employees (Ryu et al., 2021). Education substantially impacts innovation and organizational performance (Prokop et al., 2023). Existing data emphasize that internal knowledge resources strongly influence financial returns (Pangidoan & Nawangsari, 2022), company success (Marchiori et al., 2022), and performance outcomes (Ritala et al., 2021). Unique to human capital is its inseparability from individuals, which means it is always present as long as employees remain with the organization.

Relational capital refers to knowledge embedded in an organization’s interactions with external stakeholders, including suppliers, competitors, customers, and trade associations (Wilson & Herceg, 2022). This form of capital is increasingly acknowledged as essential for competitive advantage (Marchiori et al., 2022). However, partner opportunism can harm organizations by increasing transaction costs. Relational capital according to (Ryu et al., 2021) as the worth of a company's external relationships with the entities and people it transacts business with Relational capital, encompassing a company’s external connections, holds value in the insights gained through business interactions and is embedded in marketing channels and customer relationships(Fernandez-Olmos et al., 2021). Structural capital is another key asset in driving innovation and digital capabilities, with studies showing a significant correlation between structural capital and digital business capability

(Calabrò et al., 2021) and a positive link between structural capital and business innovation (Ritala et al., 2021). Digital capabilities also arise from supplier-user relationships, producing outputs or services characterized as digital (Xie et al., 2023). These capabilities form digital systems that generate novel results and frameworks without centralized planning (Heredia et al., 2022), enabling the design and management of multiple products or subsystems (Wielgos et al., 2021). Dynamic capabilities are seen as primary sources of sustained competitive advantage in a changing market (Soluk et al., 2021), allowing firms to reshape business models, enhance human and structural capital, and drive innovativeness (Ranta et al., 2021). Based on the previous findings in the literature, the following hypotheses are proposed:

- H4: Digital business capability moderates the relationship between human capital and digital business model innovation.
- H5: Digital business capability moderates the relationship between structural capital and digital business model innovation.
- H6: Digital business capability moderates the relationship between relational capital and digital business model innovation.

2.4. Digital Business Model Innovation

Business modeling describes an organization's operations and strategies for engaging with the product market (Jagódka & Snarska, 2021; Soluk et al., 2021). A business model comprises capability, customer, value proposition, and value presentation. Digital technologies that transform these value dimensions define digital business models (Heredia et al., 2022). Central to digital business model innovation is value production, focused on cost, efficiency, and pricing advantages. Enhanced transaction efficiency through technology can increase value, while network externality expands service scope and benefits for stakeholders (Marchiori et al., 2022; Prokop et al., 2023). Digitization-driven transformations within business models are anticipated to disrupt entire industries (Shouman et al., 2022). Knowledge absorption is key to innovation success, enabling firms to collaborate with partners, suppliers, and customers for technical expertise across sectors (Mancuso et al., 2023; Ramírez-Solis et al., 2022). Digital strategy supports value creation, distribution, capture, and proposition, forming a foundation for business model innovation. Digital integration facilitates learning processes and resource reallocation, creating new knowledge that benefits the firm (Prokop et al., 2023). Rapid experimentation cycles enabled by digital infrastructure make it challenging to define clear stages in the digital business model innovation process (Xia et al., 2024). External information is thus critical for managing uncertainty. Digital control evaluates digital transformation, assesses digitization, and mitigates potential risks to enhance business model services. Additionally, digital capability helps firms adapt to technological developments and varying levels of digital literacy among stakeholders, both essential for digital business model innovation (Jagódka & Snarska, 2021).

Human capital includes employees' skills, competencies, and knowledge. Employee-owned knowledge impacts innovation and competitive advantage, as workers contribute valuable social resources (Vaska et al., 2021). Factors such as motivation, commitment, and aptitude are also linked to human capital, which adds value to the organization (Calabrò et al., 2021). Innovation is widely recognized as a means to attain competitive advantage (Hagiu & Wright, 2020; Malik, 2019). Research extensively explores the relationship between innovation and competitive advantage in SMEs, such as those in Greece (Beltramino et al., 2020; Wielgos et al., 2021). Findings indicate that innovation significantly contributes to competitive advantage, accounting for 73.5% of competitive advantage outcomes. Firm age moderates this relationship, suggesting that older SMEs can better leverage innovation to enhance their competitive status. Numerous studies confirm that firm innovativeness is a significant contributor to competitive advantage, particularly through human, structural, and relational capital interactions (Gerhart & Feng, 2021; Jagódka & Snarska, 2021; Kryscynski et al., 2021; Ritala et al., 2021). Global and regional competition compels firms to stay current with technological advancements and market trends (Reim et al., 2020). Competitive advantage refers to a firm's

capability to outperform rivals, attributed to factors such as skilled labor, technology access, and intellectual capital. Unlike tangible assets, which can be easily replicated, intangible assets like human capital provide sustained competitive advantage (Ahmad et al., 2019; Ibarra et al., 2018). Developing and maintaining competitive advantage is therefore central to strategic management, as it enables firms to achieve superior sales, profitability, growth, and innovation (Hagiu & Wright, 2020; Rahman et al., 2020). Highly knowledgeable employees are essential for making innovative decisions that enhance organizational competitiveness, indicating that competitive advantage correlates positively with human capital.

Human capital can serve as a competitive advantage when it is difficult for competitors to replicate (Wielgos et al., 2021). Examples show that firms leverage employee knowledge, skills, and abilities for competitive benefit. When human capital is valued and hard to imitate, it forms a strong basis for competitive advantage (Ibarra et al., 2018). Competitive advantage is also tied to structural capital, which enhances business capabilities. Intellectual capital, comprising human, structural, and relational capital, further supports competitive advantage (Wielgos et al., 2021). Structural capital includes organizational assets such as databases, procedure manuals, and organizational strategies. Relational capital involves connections with external partners and clients, facilitating technology acquisition and innovation (Da Silva Freitas Junior & Gastaud Maçada, 2020; Fernandez-Olmos et al., 2021). Long-term collaborative partnerships enable firms to integrate and reorganize resources to build innovative capabilities, thereby enhancing technological innovation required for global competitiveness (Corvino et al., 2019; Mubarik et al., 2019). In light of the literature, the following hypotheses are proposed:

- H7: Digital business model innovation mediates the relationship between human capital and competitive advantage.
- H8: Digital business model innovation mediates the relationship between human capital and firm innovativeness.
- H9: Digital business model innovation mediates the relationship between structural capital and competitive advantage.
- H10: Digital business model innovation mediates the relationship between structural capital and firm innovativeness.
- H11: Digital business model innovation mediates the relationship between relational capital and competitive advantage.
- H12: Digital business model innovation mediates the relationship between relational capital and firm innovativeness.

3. Research Methodology

3.1. Research Model

The study framework is based on established research and incorporates characteristics commonly found in the literature on innovativeness. Key elements in this study include human capital, structural capital, relational capital, digital business model innovation, digital business capability, firm innovativeness, and competitive advantage, all assessed through a survey questionnaire (Alkhatib & Valeri, 2024; Xie et al., 2023). Figure 1 presents the conceptual framework and the hypothesized relationships among these constructs.

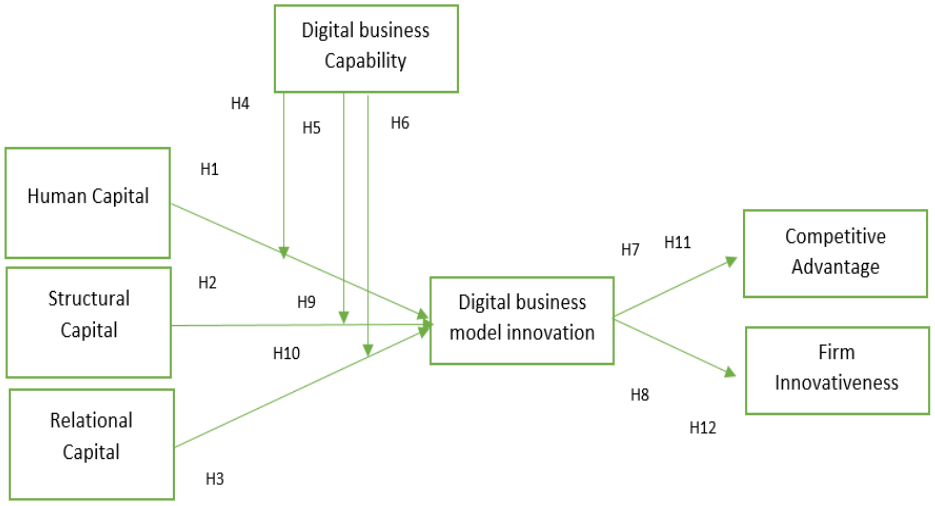

Figure 1: Conceptual Framework

3.2. Data collection, Population and Sampling

The survey method involved distributing questionnaires to senior managers working in Greek SMEs. The study was longitudinal, with data collected at two different time points. A total of 200 questionnaires were distributed, yielding 167 properly completed responses, reflecting a response rate exceeding 83%. The 33 unreturned responses were primarily due to the two-phase data collection approach. The study employed a non-probability sampling method, specifically convenience sampling, due to an unknown population size. Data was collected in two phases, labeled Time 1 and Time 2. During Time 1, demographic questions and data related to predictor variables were gathered. In Time 2, data on moderator, mediator, and outcome variables were collected from the same senior managers. A direct interaction approach was used to brief respondents on the study's purpose and provide instructions on questionnaire completion. The survey instrument also contained an explanation regarding the study's objective and guidelines for filling out the questionnaire.

3.3. Research Method

To analyze the research model's complex interrelationships, structural equation modeling (SEM) techniques were employed. SEM includes two sub-models: the measurement model and the structural model. The measurement model examines relationships between observed and latent variables, while the structural model identifies interactions among latent variables, establishing which ones directly or indirectly influence changes in other latent constructs. The study applied a two-step approach in SEM. First, confirmatory factor analysis was conducted to validate the measurement model, followed by path analysis in the structural model to examine hypothesized relationships (Hair et al., 2024).

4. Data Analysis and Results

To examine the relationships among human capital, structural capital, relational capital, digital business capabilities (moderation), digital business model innovation (mediation), firm innovativeness, and competitive advantage, this study utilized a 5-point Likert scale ranging from "strongly disagree" (1) to "strongly agree" (5). Descriptive analysis was conducted to outline the respondent profile, and hypothesis testing was performed using SEM analysis with a significance level of $\alpha \leq 0.01$. Table 1 presents the constructs and their measurement items used in this study.

Table 1. Constructs and Measurements of Items

Constructs	Measurement of Items
Human Capital (HC)	HC1: The SMEs staff has a high job and scientific skills HC2: The SMEs is constantly training its staff to acquire new skills and knowledge HC3: The SMEs staff has great job experience HC4: The SMEs staff develops new ideas and knowledge that benefit the hotel HC5: The staff in this SMEs is the best compared to the competitors from other hotels
Structural Capital (SC)	SC1: The SMEs documents its staff knowledge and experience through databases SC2: The SMEs documents intellectual property rights (e.g. patents and software) as a means of storing knowledge SC3: The SMEs protects basic knowledge and information to avoid losses if key people leave the hotel SC4: The SMEs has working methods and procedures that support innovations and new products SC5: The SMEs has technical tools that allow quick and easy access to documented and recorded knowledge
Relational Capital (RC)	RC1: The staff works with one another to solve the various problems they encounter in the SMEs RC2: There is strong cooperation amongst all organisational units within the SMEs RC3: The hotel cooperates with external stakeholders (government, public, and other Organizations) continuously to solve various problems and exchange views on common goals RC4: There are no disagreements or disputes amongst staff regarding internal cooperation RC5: SMEs management is interested in building and managing long-term relationships with customers. RC6: The SMEs actively cooperates with external parties to develop innovations or improve working methods
Digital Business Model Innovation (DBIM)	DBMI1: our business model offers new combinations of processes, products, services and information. DBMI2: our business model attracts a lot of new suppliers and other business partners DBMI3: our business model brings together internal and external participants in novel ways DBMI4: our business model is revolutionizing the way business deals are made DBMI5: we frequently introduce new ideas and innovations in our business model DBMI6: we frequently introduce new processes, routines and norms in our business model DBMI7: In the context of digital technology adoption, we are pioneers with our business model DBMI8: All in all, and in the context of digital technology adoption, our business model is novel
Digital Business Capability (DBC)	DBC1: Our digital strategy opens up entirely new opportunities to create value for our customers DBC2: Our digital strategy opens up entirely new opportunities to create value for our firm and its partners DBC3: Our firm is increasingly digitally interconnected with customers, suppliers and partners DBC4: Digital business transformation increasingly pervades and interconnects all areas of our firm DBC5: Our firm systematically and regularly monitors the progress of its digital business transformation. DBC6: Our firm systematically and regularly analyzes performance

	metrics to inspect its digital business transformation.
Competitive Advantage (CA)	CA1: The SMEs strives to possess marketing capabilities that make it more responsive to changes in the market CA2: The SMEs enjoys a distinct market share compared to the competitors CA3: The SMEs has a good reputation in the market Table CA4: The SMEs can learn more from competitors
Firm Innovativeness (FI)	FI1: Our company actively develops new products. FI2: Our company sees creating new products as critical to our success. FI3: When it comes to creating new products, our company is far better than the competition. FI4: Over the past three years, our company has been better than before regarding developing new products. FI5: Within our company, we are able to implement new product ideas from other parts of our organization. FI6: Our company actively develops in-house solutions to improve our manufacturing processes. FI7: Our company sees new manufacturing processes as critical to our success. FI8: When it comes to creating new processes, our company is far better than the competition

4.1. Respondents Demographic Profile

Table 2 presents the demographic information of the respondents

Table 2. Demographics Details

Category	Category	Frequency	Percentage (%)
Gender	Male	107	64.0
	Female	60	36.0
	Total	167	100
Age	20 to 28 years	50	29.9
	28 to 35 years	83	49.7
	35 to 42 years	34	20.3
	Total	167	100
Education Level	High school	41	24.5
	Bachelor	77	46.1
	Diploma	49	29.3
	Total	167	100
Experience	1 to 8 years	103	61.6
	8 to 12 years	64	38.3
	Total	167	100

The demographic data indicate that most respondents are male, aged between 28 and 35, hold bachelor's degrees, and possess 6 to 8 years of work experience.

4.2. Descriptive Analysis

Mean and standard deviation calculations provided insights into respondents' attitudes toward the items surveyed (Hair et al., 2024). A smaller standard deviation indicates that values are closely grouped around the mean, while a larger deviation suggests a wider spread. Table 3 displays the mean, standard deviation, and level for each variable.

Table 3. Descriptive Analysis

Types of Variables	Variables	Mean	Standard Deviation	Level
Independent Variable	Human Capital	3.41	0.91	High
	Structural Capital	3.54	0.78	High
	Relational Capital	3.44	0.88	High
Mediating Variable	Digital Business Model Innovation	3.56	1.00	High
Moderating Variable	Digital Business Capability	3.21	0.86	Moderate
Dependent Variable	Competitive Advantage	2.99	0.77	Moderate
	Firm Innovativeness	3.10	0.94	Moderate

4.3. Measurement Model

The measurement model assesses the validity and reliability of the observed variables representing the latent constructs in this study. Convergent validity, as displayed in Table 4, indicates that all factor loadings exceed the 0.50 threshold (Hair et al., 2024), confirming that the model achieves item-level convergent validity, with all composite reliability values above 0.60. This consistency indicates a high internal reliability across the latent variables. Additionally, AVE values surpassing 0.50 further establish convergent validity. Cronbach's alpha values ranged from 0.789 to 0.912, adhering to the rule of thumb that values above 0.70 indicate acceptable reliability.

Table 4: Reliability and Validity

Construct and Indicators	Outer Loadings	Cronbach Alpha	Composite Reliability	Average Variance Extracted
Competitive Advantage		0.789	0.864	0.615
CA1	0.827			
CA2	0.703			
CA3	0.765			
CA4	0.834			
Digital Business Capability		0.912	0.932	0.696
DBC1	0.733			
DBC2	0.830			
DBC3	0.867			
DBC4	0.846			
DBC5	0.862			
DBC6	0.859			
Digital Business Model Innovation		0.888	0.911	0.564
DBMI1	0.775			
DBMI2	0.835			
DBMI3	0.811			
DBMI4	0.739			
DBMI5	0.693			
DBMI6	0.777			
DBMI7	0.652			
DBMI8	0.709			
Firm Innovativeness		0.889	0.912	0.565
FI1	0.749			

FI2	0.801			
FI3	0.770			
FI4	0.718			
FI5	0.665			
FI6	0.770			
FI7	0.775			
FI8	0.756			
Human Capital		0.865	0.903	0.651
HC1	0.749			
HC2	0.827			
HC3	0.870			
HC4	0.775			
HC5	0.809			
Relational Capital		0.897	0.921	0.661
RC1	0.784			
RC2	0.828			
RC3	0.794			
RC4	0.800			
RC5	0.830			
RC6	0.840			
Structural Capital		0.854	0.895	0.632
SC1	0.759			
SC2	0.730			
SC3	0.857			
SC4	0.851			
SC5	0.768			

4.4. Structural Model

The structural model results show that human, structural, and relational capital each have a direct, significant impact on digital business model innovation (DBMI), with p-values below 0.05, supporting hypotheses H1, H2, and H3. Furthermore, DBMI mediates the indirect and significant impact of human, structural, and relational capital on firm innovativeness and competitive advantage, with p-values under 0.05, thus supporting hypotheses H4 through H9. However, digital business capability (DBC) was found to have a moderating impact on human, structural, and relational capital only in relation to certain outcomes. Hypothesis H10 was accepted, while H11 (β = -0.011, t = 0.240, p = 0.810) and H12 (β = 0.000, t = 0.003, p = 0.998) were rejected due to non-significance.

Table 5: Summary of purposed results for theoretical model

Research Purposed Paths	path coefficient	t-value	p-value	Evidence
H1: HC -> DBMI	0.281	7.294	0.000	Accepted
H2: SC -> DBMI	0.222	3.214	0.001	Accepted
H3: RC -> DBMI	-0.104	2.165	0.031	Accepted
H4: HC -> DBMI -> CA	0.183	6.217	0.000	Accepted
H5: HC -> DBMI -> FI	0.259	7.162	0.000	Accepted
H6: SC -> DBMI -> CA	0.144	3.069	0.002	Accepted
H7: SC -> DBMI -> FI	0.204	3.172	0.002	Accepted
H8: RC -> DBMI -> CA	-0.068	2.110	0.035	Accepted
H9: RC -> DBMI -> FI	-0.096	2.104	0.036	Accepted
H10:HC*DBC -> DBMI	-0.011	0.240	0.810	Not Accepted
H11:SCDBC -> DBMI	0.000	0.003	0.998	Not Accepted
H12:RC*DBC -> DBMI	0.074	2.188	0.029	Accepted

Note: "HC= Human Capital, SC= Structural Capital, RC= Relational Capital, DBMI= Digital Business Model Innovation, DBC= Digital Business Capability, FI= Firm Innovativeness, CA= Competitive Advantage"

5. Discussion and Conclusion

This study examines the influence of human, structural, and relational capital on digital business model innovation, applying resource-based view theory. All hypotheses were supported except H10 and H11, indicating that, depending on factors such as organization size, location, industry, and talent pool, the challenges in human capital may vary. This underscores the importance of prioritizing human capital management to achieve a competitive advantage. The growing adoption of advanced technologies demands new skill sets, potentially imposing challenges on lower-skilled employees and impacting organizational competitiveness if employees are not supported in acquiring necessary skills. Examining how human, structural, and relational capital influence digital business model innovation, workers with current knowledge can bring innovative ideas to meet the demands of new business models (Danneels & Vestal, 2020; Dimitropoulos et al., 2020). Structural capital, encompassing organizational culture and norms, aids employees in generating and sharing innovative ideas. Structural capital includes organizational resources that contribute to creative potential, covering employee perspectives on responsibility and their understanding of organizational values (Hagiu & Wright, 2020). Relational capital's effect on business model innovation, however, is not always positive. The study's findings on relational capital's limited influence on innovation may stem from insufficient activities that build skills and competencies in employees, which are essential for unity and idea generation, aligning with (Rahman et al., 2020). Organizations can cut costs by effectively utilizing resources, offering new products or services, and improving competitiveness. Prior research has indicated that organizational capabilities can facilitate idea transfer among departments and that structural capital helps document the knowledge embedded within human capital, enabling firms to address challenges effectively and enhance their competitive advantage (Danneels & Vestal, 2020; Ryu et al., 2021). Further, long-term partnerships that encourage knowledge sharing internally and externally enhance competitive advantage. Human capital, recognized through certifications or awards, can increase business capabilities and support service innovation. The effect of structural capital on digital business capabilities was positive, as these competencies strengthened the firm's innovativeness and competitive advantage (Calabrò et al., 2021; Trivedi & Srivastava, 2022).

Businesses are now recognizing that, beyond fixed capital and technology, intangible assets like human and structural capital also drive organizational effectiveness. Employees apply various forms of expertise, often through informal structures, to improve organizational performance. The daily operations of businesses sometimes limit their ability to form strategic partnerships due to state-

imposed regulations, constraining opportunities for cooperative relationships to enhance performance. Digital business capability, when examined as a moderating factor in the relationship between human capital and digital business model innovation, did not show a substantial impact. Although human capital, which includes employees' skills, knowledge, and expertise, is crucial for innovation, digital business capabilities as a moderator were less influential than anticipated. Human capital inherently drives innovation, offering strategic and creative inputs for new business models, often irrespective of digital capability levels (Freeman et al., 2021; Jagódka & Snarska, 2021). Core employee skills and creativity remain pivotal in supporting innovation, regardless of digital infrastructure. Other factors, such as organizational culture, leadership, and market conditions, likely impact human capital's effectiveness in promoting innovation. This suggests that firms should prioritize innovation-friendly cultures and talent development rather than relying solely on digital capabilities for innovative outcomes. As a moderator in the relationship between structural capital and digital business model innovation, digital capability appears limited. Structural capital—knowledge, processes, and organizational systems—underpins innovation and adaptation, supported by intellectual property, processes, and technology. Although digital business capability is vital for executing digital strategies, its moderating effect is minimal, indicating that structural capital's inherent quality, such as knowledge management and integrated processes, has a more substantial influence on innovation (Beltramino et al., 2020; Wang et al., 2020).

5.1. Contribution to Practice

This study provides practical insights into achieving competitive advantage and firm innovation. The findings indicate that human capital and digital business model innovation are positively correlated with firm innovation and competitive advantage. This aligns with the resource-based theoretical approach, which justifies the link between firm innovation and both human capital and competitive advantage. The results highlight that employees' educational attainment contributes to the firm's innovation capacity and competitive positioning (Agustian et al., 2023; Wielgos et al., 2021; Zahoor & Gerged, 2021). Furthermore, the study examines corporate innovativeness as a factor in innovation activity. In the context of SMEs in Greece, the analysis, based on a sample of 167 SMEs, identifies major barriers to innovation due to limited digital business model capabilities, particularly impacting SMEs' ability to innovate competitively (Ibarra et al., 2018). Understanding the importance of human capital components enables businesses to strategically invest in personnel, internal procedures, and external relationships to enhance innovation potential. This study underscores the moderating role of digital business competence, showing that companies with strong digital capabilities are better positioned to leverage intellectual assets for competitiveness and innovation. This underlines the need for companies to prioritize developing their digital competencies alongside traditional financial investments. By integrating these insights, practitioners can devise strategies to drive creativity, improve productivity, and sustain competitive advantage in today's digital business landscape.

5.2. Research Limitations

As with all research, this study has certain limitations that present opportunities for further exploration. First, the sample size is relatively small, focusing solely on senior managers within Greek SMEs, with limited representation from larger firms or other countries. Expanding the scope could provide additional insights. Second, the longitudinal approach, while useful for capturing changes over time, may have encountered challenges due to shifting business environments, which could affect survey results. Third, since SMEs often lack reliable records for measuring business capabilities, the study relies on a single data source—the managerial level—without including additional representative variables. Fourth, the study is limited to industrial sector businesses, excluding those in the primary, commercial, and service sectors. Despite these contributions, there remain areas for deeper investigation. Comparative studies across developing nations would be valuable in helping governments strengthen business capacities and models. Given the theoretical and practical complexity of this topic, more extensive research is necessary. Future research could expand by incorporating

additional variables to further examine human, relational, and structural capital's impact on competitive advantage and innovation within firms.

5.3. Suggestions for Future Research

The study findings indicate that senior managers' understanding of systems and business models will improve when human, relational, and structural capital are fully leveraged, leading to greater firm innovation and competitive advantage. Thus, to strengthen a company's competitive positioning and overall innovation, managers should receive training on digital business models. Additionally, owners should encourage managers to deepen their understanding of digital business capabilities, as behavioral beliefs significantly influence the firm's innovation potential and competitive advantage. Comparative studies between SMEs and larger enterprises could shed light on how organizational size and resource availability affect human capital and digital business capabilities in driving innovation. Future research could also explore external influences such as market volatility, regulatory conditions, and digital trends. Examining other mediators and moderators, such as leadership styles, organizational culture, and customer readiness, would provide a more comprehensive understanding of how firms can enhance competitive advantage and innovation. By exploring other dimensions based on this model and analysis, future studies could further develop the proposed framework. Additionally, interviewing key participants, such as managers and staff, could reveal insights into patterns in perspectives and ideas, enhancing our understanding of this subject.

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