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Exploring entrepreneurial capabilities and firm innovativeness to leverage financial technology start-up business performance

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ABSTRACT

Objective: This article examines the role of entrepreneurial capabilities and firm innovativeness in driving the business performance of financial technology (fintech) start-ups. By cultivating entrepreneurial orientation, innovation capacity, and knowledge creation, firms can enhance their competitive edge, adapt to market shifts, and achieve sustainable performance.

Research Design & Methods: We conducted a quantitative study using a self-administered questionnaire and partial least squares structural equation modelling (PLS-SEM) to test our hypotheses. The sample included the management teams of 144 Indonesian fintech start-ups, each in operation for at least three years.

Findings: Our analysis reveals that both entrepreneurial capabilities and firm innovativeness significantly and positively impact the business performance of fintech start-ups. Furthermore, firm innovativeness mediates the relationship between entrepreneurial capabilities and business performance. Specifically, entrepreneurial capabilities and firm innovativeness collectively explain 58.3% of the variance in business performance, while entrepreneurial capabilities account for 48% of the variation in firm innovativeness.

Implications & Recommendations: This study demonstrates that firms with robust entrepreneurial capabilities are better equipped to identify and seize opportunities, leading to higher innovation and, consequently, stronger business performance. These findings suggest that fintech firms can enhance performance through increased market share, greater profitability from new products, and more efficient operations. We recommend that managers and entrepreneurs in the fintech sector use these insights to make informed decisions regarding resource allocation, strategic planning, and organisational design. Policymakers can also leverage these insights to develop programs that promote entrepreneurial capabilities and innovation, foster economic growth and boost competitiveness within the sector.

Contribution & Value Added: Our study adds valuable insights to the dynamic and competitive fintech sector by demonstrating that cultivating entrepreneurial capabilities and fostering innovation within fintech firms can significantly enhance their performance outcomes. This research provides actionable guidance for both industry practitioners and policymakers seeking to drive growth and competitiveness in the fintech ecosystem.

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INTRODUCTION

The evolution of the financial sector, combined with advancements in information technology, drives innovations in financial technology. The integration of electronic finance, internet technologies, social networking services, social media platforms, artificial intelligence, and Big Data analytics has led to

significant transformative advancements in the fintech sector (Creamer, 2022). Financial technology, recognised as a key innovation within the financial sector, is experiencing rapid growth driven by factors such as the rise of the sharing economy, evolving regulatory frameworks, and continuous technological progress. This growth demonstrates its increasing importance and transformative impact on the industry (Ma, 2022). Like banks, fintech companies focus their business models on payment and lending services. In addition to the traditional financial industry, startups see this as a chance to enter the financial services sector. These financial services innovations include personal financial advisory services, crowdfunding platforms, virtual currencies, InsurTech (insurance technology), RegTech (regulatory technology), Big Data analytics, and cybersecurity measures. These advancements have shaped and redefined the landscape of modern financial services (Palmié *et al.*, 2020). However, fintech firms differ from traditional financial or technology firms because they operate under unique environmental conditions, particularly rapid technological disruption, evolving regulatory frameworks, and heightened customer expectations for security and transparency.

The growth of financial technology startups involves generating value through the strategic use of unique resources to identify and seize business opportunities (Silva *et al.*, 2021). This is consistent with the views that entrepreneurial values with an innovativeness will create new markets using novel methods (Buccieri *et al.*, 2020). This creative destruction theory describes the dynamics of business in the field of technology, which operates very dynamically and is one type of innovation (Hor *et al.*, 2021). The process of innovating and actively seizing this opportunity necessitates an entrepreneurial event and an entrepreneurial agent. The entrepreneurial event is concerned with the entrepreneurial capabilities, conceptualisation, and implementation of a new company in the field of innovation.

While previous research has established that entrepreneurial capabilities foster innovation and improve firm performance, this study extends the theory by examining these dynamics within the unique context of fintech. Fintech firms operate in an environment characterised by heightened regulatory oversight, digital financial risk, and continuous technology adoption cycles. These contextual pressures are not merely background factors but actively shape how entrepreneurial capabilities are deployed and how innovation is operationalised. In particular, we posit that in the fintech sector, innovation serves not only as a means of market differentiation but also as a mechanism for regulatory compliance, data-driven trust building, and platform scalability. Therefore, we argue that the mechanisms and strength of the relationships between entrepreneurial capability, innovation, and performance are distinct in this setting.

Entrepreneurial capabilities and firm innovativeness play a crucial role in determining business performance. Studies have consistently demonstrated that entrepreneurial abilities, a firm's innovative capacity, and its potential to innovate have a positive effect on business performance (Ferreira *et al.*, 2020). Entrepreneurial capability, characterised by proactivity, creativity, willingness to take risks, aggressiveness in the marketplace, and independence, facilitates the pursuit of opportunities and leads to improved business performance (Mostafiz *et al.*, 2021). Furthermore, the ability to innovate has been linked to increased efficiency, productivity, profits, market share, and sales growth, all of which contribute to enhanced business performance (Ali *et al.*, 2022; Phong & Tam, 2024). While these relationships are well-established, our study highlights how their operation within fintech firms, where regulatory and technological demands are tightly intertwined, necessitates an extension of traditional entrepreneurial and innovation theories.

Moreover, entrepreneurial capabilities, such as entrepreneurial attitude, learning capacity, and individual resources, are essential for driving business growth and success (Wulandari, 2021). These capabilities allow firms to effectively recognise, pursue, and manage business opportunities, even in highly competitive and challenging environments (Adinata *et al.*, 2023). Moreover, research has highlighted the mediating role of entrepreneurial self-efficacy and innovation competence in strengthening the connections between supply chain integration, value creation, and organisational performance (Ali *et al.*, 2022). The literature considers innovation capability a key driver of a firm's efficiency and productivity, which ultimately enhances business performance (Ali *et al.*, 2022). Furthermore, studies have underscored the critical need to align entrepreneurial orientation with innovation capacity to

achieve success, particularly in creative sectors, where a strong link between entrepreneurial management and creative capabilities is vital for performance (Prijadi *et al.*, 2024).

Overall, the literature underscores the significance of entrepreneurial capabilities and firm innovativeness in driving business performance. Earlier research spans various industries and contexts, consistently highlighting the significance of entrepreneurial abilities, innovation potential, and dynamic capabilities in improving organisational performance. The studies highlight that entrepreneurial alertness, innovativeness, and proactive behaviours are instrumental in driving organisational success (Abbas *et al.*, 2023; Mbore, 2021). As the sector expands, fintech firms face increasing competition, regulatory challenges, and ever-evolving technological landscapes. The literature demonstrates customer satisfaction, profitability, and sustainability as highlights of the beneficial effect of innovation on essential performance metrics in previous studies (Fegada & Veres, 2024; Maina *et al.*, 2023; Garousi Mokhtarzadedeh *et al.*, 2022). Entrepreneurial capabilities enable organisations to recognise and capitalise on opportunities, while innovation allows them to adapt, distinguish themselves, and generate value that aligns with customer needs. Our study emphasises that these two factors are not just important in isolation, but that their intersection is critical to achieving sustained business success in the fintech industry.

This study contributes to both academic research and practical applications. It extends existing entrepreneurship and innovation frameworks by contextualising them within the fintech industry. We argue that the simultaneous demands for technological advancement, customer-centric innovation, and regulatory compliance require firms to deploy entrepreneurial capabilities in more complex and dynamic ways than in traditional sectors. In doing so, our study reveals how fintech firms create value under multi-dimensional uncertainty – an area underexplored in prior research. Practically, our findings offer guidance to fintech managers and policymakers on how to design organisational strategies that align entrepreneurial capability and innovation to achieve sustainable performance. These insights can inform decisions related to resource investment, regulatory readiness, and capability development in an increasingly competitive digital finance environment.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

From a resource-based view (RBV), entrepreneurial capabilities are considered valuable intangible assets that play a critical role in enhancing firm performance and securing a competitive edge (Ingram & Kraśnicka, 2023). These capabilities reflect a firm's ability to deploy internal resources through innovation and agility in response to external challenges (Niyawanont, 2023). Entrepreneurial competencies, such as networking skills, market orientation, and a proclivity for risk-taking, are viewed as essential for a firm's survival and growth in a dynamic market environment (Mostafiz *et al.,* 2021). These competencies are often described using different terminologies – such as entrepreneurial competencies (Pennetta *et al.*, 2024), entrepreneurial orientation (Pulka *et al.*, 2021; Khan *et al.*, 2021), or even dynamic capabilities – yet they share a common emphasis on innovation, proactiveness, and risk-taking as foundational elements.

Entrepreneurial orientation (EO), in particular, is a strategic posture focused on identifying and exploiting opportunities ahead of competitors (Wales *et al.*, 2023). It is a psychological and behavioural disposition reflecting senior management's readiness to pursue ventures despite uncertainty (Makhloufi *et al.*, 2021). EO is known to shape learning behaviours, decision-making speed, and strategic flexibility, thereby influencing firm-level innovation and long-term performance (Simpson & Sariol, 2022). Consequently, scholars widely regard entrepreneurial capabilities – encompassing EO and entrepreneurial competencies – as a firm's ability to leverage internal resources to generate innovation-driven performance outcomes.

While these relationships are well-established across industries, existing research has not sufficiently addressed how entrepreneurial capabilities operate in fintech, a sector characterised by its high regulatory intensity, rapid technological evolution, and platform-based customer interactions. Prior literature has largely approached the entrepreneurial–innovation–performance nexus in generalised terms, overlooking how fintech firms must develop distinct capabilities to navigate their context. For example, in fintech, EO may not only involve being proactive in market entry but also in anticipating regulatory

changes or integrating compliance-by-design into service innovation. Similarly, digital trust – users' perception of security, transparency, and reliability – becomes a crucial capability for fintech firms, shaping user acquisition and retention, yet this is rarely incorporated into capability-performance frameworks.

Moreover, fintech firms often operate in ecosystems involving APIs, open banking standards, and cross-platform integrations, demanding customer interface adaptability and data-driven service personalisation. These conditions suggest that the traditional resource-based assumptions may be insufficient or incomplete for capturing the full scope of entrepreneurial success in fintech. Hence, the performance implications of entrepreneurial capabilities are likely mediated or moderated by fintech-specific dimensions such as regulatory agility, digital trust, and platform adaptability – factors which remain underexplored in the extant literature.

We sought to extend the existing theory by analysing how entrepreneurial capabilities – operationalised as innovativeness, proactiveness, and risk-taking – interact with these fintech-specific contextual factors to shape firm performance. By positioning the research within the fintech sector, this study responds to calls for greater contextualisation in entrepreneurship research and addresses a critical gap: the need to adapt and refine capability-based theories for digital-native, regulation-intensive, and customer-centric business models. Our contribution lies not only in confirming established constructs but in uncovering how they function differently in fintech, thereby advancing both theory and practice.

Relationship of Entrepreneurial Capabilities and Business Performance of a Fintech Startup Company

Entrepreneurial capabilities are critical in improving organisational processes and supporting business performance (Fan *et al.*, 2021). Numerous studies offer valuable insights into the positive effect of entrepreneurial orientation, particularly proactiveness and innovativeness, on business performance. Entrepreneurial capabilities have become a central focus in entrepreneurship research, with an expanding body of literature highlighting their critical role in shaping business outcomes (Kimjeon & Davidsson, 2022). The components of entrepreneurial capabilities, such as proactiveness and innovativeness, have been identified as key factors in driving improved business performance (Mostafiz *et al.*, 2021). Entrepreneurs who exhibit proactivity and innovation are more inclined to pursue entrepreneurial endeavours and attain superior levels of business performance (Putniņš & Sauka, 2020).

Studies suggest that entrepreneurial capabilities enhance business performance through multiple mechanisms. For example, research has shown that entrepreneurial capabilities contribute to the improved performance of small and medium-sized enterprises (SMEs) in developing countries, highlighting their positive effect on business success (Fan *et al.*, 2021). Our research also emphasises that proactivity and innovation, key elements of corporate entrepreneurship, have a positive impact on business performance (Jiménez-Barrionuevo *et al.*, 2019). Moreover, various dimensions of entrepreneurial orientation, including innovativeness, proactiveness, risk-taking, autonomy, and competitive aggressiveness, have been demonstrated to significantly enhance business model innovation and performance (Al-Mamary & Alshallaqi, 2022).

Moreover, the link between entrepreneurial capabilities and business performance has been explored across different sectors, including the hospitality industry, where these capabilities are considered a strategic asset for improving performance (Abu-Rumman *et al.*, 2021). Xiao *et al.* (2021) highlight the significance of entrepreneurial behaviours, such as proactivity, creativity, and innovative work practices, in enhancing business performance. Furthermore, scholars have examined the effect of entrepreneurial capabilities on business performance across various industries, including tourism, underscoring the substantial role these capabilities play in driving business success (Dias *et al.*, 2021).

In conclusion, literature underscores the positive impact of entrepreneurial capabilities, particularly proactiveness and innovativeness, on business performance. Entrepreneurs displaying proactive and innovative traits are more inclined to reach greater business success. By comprehending and nurturing entrepreneurial orientation, businesses across diverse sectors and organisational settings can enhance their performance outcomes. These findings collectively contribute to understanding how entrepreneurial capabilities influence business performance in various contexts and industries. Hence, we hypothesised:

H1: Entrepreneurial capability has a positive impact on the business performance of a fintech start-up company.

Relationship of Firm Innovativeness and Business Performance of a Fintech Startup Company

Comprehending the impact of different dimensions of innovation, such as product, process, marketing, and organisational innovation, on firm performance is essential for organisations aiming to enhance their competitive edge and overall success. Several studies provide meaningful insights into the link between firm innovativeness and business performance. The ability to innovate, whether through processes or market innovations, plays a crucial role in a firm's competitiveness and overall performance outcomes (Bibi *et al.*, 2020). The effect of business model innovation on firm performance is complex and shaped by elements like industry trends, competitive positioning, and strategic alignment (Hurtado-Palomino *et al.*, 2022). Moreover, organisational innovativeness has a positive influence on firm performance, with an innovative organisational culture acting as a moderating factor in this dynamic (Strychalska-Rudzewicz & Rudzewicz, 2021).

Groza *et al.* (2021) and Aslam *et al.* (2022) have highlighted the beneficial effect of organisational innovation on firm performance, emphasising the role of product, process, marketing, and organisational innovation in achieving business success. Moreover, Hoang and Ngoc (2019) examined the link between innovation capability and firm performance, uncovering a positive relationship between a company's performance and its innovation capabilities. Furthermore, investigations into the dimensions of innovation and business performance under conditions of environmental uncertainty have revealed diverse impacts of firm innovativeness on performance, stressing the importance of contextual factors (Kafetzopoulos *et al.*, 2019).

The existing literature also highlights that business model innovation can have a profound effect on firm performance, with several studies showing a positive link between business model innovation and overall performance (Xue *et al.*, 2019). Dong (2023) identified transformational leadership as a key factor in fostering innovation performance, thereby contributing to firm success. Furthermore, scholars explored the influence of external relationships on organisational innovation and performance, emphasising the role of partnerships and collaborations in driving innovation within firms (Ferreira *et al.*, 2020). Drawing from these findings, we suggest that a positive relationship exists between innovativeness and the business performance of fintech companies. Thus, we hypothesised:

H2: Firm innovativeness has a positive impact on the business performance of a fintech start-up company.

Relationship of Entrepreneurial Capability and Firm Innovativeness of a Fintech Startup Company

Makhloufi *et al.* (2021) demonstrated that entrepreneurial orientation significantly influences innovation capability. Earlier studies have explored the relationship between entrepreneurial capabilities and firm innovation, shedding light on how these factors interact to affect business performance. For example, Li *et al.* (2020) examined how entrepreneurial leadership impacts innovative work behaviour, suggesting that the organisational environment for innovation mediates the connection between leadership and employee innovation. In a similar vein, Kwoba and Ebewo (2022) found a positive relationship between capabilities and knowledge creation, with competitive aggressiveness and innovativeness acting as mediators between knowledge creation and firm performance. Collectively, these studies underline the critical role of entrepreneurial capabilities in promoting innovation and driving business outcomes. Moreover, research by Mostafiz *et al.* (2021b) examined how international entrepreneurial capabilities enhance the ability of export firms to identify opportunities and improve performance, highlighting the importance of such capabilities for firm success. Prasetyo (2021) emphasised the role of information technology capability in fostering innovation and adaptation, particularly in dynamic business environments. Moreover, the relationship between knowledge management capability, entrepreneurial creativity, and firm performance has been established, with ambidexterity serving as a mediator (Garousi Mokhtarzadedeh *et al.*, 2022). Scholars have also recognised innovation capability as essential for improving efficiency and productivity within firms (Ali *et al.*, 2022).

These studies offer important perspectives on how various entrepreneurial capabilities, such as leadership, networking, and international expertise, play a crucial role in promoting innovation and, in turn, enhancing firm performance. In summary, the integration of these studies highlights the essential connection between entrepreneurial capabilities and firm innovation in driving business success. By fostering entrepreneurial skills, cultivating innovative capabilities, and utilising dynamic capabilities, organisations can strengthen their competitiveness, adaptability, and overall performance in an ever-changing business landscape. Continued research in this field could provide a deeper understanding of the specific processes by which entrepreneurial capabilities influence innovation and performance within firms. As a result, we proposed the following hypotheses based on these insights:

H3: Entrepreneurial capability has a positive impact on the firm's innovativeness of a fintech start-up company.

The Role of Firm Innovativeness as a Mediator in The Link Between Entrepreneurial Capabilities and Business Performance in Fintech Startups

Investigating how firm innovativeness mediates the relationship between entrepreneurial capability and business performance is an important research area. In this context, Makhloufi *et al*. (2021) examined the impact of entrepreneurial orientation on innovation capability, emphasising the mediating roles of absorptive and organisational learning capabilities. The study highlights how entrepreneurial orientation affects innovation capability, which subsequently influences business performance. Similarly, Hwang *et al.* (2020) identified that the indirect effects of entrepreneurial competencies, mediated by organisational innovation capabilities, contribute more significantly to competitive advantage than direct effects alone. In the realm of firm sustainability, organisational innovation capabilities are crucial in mediating the connection between entrepreneurial competencies and maintaining a competitive market position. Moreover, Fan *et al.* (2021) found a positive relationship between entrepreneurial orientation, innovativeness, and firm performance, noting that innovativeness moderates the link between social media adoption and performance. Ferreira *et al.* (2020) explored how exploitative and explorative capabilities impact firm performance indirectly through innovation competencies, especially in firms with a strong entrepreneurial orientation, further stressing the importance of innovation. Sijabat *et al.* (2021) highlighted how dynamic capabilities in new ventures impact competitive advantage, with innovation serving as a key mediator in this process. Moreover, Mbore (2021) identified innovation capability as a key mediator in enhancing firm performance, reinforcing the importance of fostering innovation within organisations. Furthermore, Maina *et al.* (2023) found that entrepreneurial passion moderates the relationship between process innovation and performance, with higher passion levels leading to better outcomes from process innovation (Maina *et al.*, 2023).

Furthermore, Khalid (2019) explored the mediating effects of both exploratory and exploitative innovations in the relationship between entrepreneurial orientation and firm performance. This research provides valuable insights into how various types of innovation mediate the connection between entrepreneurial orientation and business performance. By reviewing these studies, it becomes clear that firm innovativeness plays a critical role in facilitating the transformation of entrepreneurial capabilities into improved business performance. Based on this understanding, we conclude that innovativeness serves as a mediator in the relationship between entrepreneurial capabilities and the business performance of fintech firms. Drawing from these empirical findings, we proposed the following research hypotheses:

H4: Firm innovativeness significantly mediates the relationship between entrepreneurial capability and business performance of a fintech start-up company.

The Role of Firm Innovativeness as a Moderating Factor in The Relationship Between Entrepreneurial Capabilities and Business Performance in Fintech Start-ups

Entrepreneurial capabilities are fundamental drivers of business performance, and the moderating influence of firm innovativeness can further strengthen this connection. To examine the interplay between entrepreneurial capabilities and business performance within the context of fintech companies,

moderated by firm innovativeness, we may draw insights from relevant literature. For example, Ariasih *et al.* (2024) investigated the impact of entrepreneurial leadership on business performance, focusing on the mediating roles of entrepreneurial orientation, team creativity, dynamic capabilities, and competitive advantage. Their findings highlight the role of technological innovation capabilities in linking entrepreneurial orientation to performance, suggesting that firm innovativeness, facilitated by entrepreneurial leadership, contributes positively to business outcomes. Furthermore, Hoang *et al.* (2023) explored how entrepreneurial leadership influences innovation performance, pointing to the moderating effects that enhance the relationship between innovation and business performance. Similarly, Fegada and Veres (2024) identified significant correlations between innovation orientation, technological capabilities, and key performance indicators like profitability, sustainability, and customer satisfaction. These studies emphasise the critical role of firm innovativeness in shaping business performance in the fintech sector. Based on these insights, we proposed the following hypothesis:

H5: Firm innovativeness significantly moderates' relationship between entrepreneurial capability and business performance of a fintech start-up company.

Drawing on existing literature and prior research, we constructed the conceptual framework and corresponding hypotheses for this study, as illustrated in Figure 1.

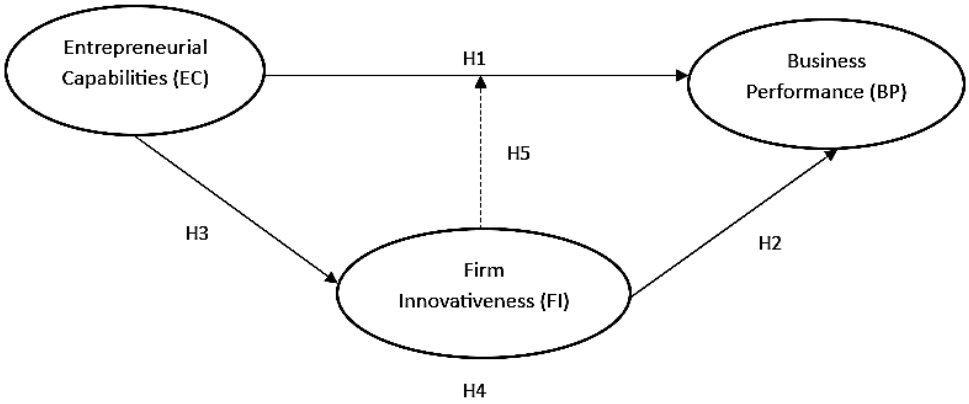

Figure 1. The Conceptual framework and hypotheses of the study
Source: own elaboration.

RESEARCH METHODOLOGY

Sample and Data Collection

In this study, we utilised a quantitative research design, focusing on a sample of financial technology start-ups. These companies, representing various business models (verticals), were licensed by the Indonesian Financial Services Authority and include both digital financial institutions and technology firms within the digital financial services ecosystem. We employed a probability sampling technique to ensure the sample accurately represents the broader population of fintech companies. By using stratified random sampling, the study ensures that every company in the industry had an equal opportunity to be selected, thereby enhancing the representativeness and accuracy of the sample (Henry, 2009).

There were 223 registered fintech company when we conducted the study (OJK International Information Hub, 2023). For determining the sample size, we applied the sample size determination method proposed by Krejcie and Morgan (1970) as the theoretical framework of our study has several variables of interest. Based on their guidelines, a sample size of 140 was deemed appropriate for a population of 220 financial technology start-ups, ensuring a robust and reliable decision model for the study (Sekaran & Bougie, 2016).

In this study, we selected the respondents from managerial roles within financial technology start-ups, including C-level executives, managers, supervisors, and staff who had been with the company for over two years. We chose these individuals due to their in-depth knowledge and access to critical information regarding the operations of their respective companies (Sandvik & Sandvik, 2003). To gather

data, we conducted a survey using a questionnaire, where respondents rated their level of agreement or disagreement with various statements on a 5-point Likert scale. We distributed the survey to managers of fintech start-ups through both online platforms and face-to-face interviews (Prijadi *et al.*, 2024). We sent a total of 200 questionnaires and received 180 responses. After screening for eligibility, we excluded 36 responses, leaving 144 completed questionnaires for analysis.

Measures and Statistical Methods

For this study, we adapted the measurement of latent variables from existing research, ensuring relevance to the context of financial technology start-ups. In the first section of the questionnaire, we collected demographic information about the respondents, including their position within the company and the year the company was established. In the second section, we included questions on business performance, covering financial, marketing, and operational aspects, with seven items based on the work of Singh *et al.* (2022), Olabode *et al.* (2022), Bodlaj and Čater (2019), and Shashi *et al.* (2019). The third section focused on entrepreneurial capabilities, with seven items related to innovativeness, proactiveness, and risk-taking, adapted from studies by Fan *et al.* (2021), Dias *et al.* (2021), Ciampi *et al.* (2021), Makhloufi *et al.* (2021), Faroque *et al.* (2021), Park and Xiao (2020), Monteiro *et al.* (2019), and Mehrabi *et al.* (2019). Finally, in the fourth section, we asked 23 questions regarding firm innovativeness, covering topics such as marketing innovation, new product development, product improvement, and product innovation, drawing from the work of Żur and Wałęga (2023), Domi *et al.* (2019), Yang and Tsai (2019), Shashi *et al.* (2019), and Anees-ur-Rehman *et al.* (2018).

We employed SmartPLS software to conduct data analysis in a two-step procedure, which includes evaluating the measurement model and the structural model. As outlined by Sarstedt *et al.* (2022), SmartPLS is capable of analysing both the outer model (measurement model) and the inner model (structural model). This software facilitated the processing of our data using structural equation modelling(SEM) techniques, allowing for an in-depth examination of relationships and variables (Sarstedt *et al.*, 2022). The analysis involved evaluating the structure of the measurement model, testing the proposed hypotheses, and investigating the relationships within the structural model (Cheung *et al*., 2024).

SmartPLS is crucial for examining the measurement model, assessing constructs, and testing hypotheses to derive meaningful insights from the data (Foltz & Foltz, 2020). The process of data analysis with SmartPLS involves key steps. Our analysis began with the specification of the model, followed by a thorough evaluation of the measurement model to ensure its accuracy and reliability. Once we validated the measurement model, we proceeded to assess its structure and perform hypothesis testing to confirm the relationships within the structural model. We tested the hypotheses through causality assessments and prediction models (Al-Mannaei *et al.*, 2023), focusing on the influence of latent variables during the structural model phase. To evaluate the inner model, we analysed key metrics such as the coefficient of determination (R^2), predictive relevance (Q^2), and goodness of fit (GoF).

RESULTS AND DISCUSSION

Results

Established since 2016, the financial technology startups sampled in this study have been in operation for between 2 to 6 years; 56 companies under 3 years, 40 companies about 3 to 4 years, and there were 48 companies have been more than 5 years. In our analysis, we initially examined the validity and reliability of each measurement to ensure that all constructs met the necessary standards. To assess these qualities, we employed composite reliability, Cronbach's alpha, and average variance extracted as key indicators of both validity and reliability.

Table 1 presents the Cronbach's alpha values for all constructs, which exceed 0.7, confirming the reliability of the measures (Sarstedt *et al.*, 2022). We assessed construct validity through both convergent and discriminant validity. Convergent validity reflects the extent to which items within a construct are closely related. As shown in Table 1, the average variance extracted (AVE) values and factor loadings were above 0.5, indicating strong convergent validity. Moreover, the AVE values for all variables exceed 0.5, signifying that the indicators for each variable are both convergent and valid. The

Cronbach's alpha and composite reliability (CR) values were all greater than 0.6, further supporting the reliability and validity of the variables and items used in our study (Sarstedt *et al.*, 2022).

Table 1. Validity and reliability construct

Variables	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)	Factor loading range
BP	0.846	0.865	0.883	0.520	0.609-0.827
EC	0.838	0.851	0.877	0.504	0.662-0.760
FI	0.969	0.970	0.971	0.587	0.631-0.873

Source: own study.

Furthermore, we conducted a goodness-of-fit test to evaluate the relationships between entrepreneurial capabilities, firm innovativeness, and business performance, ensuring the data reliability in measuring these variable relationships. This test involves two indicators. Firstly, we used the coefficient of determination to assess the extent to which entrepreneurial capabilities and firm innovativeness explain their connection to business performance. We derived the determination coefficient by analysing the R-squared values for each variable relationship (Bentler & Bonett, 1980).

Table 2. The coefficient of determination

Variable	R-square	R-square adjusted
BP	0.583	0.574
FI	0.480	0.476

Source: own study.

The R-squared values for business performance and firm innovativeness were 0.583 and 0.480, respectively. These values suggest that entrepreneurial capabilities and firm innovativeness explained 58.3% of the variance in business performance, with the remaining 41.7% attributed to factors outside the model. Moreover, entrepreneurial capabilities accounted for 48% of the variation in firm innovativeness, with the remaining 52% explained by external variables. Consequently, it is important to consider additional factors that could better account for business performance.

Subsequently, we conducted a model fit test using several statistical indicators, such as standardised root mean square residual (SRMR), normed fit index (NFI), and RMS_theta. For the model to be deemed suitable, the indicators must meet specific thresholds: SRMR < 0.08, NFI > 0.90, and RMS_theta should approach zero (Bentler & Bonett, 1980).

Table 3. Model fit summary

Model fit summary	Saturated model	Estimated model
SRMR	0.081	0.082
d_ULS	4.920	4.959
d_G	3.374	3.371
Chi-square	2074.363	2076.029
NFI	0.614	0.613

Source: own study.

The results show that the SRMR value was 0.081, which was below the threshold of 0.10, indicating a good fit according to Bentler and Bonett (1980). However, the NFI value of 0.614 was below the recommended threshold of 0.900. On the other hand, the RMS_theta value of 0.247 was close to zero. Given these outcomes, we may conclude that the model met the fit criteria, making it suitable for describing the relationships between the variables.

The SEM model includes both direct and indirect effects. A T-statistic with a p-value below 5% signifies a significant relationship between variables. The results, presented in Table 4, show that all direct relationships were statistically significant, with p-values under 0.05, confirming the hypotheses H1 to H4. However, hypothesis H5 was not supported, as its p-value was 0.442.

Table 4. Path coefficient

Hypotheses	Relationship	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
H1	EC -> BP	0.347	0.346	0.076	4.560	0.000
H2	EC -> FI	0.692	0.697	0.051	13.465	0.000
H3	FI -> BP	0.496	0.498	0.073	6.794	0.000
H4	EC -> FI -> BP	0.343	0.349	0.068	5.083	0.000
H5	FI x EC -> BP	0.040	0.046	0.049	0.802	0.422

Source: own study.

Discussion

The output in Table 4 provides a comprehensive interpretation of the relationships among entrepreneurial capability, firm innovativeness, and business performance. Entrepreneurial capabilities positively and significantly enhance business performance, demonstrating an effect size of 0.347. Therefore, enhancing entrepreneurial capabilities results in improved business performance, and conversely, improved business performance reinforces entrepreneurial capabilities. The results of our study align with prior research, which suggests that entrepreneurial orientation has a positive impact on business performance by promoting innovation and effective strategic decision-making (Żur & Wałęga, 2023). Moreover, the integration of entrepreneurial leadership and orientation within the framework of dynamic capabilities contributes significantly to improving firm performance (Nguyen *et al.*, 2024).

As entrepreneurial orientation has been associated with successful new product development, high financial performance, and overall business success (Żur & Wałęga, 2023), this aligns with our findings that new product development – one of our observed variables of firm innovativeness – exerts a pronounced and beneficial influence on business performance, yielding a substantial effect size of 0.496. This strong association further underscores that innovativeness is not merely a desirable trait but a performance-enhancing capability, particularly in dynamic sectors such as fintech. Consequently, an increase in a firm's innovativeness correlates positively with enhanced business performance.

Next, we found that entrepreneurial capabilities contribute positively and significantly to firm innovativeness, demonstrating a coefficient of 0.692. Therefore, augmenting entrepreneurial capabilities fosters heightened firm innovativeness, and vice versa. In line with these results, numerous studies have demonstrated that the entrepreneurial capability, innovation capability, and technological competence in enhancing firm performance (Omar *et al.*, 2016; Fegada & Veres, 2024b). Proactiveness, risk-taking, and innovation, as entrepreneurial capabilities, have been shown to enhance firm performance by cultivating an environment that supports innovation and informed strategic decision-making (Mojica-Carrillo *et al.*, 2021). Moreover, innovation capability, defined as the capacity to develop and execute novel ideas, has been linked to improvements in efficiency, productivity, and the overall performance of organisations (Ali *et al.*, 2022).

Our findings indicate that entrepreneurial capabilities, when mediated through firm innovativeness, have a positive and significant effect on business performance, with a value of 0.343. This supports previous research that highlights the importance of innovation capability in enhancing organisational efficiency and productivity, and the mediating influence of entrepreneurial self-efficacy and innovative competence on firm performance (Ali *et al.*, 2022). These results suggest that firm innovativeness is vital in transforming entrepreneurial capabilities into improved business performance.

As such, innovativeness within the firm plays a key mediating role in connecting entrepreneurial capabilities to business performance, particularly in the context of fintech start-ups. This finding is consistent with Han *et al.* (2022), who demonstrated that business model innovation mediates the relationship between entrepreneurial orientation and firm performance in more traditional industries. However, in the fintech sector, innovation assumes an even more significant role due to the fast-paced technological changes, complex regulatory environment, and the need for disruptive market strate-

gies. These sector-specific pressures make the effective deployment of innovativeness not just advantageous but necessary for survival. This underscores the critical importance of innovative approaches in driving performance outcomes in firms with strong entrepreneurial orientations.

In contrast, our analysis revealed that entrepreneurial capabilities have a positive but statistically insignificant impact on business performance, with a score of 0.040 when firm innovativeness is used as a moderating factor. This suggests that firm innovativeness does not significantly moderate the relationship between entrepreneurial capabilities and business performance in fintech start-ups. This finding aligns with the work of Abbas *et al.* (2019), who found no significant connection between entrepreneurial business networks and firm performance, indicating that entrepreneurial capabilities may not directly enhance business performance when influenced by other factors. Similarly, Fegada and Veres (2024) highlighted the positive relationships between innovation orientation, technological capabilities, and firm performance indicators, such as profitability and customer satisfaction, but did not establish a significant moderating effect of firm innovativeness on the entrepreneurial capabilities–performance relationship.

Interestingly, while firm innovativeness positively mediates the relationship between entrepreneurial capabilities and business performance, we found its moderating effect to be statistically insignificant. This divergence offers a critical insight into the complex dynamics within fintech firms. Unlike traditional sectors where innovation may consistently strengthen the entrepreneurial-performance link, fintech operates under unique environmental pressures, namely, regulatory volatility, rapid digital disruption, and strong reliance on external technologies (*e.g.*, blockchain, AI, digital identity systems). These factors may diminish the moderating influence of internal innovativeness because the pace and nature of innovation in fintech is often reactive and externally imposed rather than internally driven.

Furthermore, the insignificant moderation effect could suggest that once a baseline level of entrepreneurial capability is in place, additional firm innovativeness does not proportionally amplify performance outcomes. This aligns with recent findings by Crick *et al.* (2021), which caution that overemphasising innovation, without strategic alignment, can lead to inefficient or unprofitable outcomes. In fintech, over-innovation or 'innovation fatigue' can be particularly detrimental due to customer sensitivity to trust, usability, and regulatory compliance. As such, the findings challenge the often-assumed linear benefit of innovativeness and call for more nuanced theorisation around context-specific limits of innovation's strategic utility. Future studies should consider environmental dynamism, regulatory agility, and digital trust as potential boundary conditions that shape these effects.

In the context of fintech companies, we may attribute this lack of moderation to the highly dynamic and rapidly changing nature of the industry (Hor *et al.*, 2021), where the direct influence of entrepreneurial capabilities on performance might overshadow any moderating effect from innovation. Moreover, fintech innovation is often driven by external factors like technological advancements and regulatory shifts (Ma, 2022), which could reduce the significance of firm-level innovation in moderating the relationship. Consequently, entrepreneurial capabilities alone may be sufficient to drive performance outcomes, independent of innovation as a moderating variable.

In conclusion, entrepreneurial capabilities are generally associated with improved business performance. The significant relationships between entrepreneurial capability, firm innovativeness, and business performance suggest that, within the competitive financial technology sector, firms that possess strong entrepreneurial capabilities, foster a culture of innovation, and maintain technological proficiency are more likely to experience growth, attract customers, and achieve sustained success. By strategically utilising these capabilities, fintech companies are better equipped to navigate the complexities of the industry, adapt to shifting market conditions, and seize emerging opportunities to drive innovation, enhance business performance, and secure long-term success. However, the relationship between these factors is not universally positive. Crick *et al.* (2021) highlight that an entrepreneurial orientation, if not carefully managed, may lead to unprofitable decisions, emphasising that the outcomes of entrepreneurial actions can vary widely depending on the context and execution. Moreover, our finding of the non-significant moderating role of firm innovativeness further supports this nuance. It highlights that greater innovation does not always amplify entrepreneurial outcomes and may even

lead to diminishing returns if disconnected from external contingencies or strategic focus. This suggests that while entrepreneurial capabilities can contribute to enhanced performance, they may also result in negative outcomes if not properly aligned with the firm's strategic goals.

CONCLUSIONS

The significant connections identified between entrepreneurial capability, firm innovativeness, and business performance highlight the critical role that entrepreneurial capabilities play in driving innovation within financial technology startup companies. Our study offers fresh theoretical perspectives on how entrepreneurial capabilities influence both firm innovativeness and business performance in the context of fintech startups. By emphasising innovation's mediating role, we challenge the view that entrepreneurial capabilities directly drive performance, proposing instead that innovation is a key mechanism linking capabilities to performance outcomes.

We also challenge the notion that entrepreneurial capabilities are universally applicable across industries. In fintech, where disruption and rapid change are common, capabilities are crucial for driving innovation in response to market and regulatory shifts.

Our study calls for expanding existing theoretical frameworks to account for industry-specific dynamics in fintech. Unlike traditional models, which often focus on linear, technology-driven innovation, we highlight the multifaceted nature of innovation in fintech, which blends technological, regulatory, and market-driven factors. In conclusion, our study proposes a more context-driven approach to understanding entrepreneurial capabilities and innovation in fintech, offering a dynamic perspective on how these factors contribute to business performance.

However, our study has some limitations. Firstly, our sample included all identified financial technology startup companies, since we found it a small population within the industry. Secondly, as an emerging industry, characterised by agility, creativity, and adaptability, financial technology is unique and different from one company to another, but we did not divide the companies into types categorised by the authority because of the very small number of companies. Thus, we suggest future research to explore all identified financial technology companies by type and use only the founder and core management, such as C-level management or top management of the company. In addition, we also suggest that future research can explore the innovativeness of financial technology companies based on the type of company considering that the type of company in the digital financial innovation category has many variations of platforms including Aggregator, Credit Scoring, Financing Agent, Transaction Authentication, RegTech-eSign, Electronic-Know Your Customer (E-KYC), Funding Agent, Financial Planner, Insurance Tech, Tax & Accounting, Insurance Hub, Online Distress Solution (ODS), RegTech-PEP, Property Investment Management (PIM), Wealth Tech, Digital Banking, Digital Payment/Payment Gateway/Payment System.

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Use of Artificial Intelligence

We hereby declare that our manuscript does not involve the use of AI/GAI.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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