



Full Length Article

Financial innovation and digitalization promote business growth: The interplay of green technology innovation, product market competition and firm performance



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ARTICLE INFO

Keywords:

Product market competition

Digital financial innovation

Firm performance

Structural equation model

ABSTRACT

With the emergence of technological innovations, digital finance with a blend of new models and the development of inclusive financial innovation shows great significance for business firms to emphasize innovative and competitive product market competition. Thus, financial digitalization and business environment directives help improve the financial performance of business enterprises. This study assesses the role of product market competitiveness on firm performance through the mediating role of digital financial innovation. The annual data of 90 companies from 2014 to 2020 is taken from the Pakistan stock exchange market. The empirical results are estimated using three paths by the Structural Equation Model (SEM) regression approach. The study identifies that product market competitiveness positively contributed to determining the firm performance. Besides, digital financial innovation serves as the mediator in the study, which partially positively determines firm performance. It shows that firm financial innovation fails to account fully for firm performance. This study does not include several other factors determining firm performance. The research results deliver a useful empirical and theoretical contribution to digitalization and product innovation. The findings help to uncover the antecedents of financial innovation and firm performance. This research model can assist researchers in designing robust strategies to appraise the impact on firm performance. Investigators may advance valuable insights by integrating this methodology. Concerning originality, these results indicate that digitalized innovation positively influences firm performance by offering innovative products and digitalization. The outcomes contribute to the literature on digital innovation, and the study recommends that business organizations should pay particular attention to improving financial innovation and digitization in business firms.

1. Introduction

Financial innovation, digitalization, and sustainable development have emerged as key forces in today's rapidly changing global business landscape (Al-Sulaiti 2002; Al-Sulaiti & Fontenot, 2004), altering industries and driving economic growth (Amjad, Ishaque, & Rafique, 2023; Luo et al., 2023). Green technological innovation combined with financial and digital breakthroughs has revolutionized how businesses work

(Han et al., 2023; Wang, Cui, & Dong, 2023; Yang & Chen, 2023) and given a potential route toward a more sustainable future as the world struggles with severe environmental concerns (Tabbasam et al., 2023; Yang & Zhang, 2020). This study delves into the complex dynamics at play between these two factors, illuminating how the combination of financial advancement and digitalization equips businesses (Omonijo & Yunsheng, 2022; Wang, Amjad, et al., 2022) to prosper in a fiercely competitive product market while also promoting ecological

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<https://doi.org/10.1016/j.igd.2023.100111>

Received 18 September 2023; Received in revised form 3 October 2023; Accepted 4 October 2023

Available online 31 October 2023

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sustainability (Gbaka et al., 2021; Goshit and Iorember 2020; Iorember et al., 2021). This study focused on learning and exploring more about how businesses might improve sustainable performance (Amjad, Tabbasam, & Habib, 2023), foster ecological responsibility (Guo et al., 2023), and aid in the continuous transformation of the global economy by examining the relationship of these phenomena (Iorember et al., 2021; Jelilov et al., 2020; Usman et al., 2019).

Global competitiveness motivates firms to make different strategies to increase their profits by increasing market shares, consolidating comparative advantage, and improving product efficiency (Goel et al., 2022). When the firm's products face competition with similar firms in terms of price, quality, and features, it attracts more consumers (Meng et al., 2023; Shah et al., 2023; Al-Sulaiti et al., 2023, pp. 1–21). The present study explores the relationship between Product Market Competitiveness (PMC) and firm performance (Abbas et al., 2023a, 2023b; Wang, Cui, & Dong, 2023). Accordingly, PMC shows the ability of a product to compete with other similar products in the market. The Firms that focus on PMC experience higher revenues and profits. Customers are willing to pay more when they perceive better and more value in any firm products than competitors. It increases the demand for the products, which boosts revenue and profitability. Competitive products allow firms to capture a bigger market share (Amjad et al., 2022; Chaitanapat et al., 2022).

Several researchers have examined the conflicting and mixed relationship between PMC and firms' performance due to multiple factors like the competitive business environment, employees' well-being, and available resources (Jang et al., 2019; Mubeen et al., 2022). The PMC positively affects the firm's performance by improving efficiency and product quality (Moradi et al., 2017; Micah et al., 2023). In the competitive environment, firms produce higher-quality goods, optimize operations, and care for customer needs (Islami et al., 2020). It makes the firms more quick, efficient, and customer-centric, leading to improved market share, profitability, and long-term growth (Micah et al., 2023; Shah et al., 2023; Shah et al. 2023, 2023). Furthermore, competition discourages complacency and drives firms to remain watchful, adapt to changing market dynamics, and explore new methods to produce value, which increases their performance (Czinkota et al., 2021; Edh Mirzaei et al., 2021).

In contrast, PMC negatively impacts the firm performance (Liu et al., 2023). A high competition environment between firms makes it difficult to attract more customers to earn profit (Iorember et al., 2022; Mubeen et al., 2022). It leads to a decline in the prices of the products and an increase in marketing costs, which declines the firms' profits (Liu et al., 2022). When several competitors are in a market, they are involved in price wars to obtain market share. It lowers consumer prices but harms the enterprises' profitability (Calvano et al., 2020; Farm, 2017). Under higher competition, firms increase their marketing spending to differentiate their goods from their competitors (Wen et al., 2022). If a firm cannot compete successfully, it loses market share to competitors. This might result in lower profitability and decrease the firm's worth. More competitive markets are more volatile and unpredictable (Becerra & Markarian, 2021).

The study extends it by using the mediating role of digital financial innovation (DFI) to examine connection between PMC and firm performance. Several studies pointed out that innovation is crucial in determining the firm performance (Bauweraerts et al., 2022). Organizational innovation projects are a significant asset that helps businesses increase the value of their stock (Abbas et al., 2023a; Abbas et al., 2023a). By using digital innovations, firms produce quality products to meet consumer needs. Digital services and technologies enable firms to accurately portray customers' credit and reduce information asymmetry in financial lending (Bisht et al., 2022). It also helps firms to deliver information to consumers very quickly. It has also reduced transaction costs through the flow of credit funds using digital technology apps (Feng et al., 2022).

This study is very significant and novel because it explores the relationship between PMC and firm performance by using the mediating role

of digital financial innovation. There are not many studies available in the literature that examine this kind of relationship. This study tries to achieve three objectives: to explore the role of PMC on firm performance, to investigate the association between PMC and firms' digital innovation, and to explore the mediating role of firms' DFI in determining firm performance.

The following sections are set according to the categories used in the study. The first section of the study provides an introduction, and section 2 discusses the previous literature review. Section 3 details the techniques used to collect the data and conduct the research. It explains comparable econometric methods. In Section 4, this research article summarizes the study's findings, and last section investigates the conclusion and policy recommendations.

2. Literature review

Several literature examined the role of PMC on firm performance (FP). The FP is measured through customer relationships, efficient finance, employee management, and production improvement (Epstein et al., 2004). Peng and Lin (2019) measured FP by ensuring market position, operational results, and profitability. Usually, we use the financial indicator to measure the firm performance because most of the data is obtained from the enterprise reports, which increases the confidence of the stakeholders (Andersen et al., 2016). PMC happens when firms sell their goods and services, resulting in competition between firms (Jaroenjitrkam et al., 2020). In another way, it shows the concentration of firms with the same products.

Previous literature examined that competitiveness increased productivity due to awareness and competition in the market (Al Halbusi et al., 2023; Majeed et al., 2023). The concept of competitive advantage is critical for a firm to maximize financial returns (Dunk, 2007; Javeed et al., 2020). Competitive analysis in the product market is highly multifaceted. Most of the researchers agreed that competitive markets lead to the effective use of resources. Porter and Linde (1995) empirically examined that competition in product markets is beneficial and detrimental to a firm success. Ammann et al. (2013) pointed out the positive relationship between PMC and productivity in developing countries.

There are mixed results of PMC on firm performance. Several studies demonstrated that PMC enhances the FP. Moradi et al. (2017) investigated the PMC on FP in Iran from 2004 to 2012. It revealed a positive association between PMC and FP. Oh and Shin (2020) connected the PMC with FP in the US from 1990 to 2011. The study explored the manager's motivation with PMC positively contributed to determining the FP.

Mubeen et al. (2022) emphasized the PMC and organization performance in 2502 Chinese companies. This study identified that PMC positively contributed to the organization's performance. Xuan Ha and Thi Tran (2022) pointed out the role PMC on FP by using 180 listed companies in Vietnam from 2015 to 2019. The empirical results were estimated using the Structural equation model (SEM). The study used the mediating effect to explore that PMC positively contributed to firm performance (Li et al., 2022; Zhang et al., 2022). Thu and Minh (2023) investigated the link between PMC and the firm value of 555 firms in Vietnam from 2011 to 2019. The system GMM econometric approach was applied to estimate the empirical results. The study found that state-owned firms positively correlated with PMC and firm value.

In contrast, few studies explored that PMC declined firm performances. Liu et al. (2018) examined the role of PMC on firm performance in 20706 Chinese companies from 2001 to 2016. The study explored that higher PMC declined firm performance. Furthermore, this study used corporate governance as the moderator term. The study analyzed that corporate governance moderates the adverse effect.

Several researchers show that the impact of PMC on FP is unpredictable, unreliable, or unambiguous (Bradley & Kolev, 2023; Lee et al., 2019; Yuan et al., 2019). For this reason, firm digital financial innovation (DFI) is used as a mediator in this study. Nowadays, many organizations

have been increasingly inclined to benefit from digitalization and innovation-oriented shifts in market competitiveness (Liu et al., 2023; Zhao et al., 2023). One view is that innovation is critical in explaining how market competition affects business output (Guerrero-Villegas et al., 2018). Researchers have shown multiple ways in this relationship, and PMC leads to firm performance. It helps innovate and deliver innovative products to address the concerns of all stakeholders (Kitsios & Kamar-iotou, 2023).

Mixed results exist on the impact of DFI on FP. Kijkasiwat and Phuensane (2020) examined the role of DFI and firm performance in 29 European and Asian countries by using the SEM approach. It identified the mixed results of DFI on firm performance (FP).

Past several studies examined that innovation increases firm performance. Ramadani et al. (2019) examined the role of product innovation on firm performance in transition economies. The study concluded that financial innovation positively determines the firm performance. Cuevas-Vargas et al. (2022) empirically examined the DFI on firm performance in 220 Mexican companies by using PLS-SEM. The study found that DFI increased firm performance.

Jung and Shegai (2023) investigated the role of digital market innovation on a company's performance. The study found that digital market innovation directly and indirectly affects the firm's performance. Li et al. (2023) examined that technological and environmental indicators significantly impacted the firm performance in 83 private firms in China. Shah et al. (2023) examined the role of digital technology on firm performance in Pakistan. SEM explored that digital capability, transformation, and orientation positively increased the FP. Montani et al. (2023) pointed out the relationship between innovation and FP in different enterprises. It found that firm innovation positively impacts the firm performance.

Reviewing the previous literature, it is estimated that PMC directly and indirectly impacts the firm performance. Several studies explored that PMC positively impacts firm performance (Moradi et al., 2017; Mubeen et al., 2022; Oh & Shin, 2020; Xuan Ha & Thi Tran, 2022). In contrast, few studies explored that PMC declined firm performance (Liu et al., 2018). Furthermore, firm DFI increases firm performance (Cuevas-Vargas et al., 2022; Li et al., 2023; Montani et al., 2023; Ramadani et al., 2019; Shah et al., 2023). Limited studies in the literature examined the role of PMC on firms' performances by using the mediating role of digital innovation. This study tries to fill this research gap in the literature.

The present study assesses the role of firm performance (FP) on product market competitiveness (PMC) by using Digital Financial Innovation (DFI) as the mediator. Based on the research objective, this model is developed in Fig. 1. It includes three variables: firm performance (FP) is the dependent variable, and product market competitiveness (PMC) is the independent variable. Several studies in the literature examined the mixed relationship between PMC and firm performance. (Li et al., 2022; Moradi et al., 2017; Mubeen et al., 2022; Oh & Shin, 2020; Zhang et al., 2022) explored the positive relationship, while in contrast (Liu et al., 2018; Tong et al., 2016) found the inverse association. However, the previous literature fails to identify any connection between financial digitalization and PMC. Digital Financial Innovation (DFI) is used as the mediator to generate a bridge between PMC and FP (Cuevas-Vargas et al., 2022; Li et al., 2023; Montani et al., 2023; Ramadani et al., 2019; Shah et al., 2023).

Consequently, based on these logical and rational claims, this study fills the literature gap by exploring the associated variables, financial innovation/product innovation. This study examines how product market competitiveness affects sustainable company performance.

In view of previous literature, the null hypothesis of the present study is generated as follows:

- H01.** There is no direct positive association between PMC and firm performance.
- H02.** There is no indirect relationship between digital financial innovation (DFI) and product market competition (PMC).
- H03.** There is no indirect relationship between product market competition (PMC) and firm performance through the mediating role of digital financial innovation (DFI).

The first hypothesis will explore the relationship between PMC and firm performance, whether it shows a positive or negative relationship. Usually, developing countries focus more on improving the market to gain more profitability. The competitive force motivates firms to create innovative and unique products to capture a reasonable market share.

The second hypothesis will examine the indirect impact of PMC on financial digitalization. It will try to explore whether PMC increases or decreases financial digitalization. In developing countries, firm competitiveness motivates many firms to use advanced financial digitization services by financial institutions for the convenience of their customers. This not only enhances their profits but also increases the market share.

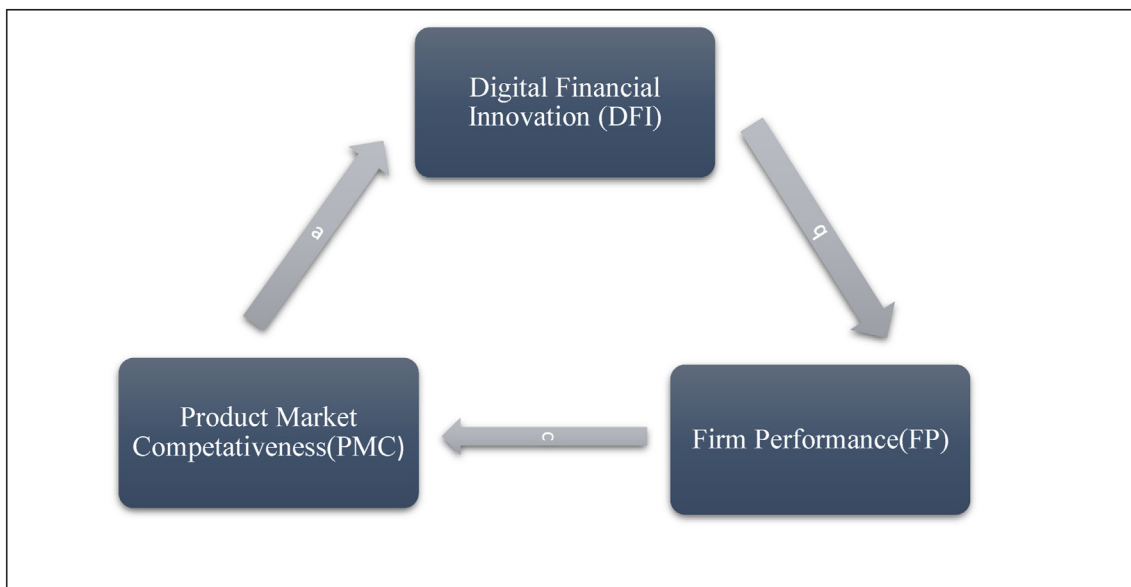


Fig. 1. Proposed model.

The third null hypothesis will explore whether financial digitalization is mediating with PMC to determine firm performance. This study will explore whether financial digitalization partially, strongly, and nothing impacts the determining firm performance using PMC.

3. Methodology

3.1. Variable definition

3.1.1. Product market competition

The primary independent variable investigated in our study is competition within the product market competition (Mubeen et al. 2021; Mubeen et al. 2021; Wang et al. 2021). The degree of competition in a product market competitiveness refers to the degree of monopoly, oligopoly, or competitiveness enterprises exhibit in their activities (Liao et al., 2023; Local Burden of Disease, 2021; Shuja & Abbas, 2022). Previous research has employed a variety of methodologies to assess market competition and variation, including the usage of indicators/metrics such as the Herfindahl Hirschman Index (HHI) and Boone Index (Fosu, 2013). Prior research literature has indicated that the HHI is the most effective measure for assessing market competition and turbulent business environment compared to alternative methodologies (Zou et al., 2015). Previous research also shows that companies often compete by emphasizing their sales figures, highlighting the industry's competitive landscape in terms of revenue (Zou et al., 2015). Besides, several researchers have used HHI to quantify competition within different industries (Jain et al., 2013; Michaelides et al., 2019). According to research (Javeed et al., 2020; Michaelides et al., 2019), the method adopted is to use the square of the revenue share of each company in the industry to determine the level of market competition. The calculation is based on overall industry sales.

3.2. Firm performance

In this investigation, the dependent variable used is enterprise performance. Existing literature shows that a variety of methods can be used to calculate business performance (Javeed et al., 2020). Many academic works explore the impact of PMCs on firm performance (FP). The measurement of firm performance encompasses a variety of factors, including customer interaction, effective financial management, people management, and manufacturing improvements (Epstein et al., 2004). Besides, Peng and Lin (2019) measured organizational performance (FP) in their study by adopting market position, operating performance, and revenue indicators. Financial indicators are often used to evaluate firm performance as they rely on corporate reports' data, which enhances stakeholder confidence (Andersen et al., 2016). As a result, product market competitiveness (PMC) occurs when companies sell their goods and services, resulting in a competitive and turbulent business environment among these organizations (Jaroenjitrkam et al., 2020). Thus, it shows arrangements with companies offering similar products.

Existing literature examines the relationship between enterprises' competitiveness and productivity, emphasizing that product competitiveness can increase firms' productivity through improved market knowledge and competition. The idea of competitive advantage is crucial for businesses to optimize the financial returns (Dunk, 2007; Javeed et al., 2020). The investigation of product market competition is highly complex and multi-dimensional. Researchers agree that competitive markets facilitate the efficient allocation of resources. Porter et al. (1995) conducted an empirical investigation to assess the impact of product market competition on firm performance and found positive and negative effects on the success of firm performance (Javeed et al., 2021; Porter & Kramer, 2006). Past literature (2013) highlighted the existence of a good correlation between private military contractors (PMCs) and production levels in developing countries (Boamah et al., 2023).

The impact of PMC (product market competition) on corporate performance has led to different findings. Several studies provide evidence

supporting the idea that competitive activation in product market competitiveness has a positive impact on organizational performance. The study conducted by Moradi et al. (2017) explored the impact of product market competition on family planning in Iran between 2004 and 2012 (Moradi et al., 2017). The analysis shows a significant correlation between product market competition and firm performance. Shin (2020) established the relationship between product market competition and firm performance in the United States from 1990 to 2011. This study examined the role of manager motivation (through the usage of product market competition) in determining firm performance.

3.3. Mediating variable – digital financial innovation

Previous research studies suggested that intervening variables play a role in the relationship between gender diversity and firms' performance (Fosu, 2013). In order to address the concerns mentioned above, we investigated the mediating role of financial innovation in the relationship between product competitiveness (PMC) and enterprise performance (FP). The present study employed the concept of financial innovation as a mediating variable to examine its role in mediating the relationship between PMC and firm performance.

Multiple studies have demonstrated that the influence of PMC on firm performance exhibits characteristics of unpredictability, unreliability, or lack of clarity (Bradley & Kolev, 2023; Lee et al., 2019; Yuan et al., 2019). Therefore, the utilization of firm digital financial innovation (DFI) is employed as an intermediary in the present investigation. In contemporary times, there has been a growing trend among companies to use digitalization and innovation-driven changes in market competitiveness (Liu et al., 2023; Zhao et al., 2023). According to Guerrero-Villegas et al. (2018), there exists a perspective that asserts the significance of innovation in elucidating the impact of market competition on corporate production. Multiple ways in which researchers have demonstrated this relationship have indicated that product market competitiveness (PMC) is positively associated with business performance. According to Kitsios and Kamariotou (2023), the organization's ability to develop and produce novel goods is crucial in addressing the needs of all stakeholders.

There is a lack of consensus regarding the effects of digital financial innovation (DFI) on a firm's performance, with varying outcomes reported in the literature. A previous study by Kijkasiwat and Phuensane (2020) investigated the relationship between DFI and firm performance (FP) in a sample of 29 countries from Europe and Asia. The researchers employed the Structural Equation Modeling (SEM) approach to analyze the data. The study revealed the varied outcomes of DFI on firm performance.

This study expands upon existing research by incorporating the concept of DFI as a mediating factor in the relationship between PMC and firm performance. Multiple scholarly investigations have highlighted the significance of innovation when assessing firms' performance (Bauwer-aerts et al., 2022). According to Batool et al. (2022), Liu et al. (2022), Wang et al. (2022), Xin et al. (2023), Zhang and Dilanchiev (2022), implementing organizational innovation initiatives has a crucial role in enhancing the stock value of business firms. Business firms employ digital technologies as the means to manufacture high-quality products that effectively cater to the demands of consumers. According to Bisht et al. (2022), the utilization of digital services and technologies allows firms to effectively represent the creditworthiness of clients and mitigate the presence of information asymmetry in the context of financial lending. Additionally, it aids companies in expeditiously disseminating information to consumers. Additionally, the utilization of digital technology applications has decreased transaction costs related to the transfer of credit funds (Feng et al., 2022).

The present study explores the mediating role of DFI between PMC and FP. We obtained information for this analysis from the Pakistan Stock Exchange, focusing on Islamic banking. Observations of 90 different companies from 2014 to 2020 data (Singh et al., 2018). The empirical results are estimated using R-language, Stata, and SPSS econometric

software. The empirical results are evaluated using the Structural Equation Modeling (SEM) regression equation. It is used to analyze the complex relationship between variables. It allows us to examine the direct association between the variables and the indirect relationship among the multiple variables. Following by Baron and Kenny (1986), SEM regression can be written as follows.

In the first step, the dependent variable's direct effect is estimated using the independent variable. This study uses FP as the independent variable, while PMC is the independent variable. Its regression is written as follows:

$$FP = \beta_0 + \beta_1 PMC \tag{1}$$

In equation (1), β_1 shows the coefficient of PMC. If the coefficient of β_1 is statistically significant, and this model is used for further mediation analysis. However, Shrout and Bolger (2002) recommended that if β_1 is insignificant, then the model can be the next step forward based on a sound theoretical background.

In the second step, the mediator chooses the indirect path. This study uses DFI as the mediator as the dependent variable. Its regression equation can be written as follows:

$$DFI = \beta_2 + \beta_3 PMC \tag{2}$$

In equation (2), β_3 presents the coefficient of PMC. The significant coefficient shows that PMC affects DFI. Its insignificant value shows no relationship between these two variables.

In the third step, the effect of the mediator and independent variable is captured to determine the dependent variable.

$$FP = \beta_4 + \beta_5 PMC + \beta_6 DFI \tag{3}$$

In equation (3), β_5 shows the coefficient of independent variable (PMC), and β_6 demonstrates the coefficient of mediator (DFI). If β_5 is insignificant shows, then it shows the complete mediation of CI. If β_5 is smaller in magnitude and significance than it shows the partial mediation.

4. Results and discussion

This present study's motivation remains to examine the relationship between business firms' performance and product market competition. This research investigates how digital financial innovation (DFI) mediates this proposed relationship between product market competitiveness and organizational performance. In the scientific literature, several scholars have examined a direct link between product market competition and enterprises' business performance, and their findings indicated a positive connection (Javeed et al., 2020; Ruiz-Porras & Lopez-Mateo, 2011; Van Reenen, 2011). In contrast, some studies have shown U-shape or negative relationships (Bloom et al., 2010; Januszewski et al., 2002; Ko et al., 2016). The literature has shown mixed results, including neutral, negative and positive relationships between firms' performance and product market competition (Guney et al., 2011; Sheikh, 2018). This study claimed that there is not a direct positive association between product market competitiveness and firm performance. Besides, the literature exhibited that small firms need to demonstrate digitalized

innovative behaviour and lower business profit (Dechezleprêtre & Sato, 2017). Hence, based on rational and logical claims, this study aims to fill these literature gaps by examining the link between chosen variables, digital financial innovation/product innovation (Abaalzat et al., 2021; Al-Sulaiti et al., 2006; Al-Sulaiti et al., 2005). As a result, the present study emphasizes how enterprises' product market competition affects sustainable performance (Table 1).

Table 2 represents the summary statistics of this study. In this study, three variables of 540 observations are under-considered. The mean values of firm performance (FP), product market competition (PMC), and digital financial innovation (DFI) are 1.01, 2.01, and 9.70, respectively. The mean of these variables is greater than their standard error, displaying that the series is under-dispersed (Asgar et al., 2023; Rani et al., 2022a; Rani et al., 2022b).

Fig. 2 presents the correlation plot to examine the correlation between the variables to check the issue of multicollinearity in the model (Sial et al., 2022). The lower color scale shows the colors of correlation between the variables, which lay between -1 and 1. The Dark red color indicates the correlation value "1" indicates the perfect negative correlation, while the dark blue color demonstrates the correlation value "1," suggests the perfect positive correlation. Light blue and red color illustrate the weak correlation. All bubbles' correlation values are less than the absolute value of 0.80, showing weak multicollinearity between the variables (Amjad, 2023; Amjad et al., 2021; Amjad & Rehman, 2023).

Table 3 exhibits the VIF for independent and mediating variables to check the issue of multicollinearity in the model. The issue of multicollinearity leads to misleading results in the model. Asteriou and Hall (2006) recommend that VIF values less than ten show the absence of a multicollinearity issue in the model. In our model, the value of all

Table 2
Descriptive statistics.

Variables	Obs	Mean	Std. Dev	Min	Max
FP	540	1.0091	1.004	-48.31	10.40
PMC	540	2.019	1.04	30.47	0.985
DFI	540	9.70	7.391	7.39	11.85

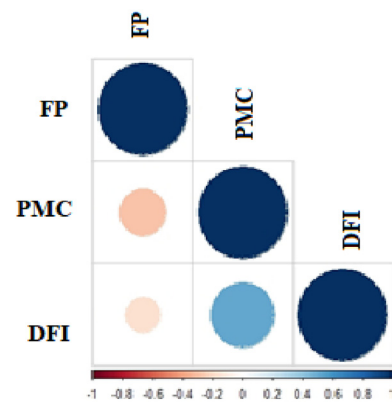


Fig. 2. Correlation plot.

Table 1
Summary of selected studies.

Authors	Variables/constructs	Country	Relationship	Method
Schulze et al. (2022)	customer and competitor orientations	Germany	Positive	SEM
Javeed et al., 2020	environmental regulations, firm performance, product market competition	Pakistan	Negative and Positive	Descriptive statistics
Rajapathirana and Hui (2018)	innovation capability, innovation type, and firm performance	Sri Lanka	Positive	SEM
Liu et al. (2023)	Digital Inclusive Finance	China	Positive	Gini index
Yue et al. (2022)	digital finance, financial inclusion,	China	Positive	Panel Data Analysis
Tang et al. (2022)	Digital finance, environmental regulations	China	Negative and Positive	Panel Data Analysis
Xia et al. (2022)	Digital finance, corporate resilience, pandemic	China	Positive	Panel Data Analysis
Lin and Ma (2022)	Digital finance, green innovation	China	Positive	Panel Data Analysis

Table 3
Variance inflation factor (VIF).

Variables	VIF	1/VIF
PMC	1.10	.910
DFI	1.08	.925
Mean VIF	1.04	

variables is less than shows the weak issue of multicollinearity in the model (Asghar et al., 2022; Wang, Amjad, et al., 2022).

Estimate empirical results of our first null hypothesis to examine the direct effect of PMC on firm performance are presented in Table 4. It is observed that the coefficient of PMC is statistically significant, showing one unit increase in the PMC statistically significantly increases firm performance by an average of 1.0955 units. These results indicate that we reject our first null hypothesis and show a positive correlation between firm performance and PMC. These findings are consistent with past studies (Moradi et al., 2017; Mubeen et al., 2022; Oh & Shin, 2020).

These results show that PMC has a significant impact on firm performance. PMC enhances firm performance by expanding the market share of the firm. Usually, the competitive firms do not compromise on the quality of their products and prefer customer satisfaction and loyalty. When these firms offer their products, they attract large customers. The higher customer base increases revenues and profitability, leading to increased economies of scale and strong bargaining power. It also derives the innovation that leads to unique features and superior products compared to rival firms, ultimately increasing the firm's performance (Xuan Ha & Thi Tran, 2022). Additionally, the coefficient of PMC is statistically significant, showing that this model can be extended for mediation analysis.

Table 5 shows the indirect relation between mediator Digital financial innovation (DFI) and independent variable PMC. The empirical results illustrate that PMC significantly positively contributes to determining the DFI. It shows one unit increase in the PMC significantly increases the DFI by an average of 0.2528 units. These results verify that we reject our null hypothesis and explore the positive relationship between product market competition and firms' digital financial innovation (DFI).

The PMC profoundly impacts digital financial innovation (DFI) and influences the nature and rate of innovation in the financial sector. Higher PMC place pressure on financial institutions to differentiate their products and stay ahead of their rivals. For this purpose, most firms attract digital finance for investing in digital finance technologies like digital payments, mobile banking apps, and robo-advisors. Moreover, the firm also seeks collaboration with fin-tech and tech giants, which is more customer-centric because it cares more about the customer's preferences and needs. The mediator's coefficient is also significant; we can extend this model for further estimation.

Table 6 shows the results of the mediating role of DFI to examine the

Table 4
Direct effect of PMC on firm performance.

Dependent variable = Firm performance (FP)				
	Coef.	Std. Err.	Z	P > z
PMC	1.0955	0.067	16.34	0.000
CONS	2.3720	0.24	9.875	0.000

Table 5
Indirect effect of corporate innovation and product market competitiveness.

Dependent variable: Digital financial innovation (DFI)				
	Coef.	Std. Err.	Z	P > z
PMC	0.2528	0.0087	29.0900	0.0000
Constant	2.6268	0.0321	81.9400	0.0000

Table 6
Analysis of PMC and Firm Performance through the mediating role of DFI.

Dependent variable = Firm performance (FP)				
	Coef.	Std. Err.	Z	P > z
PMC	0.1917	0.079	2.4265	0.0000
DFI	0.1154	0.0159	7.2578	0.0500
Constant	4.4123	0.485	9.0975	0.0000

relationship between PMC and firm performance. The coefficient of PMC is statistically significant and lower than the coefficient listed in Table 4. It shows that PMC is a considerable contributor to firm performance. Furthermore, the coefficient of mediator DFI is also statistically significant (Cuevas-Vargas et al., 2022; Li et al., 2023; Montani et al., 2023; Ramadani et al., 2019; Shah et al., 2023). Both coefficients are statistically significant, showing that mediators also play an essential role in the firm's performance. These results support that mediator DFI partially mediation.

It shows that although the firm's digital financial innovation (DFI) plays a significant role in transmitting the effect of PMC, other factors contribute to the firm performance, and the mediator fails to account for all factors. Numerous other factors include management effectiveness, financial resources, organizational culture, regulatory environment, and competitive strategies that influence the firm performance. It emphasizes that, to some extent, Pakistani firms can increase efficiency by promoting digital financial products and services that cater to evolving market trends and customer demands.

5. Conclusion and policy recommendations

This research assesses the mediating role of digital financial innovation on the link between product market competition and firm performance. The results of this study implement the structural equation model (SEM) approach by utilizing panel data from the Pakistan stock exchange market from 2014 to 2020. The correlation plot and variance inflation factor (VIF) explore the absence of multicollinearity in the model. To achieve the first objective, the empirical results found that product market competitiveness positively contributes to Pakistan's firm performance. The intensified competition motivates firms to improve their efficiency, quality of the products, and innovation. Firms spend on research and development to differentiate themselves and provide greater value, which leads to enhanced goods and services. Besides, product market competitiveness leads to cost-cutting measures, simplified processes, and optimal resource allocation, all of which contribute to increased profitability and overall firm success. To achieve the second objective, the empirical regression equation explores that product market competition increases firms' digital innovation in Pakistan. The growing product market competitiveness has fueled increased digital innovation among firms. Firms are motivated to implement digital technologies and tactics that improve operational efficiency, customer engagement, and overall competitiveness to stand out and win market share. To achieve the third objective, the regression equation explores the partial mediating role of firm digital financial innovation with the relationship between product market competition and firm performance. It shows that although digital financial innovation plays a significant role in transmitting the effect of product market competitions, other factors contribute to the firm performance, and the mediator fails to account for all factors. Numerous other factors include management effectiveness, financial resources, organizational culture, regulatory environment, and competitive strategies that influence the firm performance. It emphasizes that, to some extent, Pakistani firms can increase efficiency by promoting digital financial products and services that cater to evolving market trends and customer demands. A highly competitive environment encourages R&D spending, which leads to product innovation and increases corporate earnings. The mediating development of innovation also suggests that firms that invest in R&D activities have higher profitability

because stakeholders and society perceive firms to have a good reputation.

5.1. Study limitations

Despite the fact that this study provides valuable insights into the interplay between product market competition, digital financial innovation, and firm performance, it is essential to recognize certain limitations. Firstly, the study's reliance on panel data from the Pakistan stock exchange market from 2014 to 2020 may limit the generalizability of its findings to other geographic regions or time periods, given that the dynamics of competition and innovation can vary substantially by context. Secondly, while structural equation modeling (SEM) is a robust analytical instrument, its results depend on the quality of the data used, and measurement error could potentially impact the model's accuracy. In addition, this study focuses predominantly on the association between these variables at the firm level, leaving room for future research to investigate potential industry-level effects and nuances. Furthermore, the study implies a linear relationship between competition, innovation, and firm performance, which may be an oversimplification of these dynamics' complexity. Lastly, while the study emphasizes the positive aspects of innovation driven by competition, it does not delve into potential negative consequences, such as the possibility of unscrupulous practices resulting from aggressive competition. Given these limitations, future research should address these nuances to provide a more complete understanding of the topic.

5.2. Social implications

The findings of this research have significant social implications by highlighting the potential for product market competition to drive innovation, particularly in the context of green technology. As firms intensify their competitive efforts, they are compelled to invest in research and development activities that often lead to the adoption of environmentally friendly practices and technologies. This shift towards sustainability not only benefits the firms themselves but also contributes to broader environmental conservation efforts. Thus, the research underscores the positive societal impact of competition-driven innovation, aligning business objectives with the imperative of environmental responsibility.

5.3. Practical implications

The practical implications of this research are significant for business management. Managers who understand that competition is an accelerator for performance improvement can strategically use it to boost productivity, increase product quality, and foster innovation. This realization offers managers a clear road map for navigating market pressures successfully. Managers can position their companies for long-term growth and profitability by viewing competition as an opportunity rather than a threat.

5.4. Study recommendation

This study recommends that Pakistan pay particular attention to creating a favorable environment for adopting digitization and innovation in all firms. This can be accomplished by stimulating R&D investments, providing tax advantages for digital transformation efforts, and making inexpensive high-speed internet and digital training programs available. Furthermore, encouraging public-private partnerships for innovative projects and collaboration between academia, industry, and government entities to develop a skilled digital workforce can further stimulate the positive impact of digital innovation on firm performance within the competitive landscape.

Author statement

All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated sufficiently in the work to take public responsibility for the content, including participation in the concept, design, analysis, writing, or revision of the manuscript. Furthermore, each author certifies that this material or similar material has not been and will not be submitted to/or published in any other publication.

Declaration of competing interest

All authors have approved this manuscript. The authors have declared no financial or other contractual agreements that might cause conflicts of interest.

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