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# Exploring global dynamic managerial capabilities and firm innovativeness in fintech-oriented firms: evidence from Jordan's Industry 4.0 context

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In today's fast-evolving digital economy, managers play a critical role in driving innovation, particularly in the dynamic and high-risk fintech sector. This study investigates how global dynamic managerial capabilities (GDMC), including social capital, human capital, and cognitive skills, affect the innovative performance of fintech firms. Based on 205 valid responses from Jordanian manufacturing companies operating under Industry 4.0 conditions, regression analysis was applied to examine these relationships. The individual components of GDMC did not show a significant impact on innovation when assessed separately. However, when considered together, they had a strong, positive influence on firm innovativeness. These results emphasize the value of an integrated managerial capability profile, particularly in digital business environments. Extending the GDMC framework to the fintech context, this study adds evidence that combined managerial strengths can support innovation and help firms build a competitive edge in tech-driven industries.

## KEYWORDS

digital economy, fintech firm, global dynamic, managerial capabilities, risky innovation

## 1 Introduction

Digital competition has intensified across sectors as data-driven technologies, platform ecosystems, and regulatory change reshape how firms create value. This shift is especially visible in fintech-oriented environments, where innovations in digital payments, open finance APIs, cloud infrastructure, artificial intelligence, and blockchain can alter industry boundaries and accelerate competitive imitation (Gomber et al., 2018; Bresciani et al., 2021; Sharma et al., 2024; Baig et al., 2024). Under these conditions, firms face continuous pressure to innovate while managing the tension between exploiting existing capabilities and pursuing new opportunities (Yang et al., 2023; Vetter et al., 2023; Nazuri et al., 2025).

Prior research recognizes that managerial action matters for strategic renewal, yet two gaps remain important for innovation research in fast-moving digital contexts. First, the literature often treats managerial resources (experience, networks, cognition) as separate drivers, even though innovation in regulated, ecosystem-based settings typically require coordinated bundles of knowledge, relationships, and information processing (Murinde et al., 2022; Teece, 2016; Zarifis, 2024). Second, evidence remains limited on the microfoundations through which managers,

particularly middle managers operating close to implementation, translate individual capabilities into firm-level innovativeness in fintech-oriented settings (Kupiek, 2021; Cristofaro et al., 2022; Anim-Yeboah et al., 2020). This limitation matters because digital opportunities and constraints are interpreted and acted upon by managers who must coordinate across functions, partners, and compliance requirements.

This study addresses these gaps through the lens of Global Dynamic Managerial Capabilities (GDMC), which captures the human capital, social capital, and cognitive capabilities that enable managers to sense opportunities, mobilize resources, and guide innovation under uncertainty (Heubeck and Meckl, 2022; Heubeck, 2023; Helfat and Martin, 2015). GDMC is particularly relevant for fintech-oriented environments, where innovation is often shaped by managerial judgment, ecosystem positioning, and decision-making under regulatory constraints (D'Adamo et al., 2022; Popelo et al., 2021). The focus extends beyond top executives by emphasizing middle managers, whose boundary-spanning role in flatter organizations can connect strategy to execution and speed up the internal adoption of digital business model changes (Soni et al., 2022; Zarifis and Cheng, 2022; AlNuaimi et al., 2022).

The empirical context is Jordan, where fintech-related innovation is developing alongside Industry 4.0 adoption and institutional initiatives that support digital finance experimentation (Shqair and Altarazi, 2022; Dhiaf et al., 2024). The Central Bank of Jordan launched the Jordan Fintech Center (Jo-Fintech) and a regulatory sandbox (JoRegBox) to strengthen a national ecosystem for financial technology and innovation. In parallel, national open finance standards and related institutional programs have aimed to support interoperability and speed up innovation diffusion across financial and non-financial firms. These conditions make Jordan analytically useful for examining how managerial capability bundles relate to innovativeness in a digitally emerging and institutionally evolving environment.

Accordingly, this study addresses the following research questions:

- 1 How do the three GDMC dimensions, managerial human capital, managerial social capital, and managerial cognition, relate to firm innovativeness in fintech-oriented firms operating in a fast-changing digital environment?
- 2 Does an integrated GDMC capability bundle (human capital, social capital, and cognition combined) explain firm innovativeness more strongly than any individual capability dimension?

Answering these questions contributes to the literature in three ways. First, it strengthens microfoundations research by examining how managerial capability dimensions operate separately and as a coordinated bundle. Second, it extends GDMC work to fintech-oriented settings where innovation is influenced by ecosystem coordination and regulatory complexity. Third, it offers context-sensitive insight from Jordan as a digitally emerging market, supporting both researchers and practitioners seeking to develop managerial capability profiles associated with improved innovation outcomes under Industry 4.0 conditions.

## 2 Literature review

This section provides a literature review that strengthens the manuscript's theoretical grounding and responds to recent debates in

innovation and digital strategy research. The section is organized into two parts. Section 2.1 synthesizes innovation scholarship most relevant to fintech-oriented environments, including capability-based and network-based perspectives. Section 2.2 then develops GDMC as a microfoundational framework rooted in dynamic managerial capabilities research, clarifying its origins, applications, and relevance. The research gap and positioning are restated in Section 2.3.

### 2.1 Innovation in fintech-oriented and Industry 4.0 environments

Innovation is commonly treated as a central mechanism through which firms renew their competitive position under technological change. In measurement-oriented innovation research, innovation is frequently defined as the implementation of a new or significantly improved offering or process, emphasizing observable change rather than intentions alone (Bresciani et al., 2021; Corradini, 2020). Many empirical studies also distinguish dimensions of innovativeness (e.g., product, process, organizational), because different innovation types can rely on different knowledge bases, resources, and coordination demands (Bresciani et al., 2021; Ghosh et al., 2022). This multidimensional view is particularly relevant in digitally intensive settings where changes can occur at the same time in customer-facing offerings, internal operations, and governance routines.

A first theoretical stream links innovation to a firm's capacity to build, integrate, and reconfigure resources under change. Dynamic capability theory argues that firms operating in volatile environments require more than operational efficiency, they require higher-order capabilities that enable sensing opportunities, seizing them, and reconfiguring assets as technologies and markets evolve (Teece, 2016). The logic connects closely to innovation outcomes because successful innovation often requires reallocation of attention, resource recombination, and experimentation under uncertainty (Yang et al., 2023; Vetter et al., 2023). A second stream emphasizes external knowledge and learning. Absorptive capacity research explains how firms identify, assimilate, and exploit external knowledge, which is central when innovations depend on technology spillovers, partner learning, or platform complementors (Cohen and Levinthal, 1990). A third stream focuses on organizational ambidexterity, highlighting the tension between exploration (novel search) and exploitation (refinement and efficiency) as a recurring innovation challenge in technology-driven sectors (March, 1991). Empirical work shows that managing exploratory and exploitative innovation at the same time often requires internal coordination and structural or leadership mechanisms that reconcile competing demands.

A parallel innovation tradition stresses networks, ecosystems, and inter-organizational collaboration. Innovation is often embedded in relationships across suppliers, customers, regulators, and knowledge communities, which makes social exchange and network position strategically important (Nahapiet and Ghoshal, 2009; Cappiello et al., 2020). In fintech-oriented contexts, this network logic becomes even more salient because many innovations depend on interoperability, trusted data exchange, and coordinated adoption across multiple actors (Gomber et al., 2018; Sharma et al., 2024). Fintech innovation has also been described as involving multiple "innovation objects," such as new business models, products and services, organizational arrangements, and processes or systems, reflecting the breadth of

change that digital finance can trigger (Puschmann, 2017). These fintech-oriented changes may occur inside dedicated fintech firms, inside incumbent financial institutions, or within non-financial firms that embed fintech tools (e.g., payments, financing solutions, supply-chain finance) into their operations (Soni et al., 2022; Dhiyf et al., 2024).

Industry 4.0 intensifies these innovation pressures through smart, connected systems that integrate physical operations and digital intelligence. Technologies such as IoT, AI, and cloud platforms can shorten innovation cycles and increase the coordination load required to implement new solutions at scale (Ghosh et al., 2022; Pattij et al., 2022). These shifts also reshape managerial work, because managers must interpret complex signals, coordinate internal adoption, and engage with external partners and institutional requirements that influence innovation feasibility (Kupiek, 2021; Anim-Yeboah et al., 2020). Fintech-oriented innovation further increases complexity when regulatory frameworks and compliance requirements interact with experimentation and product rollout (Murinde et al., 2022; Sharma et al., 2024). In such settings, innovation becomes a managerial capability challenge as much as a technological challenge (Wira et al., 2023; Masoud, 2013).

## 2.2 Global dynamic managerial capabilities

As markets become more volatile and technology evolves at breakneck speed, the spotlight has turned to the people behind the strategy: managers. The idea of Global Dynamic Managerial Capabilities (GDMC) offers a powerful way to understand how individual managers can help companies adapt, respond, and thrive in uncertainty (Heubeck and Meckl, 2022; Tasheva and Nielsen, 2022).

Dynamic managerial capabilities research provides a microfoundational explanation for strategic change and innovation by focusing on what managers can do to create, extend, or modify how an organization functions and competes (Helfat and Martin, 2015). This perspective complements dynamic capability theory by explaining how sensing, seizing, and reconfiguring activities are shaped by managerial resources and cognition (Teece, 2016). Within this broader stream, GDMC emphasizes the managerial capabilities needed in environments characterized by international exposure, cross-boundary information flows, and rapidly changing digital ecosystems (Tasheva and Nielsen, 2022). Prior work has applied this logic to international strategy and superior performance, arguing that globally oriented managerial resources can support adaptation under uncertainty (Tasheva and Nielsen, 2022). More recent research has examined dynamic managerial capabilities in digital firms' innovativeness, highlighting how integrated managerial capability portfolios can shape innovation outcomes in digital contexts (Heubeck and Meckl, 2022; Heubeck, 2023).

Consistent with this literature, GDMC is typically conceptualized as a configuration of three capability dimensions, managerial human capital, managerial social capital, and managerial cognition (Helfat and Martin, 2015; Heubeck and Meckl, 2022). These dimensions are not fixed traits, they can be developed through learning, experience, and exposure to complex environments (Heubeck, 2023; Ghosh et al., 2022). The conceptual argument is especially relevant for fintech-oriented innovation because many innovations require managers to mobilize domain knowledge (human capital), coordinate inside and outside

networks (social capital), and interpret ambiguity while making timely decisions (cognition) (Cristofaro et al., 2022; Toldbod and Dumay, 2023).

### 2.2.1 Managerial human capital

Managerial human capital refers to the cumulative knowledge, skills, and professional experience managers bring to their roles. These capabilities can stem from formal education, leadership training, or years of hands-on experience addressing business challenges (Hatch and Dyer, 2004; Ployhart et al., 2011). In fintech-oriented environments, managerial human capital matters because innovation initiatives often require technical literacy, opportunity recognition, and the ability to coordinate cross-functional implementation under time pressure (Subramaniam and Youndt, 2005; Teece, 2016).

Two facets receive repeated attention, entrepreneurial thinking and leadership ability. Entrepreneurial thinking supports opportunity recognition and experimentation, while leadership aligns teams around innovation priorities and translates ideas into execution (Teece, 2016). Accordingly, Hypothesis 1 proposes that managerial human capital has a positive relationship with firm innovativeness (H1).

### 2.2.2 Managerial social capital

Managerial social capital encompasses the networks, relationships, and trust managers build within and outside the organization. These relationships serve as pathways for sharing information, gaining support, and securing resources, important mechanisms in innovation settings that depend on partner knowledge, ecosystem coordination, or stakeholder legitimacy (Cappiello et al., 2020). Social capital is often discussed through structural, relational, and cognitive dimensions that shape access to knowledge, strength of ties, and shared understandings (Nahapiet and Ghoshal, 2009). Managers who build rich internal and external networks may detect early signals of change and reduce implementation barriers by aligning stakeholders behind new initiatives (Sarwar et al., 2021; Zunairoh and Wijaya, 2024). Based on these arguments, Hypothesis 2 proposes that managerial social capital positively influences firm innovativeness (H2).

### 2.2.3 Managerial cognition

Managerial cognition refers to how managers perceive, interpret, and act upon complex information (Harvey, 2022). It includes both mental processes (attention, pattern recognition, memory) and cognitive structures that guide strategic judgment (Helfat and Martin, 2015). In fintech-oriented and Industry 4.0 contexts, information is abundant but noisy, and managers must filter signals, evaluate risks, and decide under ambiguity (Mainali and Weber, 2025). Cognitively agile managers may switch between fast pattern recognition and more reflective analysis depending on novelty and risk, which can influence innovation timing and quality (Cristofaro et al., 2022). This capability is expected to support responsiveness and innovation under uncertainty, leading to Hypothesis 3: managerial cognition is positively associated with firm innovativeness (H3).

## 2.3 Research gap, context positioning, and linkage to hypotheses

Despite broad agreement that managerial capabilities matter for innovation, existing research remains limited in two ways that

motivate this study. First, many studies examine managerial capability dimensions independently, while fintech-oriented innovation often requires coordinated configurations of expertise, networks, and cognition to coordinate experimentation, compliance, partner engagement, and implementation (Heubeck and Meckl, 2022; Murinde et al., 2022). Second, empirical evidence from digitally emerging markets remains comparatively scarce, even though institutional initiatives, regulatory experimentation, and ecosystem maturity can shape innovation constraints and opportunities.

Jordan provides a timely setting because national institutions have invested in fintech ecosystem development and experimentation infrastructure, which can speed up innovation diffusion while increasing coordination demands for managers. The Central Bank of Jordan has launched Jo-Fintech and a regulatory sandbox (JoRegBox) to support an innovative environment within the financial and banking sector. In addition, the rollout of open finance standards and related initiatives can shape interoperability and knowledge flows across firms and partners.

Building on these arguments, this study examines whether each GDMC dimension relates to innovativeness (H1–H3) and whether the integrated GDMC configuration provides stronger explanatory power than any single dimension (H4).

### 3 Establishing a connection between GDMC and the innovativeness of fintech firms

In the age of digital transformation, innovation has become both a necessity and a challenge—especially for fintech firms navigating rapid technological shifts and regulatory pressures. At the heart of this innovation process lies the manager: the individual responsible for making sense of uncertainty, connecting resources, and driving change. This section explores how Global Dynamic Managerial Capabilities (GDMC) contribute to firm-level innovation by combining two powerful ideas from the literature: the GDMC framework and the network view of innovation (Tasheva and Nielsen, 2022).

The GDMC framework focuses on three personal capabilities that managers use to respond effectively to dynamic environments: human capital (their experience, skills, and leadership), social capital

(their networks and relationships), and cognition (how they think and make decisions) (Harvey, 2022). Research has shown that these capabilities allow managers to adapt, make strategic choices, and steer their firms toward innovation and resilience (Helfat and Martin, 2015; Heubeck and Meckl, 2022; Teece, 2016; Cristofaro et al., 2022).

At the same time, the network-based view of innovation reminds us that innovation rarely happens in isolation. It grows out of collaboration—between teams, departments, firms, and even industries. Managers who are well-connected and trusted across networks are more likely to access diverse knowledge, stimulate creative thinking, and bring innovative ideas to life (Sarwar et al., 2021; AlNuaimi et al., 2022; Ghosh et al., 2022).

Bringing these perspectives together, we argue that fintech firms—particularly those in emerging economies like Jordan—rely heavily on the personal strengths of their managers to succeed in today's innovation-driven economy. Figure 1 illustrates the conceptual model guiding our research, which explores how each GDMC component contributes to innovativeness, both individually and in combination.

*Hypothesis 1 (H1):* Managers with higher levels of human capital contribute positively to innovation in fintech firms.

Human capital includes a manager's formal education, industry experience, leadership style, and problem-solving ability. These qualities equip managers to recognize new opportunities and implement innovative strategies more effectively (Teece, 2016; Heubeck, 2023; Xu and Li, 2023). In rapidly changing sectors like fintech, managers with strong professional backgrounds often lead more agile, forward-thinking organizations (Zarifis, 2024).

*Hypothesis 2 (H2):* Managers with strong social capital are more likely to support innovative activities within fintech firms.

Social capital refers to the strength and diversity of a manager's professional relationships, both inside the firm and across industry boundaries. These networks provide access to ideas, partnerships, and resources that can support innovation (Sarwar et al., 2021; Zunairoh and Wijaya, 2024). Managers who collaborate across teams and organizations often create conditions where new ideas can take shape and be implemented (AlNuaimi et al., 2022; Shen et al., 2022).

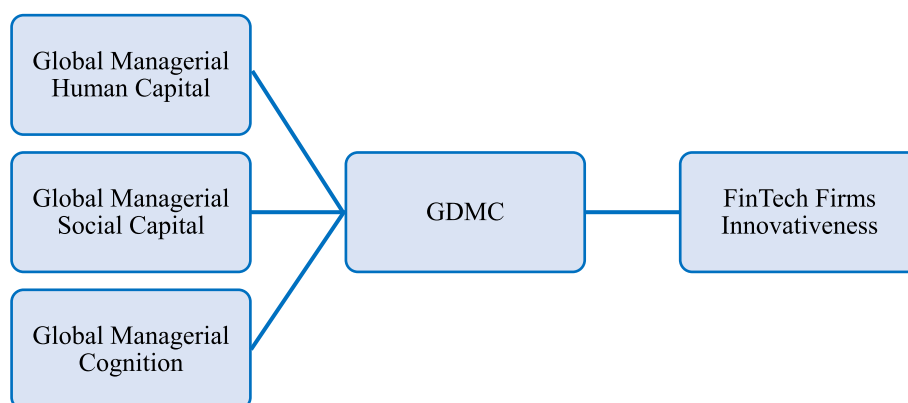


FIGURE 1  
Conceptual framework.

*Hypothesis 3 (H3):* Managers with high cognitive ability are more effective at driving innovation in fintech firms.

Cognitive capabilities shape how managers interpret complex situations, handle ambiguity, and make strategic decisions. In uncertain, high-pressure contexts, such as the fintech industry, managers with strong analytical skills and flexible thinking are better positioned to identify innovation opportunities and respond creatively (Cristofaro et al., 2022; Toldbod and Dumay, 2023; D'Adamo et al., 2022).

Consequently, the following hypothesis is put up for consideration:

*Hypothesis 4 (H4):* The combined effect of human capital, social capital, and cognition—taken together as GDMC—has a stronger influence on innovation than any individual component alone.

While each capability supports innovation on its own, research suggests that it's the synergy between these traits that truly empowers managers to lead innovation successfully (Heubeck and Meckl, 2022; Fellenstein and Umaganthan, 2019). Managers who can draw on all three strengths—knowledge, relationships, and strategic thinking—are more capable of driving complex, coordinated innovation initiatives (Bresciani et al., 2021; Ghosh et al., 2022).

## 4 Methodology

### 4.1 Research design and approach

This study adopted a quantitative, deductive research design to examine the relationship between Global Dynamic Managerial Capabilities (GDMC) and fintech firm innovativeness. A structured questionnaire was developed based on validated constructs in the strategic management and innovation literature (Heubeck and Meckl, 2022; Helfat and Martin, 2015). The focus was on fintech-related manufacturing firms in Jordan, where Industry 4.0 adoption is accelerating (Shqair and Altarazi, 2022).

### 4.2 Sampling and data collection

A purposive sampling approach was used to reach 2,920 managers across Jordanian fintech-affiliated firms, selected from national industry directories and fintech registries. Data collection occurred via email invitations and follow-up reminders over a two-month period. A total of 205 valid responses were obtained, representing a 7.02% response rate—acceptable for managerial surveys in specialized sectors (Baruch and Holtom, 2008; Pattij et al., 2022).

Participation was voluntary and anonymous. Ethical procedures were followed, and informed consent was obtained in accordance with academic research standards.

### 4.3 Instrument and measurement

The survey instrument included multi-item Likert-scale measures (1 = strongly disagree to 5 = strongly agree) to capture the three GDMC components. Item wording was adapted to the fintech-oriented and Industry 4.0 setting while keeping conceptual alignment

with established dynamic managerial capability and innovation scholarship.

- Human Capital (adapted from Xu and Li, 2023; Teece, 2016). The items capture managers' perceived depth of relevant expertise, leadership preparedness for innovation initiatives, and ability to mobilize knowledge in fast-changing digital work settings.
- Social Capital (Sarwar et al., 2021; AlNuaimi et al., 2022). The items capture the breadth and usefulness of managerial networks for accessing information, building collaboration across units and partners, and securing support for innovation implementation.
- Cognition (Cristofaro et al., 2022; Toldbod and Dumay, 2023). In line with the managerial cognition emphasis in dynamic managerial capabilities research (Helfat and Martin, 2015), the cognition items focus on managers' perceived ability to interpret complex information, recognize patterns in uncertain environments, evaluate trade-offs, and adjust thinking when conditions change. This operationalization reflects the role of cognition in sensing and seizing opportunities under uncertainty.

The dependent variable, firm innovativeness, was assessed through items reflecting product, process, and organizational innovation (Bresciani et al., 2021; Ghosh et al., 2022). This approach aligns with the view that innovation in digital environments can involve simultaneous change in offerings, internal processes, and organizational routines, rather than product development alone. Self-reported measurement is common in managerial capability research because many relevant constructs (e.g., cognition, perceived network usefulness, capability deployment) are not directly observable through archival data. This study therefore used several procedural steps to strengthen validity and reduce bias: participation was voluntary and anonymous; respondents were informed there were no right or wrong answers; scale anchors and item wording were standardized for clarity; and the full instrument was reviewed by academic and industry experts to confirm content relevance and comprehension. These procedures are consistent with recommended practices for reducing method-related inflation in survey-based research (see Table 1).

### 4.4 Data analysis

The data were analyzed using multiple linear regression to test the direct effects of the GDMC dimensions and the integrated GDMC construct on firm innovativeness. The analysis was conducted in SPSS, and key assumptions, linearity, multicollinearity, normality, and homoscedasticity, were assessed and met (Field, 2024).

All hypotheses were evaluated at a 95% confidence level ( $p < 0.05$ ). Diagnostics such as VIF scores and correlation matrices were used to confirm statistical robustness.

### 4.5 Summary

This methodology provides a systematic approach for examining how managers' dynamic capabilities relate to innovation in fintech-related firms within an Industry 4.0 environment. It also supports reliability, validity, and transparency in measurement and analysis (see Tables 2, 3).

TABLE 1 Descriptive statistics of key variables.

	Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1	Firms' innovativeness	8.205	8,044	1										
2	MHC	0.128	0.610	0.141	1									
3	MSC	0.023	0.685	0.321**	0.093	1								
4	MC	0.037	0.503	0.261*	0.423*	0.348**	1							
5	Global dynamic managerial capabilities	0.067	0.431	0.338**	0.686***	0.710***	0.773	1						
6	Gender	0.131	0.341	0.308*	-0.186	0.074	-0.048	-0.067	1					
7	Management level	1.882	0.764	0.091	-0.153	-0.126	-0.148	-0.197	0.118	1				
8	Functional background	1.133	0.454	0.011	0.008	-0.214	0.053	-0.089	-0.115	0.304*	1			
9	Firm size	4.18	2,234	0.077	-0.117	-0.002	-0.026	-0.067	0.107	0.561***	0.291*	1		
10	Firm age	43,898	39,024	-0.161	-0.190	-0.225	-0.050	-0.228	-0.068	0.233	0.246*	0.391**	1	
11	Firm performance	7,86	5,085	-0.018	0.004	-0.004	0.004	0.002	-0.016	-0.108	-0.141	0.116	-0.131	1

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

TABLE 2 Regression results predicting innovativeness.

Variables	Model 1 (human capital, social capital, cognition)	Model 2 (GDMC)
Constant	4.002 (3.712)	4.041 (3.605)
Managerial human capital	0.108 (1.725)	—
Managerial social capital	0.240 (1.527)	—
Managerial cognition	0.155 (2.179)	—
Global dynamic managerial capabilities	—	0.364** (2.202)
Gender	0.302* (2.802)	0.315* (2.723)
Management level	0.073 (1.529)	0.114 (1.508)
Functional background	0.117 (2.271)	0.062 (2.174)
Firm size	-0.112 (0.561)	0.030 (0.549)
Firm age	0.019 (0.028)	-0.112 (0.027)
Firm performance	-0.007 (0.191)	-0.011 (0.188)
<b>Model statistics</b>		
R <sup>2</sup>	0.258	0.253
Adjusted R <sup>2</sup>	0.143	0.165*
F-statistic	2.229*	2.883*

Dependent variable: firm innovativeness. Standard errors are reported in parentheses. \*\* $p < 0.05$ , \* $p < 0.01$ .

## 5 Results

This section presents the results of the empirical analysis used to test the four hypotheses. Multiple regression techniques were used to examine the relationship between GDMC, human capital, social capital, and cognition, and the innovativeness of fintech-related firms operating in Jordan's Industry 4.0 setting.

The results are reported in two stages. First, the individual contributions of each GDMC component were tested. Second, the combined impact of GDMC as an aggregated construct was examined.

### 5.1 Regression analysis: individual GDMC components (H1–H3)

In the first model, managerial human capital, social capital, and cognition were entered as independent predictors of firm innovativeness. As shown in Table 4, none of the components had statistically significant individual effects.

- Human capital produced a small, non-significant beta coefficient ( $\beta = 0.041$ ,  $p > 0.05$ ), suggesting that a manager's education, training, or experience alone may not directly translate into

TABLE 3 Summary of hypotheses testing results.

Hypotheses	Statement	Results
H1	Innovation in the financial technology sector is encouraged by managers who have greater levels of human capital.	Not supported
H2	In the fintech industry, managers with higher levels of social capital are more likely to support innovative practices.	Not supported
H3	The innovativeness of fintech companies is increased when they are led by managers who have superior cognitive talents.	Not supported
H4	Companies in the fintech industry are more innovative when led by managers who have more global and dynamic managerial abilities.	Supported

TABLE 4 Regression analysis for combined GDMC predicting innovativeness.

Variable	Standardized ( $\beta$ )	$p$ -value
Managerial human capital	0.041	> 0.05
Managerial social capital	0.072	> 0.05
Managerial cognition	0.078	> 0.05
R <sup>2</sup>	0.276	

TABLE 5 Regression results for combined GDMC construct.

Variable	Standardized ( $\beta$ )	$p$ -value
GDMC (composite)	0.431	< 0.01
R <sup>2</sup>	0.461	

firm-level innovation. This may indicate that traditional metrics of managerial quality do not automatically trigger innovative outcomes in fintech settings, where adaptability and technological fluency are essential.

- Social capital also failed to demonstrate a significant influence ( $\beta = 0.072$ ,  $p > 0.05$ ). Although strong networks and external partnerships are known to support knowledge sharing, this result suggests that social ties without integration into strategic execution may have limited standalone value.
- Managerial cognition had a slightly higher coefficient ( $\beta = 0.078$ ,  $p > 0.05$ ), yet still did not reach significance. While this may reflect the importance of strategic thinking in theory, cognition alone may not be enough in a practical fintech context unless supported by complementary capabilities.
- Collectively, this model explained 27.6% of the variance in innovativeness ( $R^2 = 0.276$ ), indicating a modest level of predictive power.

These findings mean that Hypotheses 1, 2, and 3 are not supported. In other words, none of the three capabilities independently predicts innovation with statistical significance in this sample. This may reflect the complexity of fintech innovation, which often requires not just one managerial strength but a combination of complementary abilities.

## 5.2 Regression analysis: combined GDMC construct (H4)

The second model assessed the effect of the integrated GDMC construct, where the three dimensions, human capital, social capital, and cognition, were aggregated into a single variable representing overall managerial capability. As shown in Table 5, this combined

construct had a statistically significant and positive effect on firm innovativeness.

- The model produced a standardized beta coefficient of  $\beta = 0.431$  ( $p < 0.01$ ), indicating a strong positive association.
- This model also explained 46.1% of the variance in innovativeness ( $R^2 = 0.461$ ), showing a notable improvement in explanatory power over the individual predictors model.
- This result supports Hypothesis 4, indicating that when these capabilities operate together, they relate strongly to firm innovation. This aligns with prior findings (Heubeck and Meckl, 2022), suggesting that managerial effectiveness in dynamic environments depends on combining analytical ability, networks, and knowledge in a coherent approach.

In fintech firms, where digital change, regulatory uncertainty, and customer expectations shift quickly, the combined effect of these managerial qualities appears stronger than each dimension tested in isolation.

In fintech, these findings underline the importance of a comprehensive approach to managerial capability development. Managers in fintech should possess technical and cognitive strengths, while also being able to build meaningful relationships and apply their knowledge within strategic frameworks. Future research may examine how these combined capabilities are developed and how organizational context shapes their outcomes.

## 6 Discussion

This study examined how GDMC, specifically human capital, social capital, and cognition, relate to the innovativeness of fintech

firms operating in an Industry 4.0 context. The results present a measured view of how innovation is shaped by managers' combined strengths and offer theoretical and applied contributions to innovation and digital strategy research.

When each GDMC component was analyzed individually, no statistically significant relationship with firm innovativeness emerged. This outcome challenges the common assumption that managerial education, experience, networks, or strategic thinking, when examined separately, consistently drive innovation. Although prior studies have emphasized these attributes (Teece, 2016; Xu and Li, 2023; Sarwar et al., 2021), the present results indicate that, in fintech settings, these capabilities may need to operate together to produce a meaningful effect.

A different pattern appeared when GDMC was tested as an integrated construct. The combined managerial capability measure showed a statistically significant and positive relationship with innovativeness, supporting Hypothesis 4. This aligns with Heubeck and Meckl (2022), Fellenstein and Umaganthan (2019), who argue that managerial effectiveness in dynamic environments depends on the combined use of analytical ability, networks, and domain experience.

In fintech firms, where digital change, regulatory uncertainty, and customer expectations shift quickly, the combined effect of these managerial qualities appears stronger than any single dimension alone. The results also support the microfoundations perspective in dynamic capabilities theory, which links firm-level outcomes to individual-level behaviors and skills (Helfat and Martin, 2015). The evidence indicates that innovation is less about a single managerial strength and more about the joint application of cognitive, relational, and experiential capabilities.

An important scope implication concerns whether these findings are unique to fintech firms. The evidence indicates that the strongest effect occurs when managerial capabilities operate as a coordinated bundle. This pattern fits innovation in ecosystem-based and regulated settings, where innovation depends on coordinating technical knowledge, partner relationships, and rapid interpretation of uncertain signals. Fintech-oriented innovation often has these characteristics because products and processes depend on interoperability, trust, data governance, and compliance, making isolated managerial strengths less effective when applied alone (Murinde et al., 2022; Gomber et al., 2018; Sharma et al., 2024).

At the same time, the underlying logic is not limited to fintech. Other digitally intensive sectors facing similar coordination demands, such as e-commerce platforms, logistics and supply-chain finance, health technology, and digital content industries, may also require managers to integrate expertise, networks, and cognition to achieve innovation outcomes. This boundary framing supports broader "digital shift" debates by treating GDMC as a microfoundational capability bundle that becomes particularly important when innovation requires cross-functional implementation, external partner alignment, and rapid adaptation under uncertainty (Helfat and Martin, 2015; Teece, 2016; Heubeck and Meckl, 2022).

From a contextual perspective, the study also adds evidence on innovation in emerging economies like Jordan. Much of the managerial capability literature relies on Western economies or large multinational firms, while this study indicates that similar dynamics

can appear in smaller, digitally evolving economies. Jordan's fintech sector is still integrating Industry 4.0 technologies, and the fact that integrated managerial capabilities relate to innovation provides a positive signal for regional digital competitiveness.

The findings also point to the role of middle managers in innovation outcomes. As organizations become flatter and more digitally connected, mid-level leaders increasingly connect operations with strategy execution and innovation leadership (Anim-Yeboah et al., 2020; Zarifs and Cheng, 2022). The results indicate that when middle managers are supported with diverse, dynamic capabilities, they can act as catalysts for organizational change.

The study results yield several practical implications for organizations operating in digitally intensive settings. Rather than focusing development on isolated managerial attributes, firms may benefit from developing a balanced configuration of managerial capabilities. Leadership development initiatives may be more effective when they integrate cognitive adaptability, relational competence, and domain-specific knowledge within a unified training structure, matching the interdependent nature of innovation work in digital settings.

Recruitment and selection practices may also need adjustment. Emphasis may be placed on candidates who combine technical understanding with strategic responsiveness and the ability to collaborate across functional boundaries. In fintech-oriented contexts, where rapid change and coordination complexity are common, an integrated capability profile may offer more value than excellence in any single dimension.

At the organizational level, particularly in digitally emerging markets, internal conditions may be structured to support the integration of managerial capabilities. Cross-functional team arrangements, mentoring structures, and structured knowledge-sharing platforms can create channels through which managerial potential is more reliably translated into product, process, and organizational innovation outcomes.

Several limitations of the study point toward promising directions for future research. The cross-sectional design restricts causal inference, leaving open questions about timing in capability development and innovation. Longitudinal research could clarify whether dynamic managerial capabilities develop before innovation, evolve in response to it, or develop alongside Industry 4.0 pressures.

Contextual scope represents a further limitation. The setting is limited to Jordan and to a fintech-oriented digital environment, where institutional support, ecosystem maturity, and regulatory experimentation may shape innovation paths. Replication across countries and sectors would improve external validity and help specify boundary conditions. Comparative designs could also test whether the bundled effect of dynamic managerial capabilities is stronger in highly regulated industries or whether ecosystem maturity changes the role of social capital in innovation.

Reliance on self-reported survey data introduces potential response bias. Future studies could strengthen measurement by adding objective innovation indicators, such as new product launches, process automation benchmarks, or partnership formation records, alongside multi-source data collection. Such designs could also examine whether product, process, and organizational innovation respond differently to specific managerial capability dimensions.

Finally, the analysis focused on direct relationships, although theory suggests more complex mechanisms. Mediators such as digital strategy coherence, absorptive capacity, or innovation climate, and moderators such as environmental turbulence, regulatory uncertainty, or partnership intensity, may shape how managerial capabilities relate to innovation. Extending the model in these directions could add explanatory clarity while maintaining the microfoundational focus.

Taken together, these findings contribute to a more specific understanding of managerial influence on innovation in complex digital contexts and highlight the strategic value of developing the full configuration of dynamic managerial capabilities.

## Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

## Ethics statement

Ethical approval was not required for the study involving humans in accordance with the local legislation and institutional requirements. Written informed consent to participate in this study was not required from the participants or the participants' legal guardians/next of kin in accordance with the national legislation and the institutional requirements.

## Author contributions

RS: Conceptualization, Methodology, Investigation, Data curation, Formal analysis, Writing – original draft, Writing – review & editing. QB: Resources, Writing – review & editing, Formal analysis, Writing – original draft, Methodology, Data curation, Conceptualization, Investigation. KM: Software, Methodology, Investigation, Funding acquisition, Writing – review & editing, Conceptualization, Writing – original draft, Formal analysis, Resources, Project administration, Data curation. KA: Resources, Visualization, Supervision, Conceptualization, Validation, Data

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