

The Influence of Digital Technologies, Cultural Diversity, Innovation Capability and Open Innovation on Firm Performance: The Role of Entrepreneurial Orientation

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Abstract

The aim of this research paper is to discover the arbitrating influence of the entrepreneurial orientation in the relationship between Cultural Diversity and Firm Performance as well as between digital technology and firm performance. Another aim of this study is to test the association in-between Open Innovation and the Firm Performance as well as the association between innovation capability and firm performance. SMEs with 5 to 300 employees in Sindh province, Pakistan was utilized to obtain the required data. This article chose SMEs as they form a very important part of the Pakistan economic participation. The hypothesized relationships in the proposed framework were conducted using Smart-PLS. The results reveal that EO, DT, OI and IC have a significant relation with FP. More so, the findings are an indication that the EO is seen as an intervening aspect in the connection between CD and FP. The results of this study are also indicators that EO is a major mediator between DT and FP. Moreover, the results will equip researchers and managers with the better understanding capability of the certain role that the EO plays as the mediator. The findings further show that companies ought to concentrate on how the resources can be utilized to improve their capabilities which will lead to improved performance. The findings motivate the firms to seize the opportunity of new digital technologies and trend of digitalization in industries by being committed in adopting new digital technologies and in modernizing the performance of firms in terms of digital capabilities by becoming leaders in innovation besides enhancing performance of firms.

Keywords: Entrepreneurial orientation; firm performance; cultural diversity; Innovation capability; open innovation; digital technology.

JEL Classification: L25, L26, O31, O32, M14

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1. Introduction

Businesses in today's technological society have problems in innovation and competitiveness as a consequence of technical developments, economic disruptions, and level of market needs (Bhakar, Sharma, & Kumar, 2024). These issues have compelled most of the organizations to redesign their business models. Blistering changes left to the business establishments wondering whether to upgrade or to substitute their long held strategies (Zhao et al., 2024). The most likely means of exiting such unsympathetic competition is the use of technology to innovate commodities, offerings and procedures. One of the problems that SMEs face to succeed in the highly competitive environment is the incorporation of new technologies (Rahahle et al., 2024). A number of researchers state that companies should expeditiously modify themselves to the realities of fast-evolving, hypercompetitive global markets by not only continuously reshaping their decisions and actions in relation to marketing, but also stretching, altering and/or reorganizing their resource foundation (Sullivan & Wamba, 2024).

How well-established firms can perform and attain a long-term competitive advantage to survive in a rapid business environment is a crucial question. The majority of successful companies are stable and potent in satisfying the current requirements of business and simultaneously adjust to the environment variations (Abbas et al., 2024). In the case of traditional SMEs, entrepreneurial orientation (EO) of the company might be deemed an important issue that would characterize such adapting decisions. Thus, EO has an effect on firm recognition of entrepreneurial opportunities and decisions made by a firm regarding the benefit of entrepreneurial opportunities. The degree of EO in a specific firm has been attributed to various results, including firm performance (Kusa, Suder, & Duda, 2024). In addition, EO maximizes the production of companies, the culture aspect is another factor to be considered. Cultural diversity (CD) has the potential to bring numerous opportunities and enable firms to acquire priceless knowledge in addition to the lack of resources and competencies (Dodd et al., 2024). Nonetheless, the association in-between the cultural diversity and firm performance (FP) is not generic including level of EO in the firm (Gavrić & Braje, 2024).

Researchers worldwide are exploring the topic of digital transformation in businesses, particularly in SMEs, to drive innovation and enhance performance (Zhao et al., 2024). Technology adoption is a strategic innovation that significantly impacts a firm's competitive advantages, particularly in terms of performance (Shah et al., 2024). Digital technologies (DT) have proven effective in enhancing financial performance, including functioning and financial aspects (Ferreira, Fernandes, & Veiga, 2024). A balanced introduction of various innovations is necessary to cope with environmental changes and uncertainties (Barba-Sánchez et al., 2024). Innovation is a critical process for firms to deliver new products and services to the market, which affects their survival and desirability in open innovation (OI). OI is a novel idea that enables managers to leverage an organization's company-wide and outside competencies in order to develop their own technologies (Mostafiz, Ahmed, & Hughes, 2025). Moreover, innovation capability (IC)

makes organization create innovations on an ongoing basis in response to the shift in the market environment and imbues it with all the strategies, system and structure that facilitate innovation in an organization (Tehrani et al., 2024).

The past results are fascinating but do not consider the effects of digitalization on EO. It has been demonstrated in the previous literature that CD may serve as a source of generating the EO, which affects FP (Marino et al., 2024). Yet, the mediating role of EO has not been well comprehended for accelerating the association in-between CD and FP, and more studies are needed to explore the processes behind the existence of this nexus (Alqahtani, Uslay, & Yenyurt, 2024). Though the past studies indicated that practices of OI strongly affect the various performance indicators, the connection between OI and FP of SMEs has received minimal interest (Le & Mohiuddin, 2024). Concerning the studies of the innovative ability in large organizations and SMEs, there is partial evidence that has established the affirmative and strong correlation among IC and FP (Osman Zainal Abidin, 2024). This indicates the necessity to undertake more empirical studies in this field, and particularly in the environment of SMEs

The objective of this article is to find the importance of utilization of resources in SMEs and to know the impact of resources like digital technology on FP and also how the innovation impacts the success of the firm. There are various contributions in this research. Firstly, this paper supports the literature by investigating an association in-between EO and digital technologies. Secondly, this research study add novelty to the realm of literature by finding an intervening effect of EO in-between CD and FP. Thirdly, this research gives support to the relationship between open innovation and FP in the perspective of SMEs. Fourthly, this paper highlights the association in-between IC and FP. Finally, this research also contributes to literature as the new conceptual framework has been introduced. In addition to the theoretical contribution, organizations will get knowledge about digital technologies, why they are important and how they can be used to increase FP and how cultural diversity and EO together affects firm performance.

2. Literature Review

2.1 Theoretical Development

2.1.1 *Resource Based View (RBV)*

The theory of RBV in the literature focuses on the influence of the capability of firms in the generation of firm benefits (Helfat et al., 2023). Penrose (1959) developed the theory, RBV contends that the competitive edge of a given organization is stipulated by the critical resources that the organization possesses. On a basic level, the main proponents of the RBV thought of an organization as a collection of assets or resources which are semi-permanently fixed in it. Considering the RBV theory El Nemar et al. (2025) identified EO as the ability of a given organization that is helpful in identifying, evaluating, and exploiting novel opportunities

in a manner that cannot be easily replicated (Ozdemir et al., 2023). The Resource-based view (RBV) theory has an diversified approach that is about the efficient acquisition and utilization of organizational resources (Chatterjee, Rana, & Dwivedi, 2024). A diverse workforce act as a strategic asset that will provide a competitive sales edge due to the development of unique skills, perspectives, and problem solving techniques (Saha et al., 2024). Recent studies clearly hypothesize the concept of digital capabilities (e.g., digital technologies, data infrastructure, digital tools) as strategic resources that contribute to the capacity of a firm to sense and seize market opportunities. Digital capabilities are defined in a study on entrepreneurial performance under metaverse conditions; they are internal strategic resources that reinforce the operational efficiency, innovation and adaptive capacity. These resources allow firms to increase their entrepreneurial activities, as well as responsiveness to dynamic environments (Wang & Zhang, 2024). Therefore, according to the RBV theory, an improved performance of SMEs will be achieved when they concurrently adopt other technologies including AI, big data analytics, IoT, and block chain, in comparison to their counterparts in the same market (Vrontis, Chaudhuri, & Chatterjee, 2022).

2.1.2 Digital Technologies (DT)

Digital technologies include an ample range of technologies and systems, including artificial intelligence (AI), IoT enabled solutions, platforms for cloud computing, big data analytics and block chain that are altering the organizational processes and decision-making (Nassereddine & Khang, 2024). These technologies can be used to elevate efficiency, transparency, and innovation in industries through the collection of data in real-time, the strategic insights and the automation of the same (Nassereddine & Khang, 2024). We could coordinate, trace, and sustain the supply-chain and project-management scenarios with the facilitation of digital technologies that optimize the use of resources and minimize waste (Eze et al., 2025). In addition, digital solution integration improves agility and resilience, enabling companies to act suitably in response to market instabilities and environmental challenges (Neri et al., 2023). The Resource-Based View (RBV) can be an essential theoretical framework to explain the role of digital technologies in organizations. RBV shows that strategic advantage is developed and exploited through the development and use of the valuable resources and capabilities of firms. Such technologies as artificial intelligence, big data analytics, and digital platforms are the key technological assets in the digital era that allow companies to empower their resource base and complement the organizational capacity. Digital adoption and application could be perceived as a strategic approach where companies could use internal resources to facilitate the digital change and development of capabilities. (Gillani et al., 2024)

2.1.3 Cultural Diversity (CD)

Cultural diversity is a practice that describes the existence of culturally different individuals in an organization or a society in terms of their values, beliefs and practices. It boosts creativity, innovation and problem solving because it adds diverse thinking and experiences into

decision making (Kabir et al., 2023). Cultural diversity is a good resource in the sense of the Resource-Based View (RBV) as it is an intangible resource of the organization that makes the firms rich in terms of knowledge base. The variety of cultural backgrounds in the organizations offer heterogenic views, knowledge, and experiences which increase knowledge sharing and organizational learning abilities (Paolone et al., 2024). Cultural diversity enhances inclusiveness, teamwork, and respect towards each other in an organizational setting, enhancing employee engagement and performance. Furthermore different teams are more flexible and able to know the global markets hence enhanced competitiveness and sustainability (Al-Hiyari et al., 2023). However, cultural diversity management also presupposes efficient communication, cultural intelligence and leadership sensitivity to avoid misunderstandings and conflicts (Eden, Chisom, & Adeniyi, 2024).

2.1.4 Innovation Capability (IC)

IC refers to the skill of a firm to repeatedly produce, create and adopt new ideas, products, or processes that consequently increase the performance and competitiveness (Aker et al., 2023). It entails the capacity of a firm to translate expertise and resource into creative results with the help of creativity, teamwork, and life-long learning (Gama & Magistretti, 2025). Strong innovation capacity provides the organizations with the resources to act impactful to changes in the market, advancement in technology, and consumer needs (Bansal et al., 2023). Resource-Based View (RBV) assumes that sustainable competitive advantage is attained when firms develop rare internal resources and capabilities. In this approach, innovation capability has been regarded as a critical organizational capability because it enables companies to re-assemble knowledge, technology, as well as, ability to develop new products and processes. Companies that have superior innovation competencies are in a position to apply their internal resources to create technological developments and high-quality strategic performance (Zhang & Chen, 2025)

2.1.5 Open Innovation (OI)

Open innovation refers to the situation in which organizations take into consideration internal as well as external ideas and knowledge as well as technologies in order to enhance speed and strengthen market competitiveness (Bertello, De Bernardi, & Ricciardi, 2024). Unlike traditional closed frameworks, open innovation encourages interaction with external sources of information, such as customers, suppliers, universities, and research centers, thus allowing companies to access a wide range of knowledge, divide risks and risks, and reduce the cost of development and lead times (Broekhuizen et al., 2023). In the Resource Based View (RBV) terms, open innovation has been theorized as a strategic process whereby companies open up and combine and exploit internal and external resources to develop valuable, rare, and hard-to-replicate capabilities. Open innovation activities such as the establishment of external relationships, sharing of knowledge and co creation are activities that can broaden the resource base of a firm and consequently increase its ability to be innovative and to maintain a competitive edge in a volatile

environment (Huang & Zhou, 2025). Moreover, open innovation fosters innovation, exchange of knowledge, and co-creation enabling organizations to react better to changes in technology and markets. It encourages constant enhancement and flexibility by encouraging cross boundary idea flows (Akimov et al., 2023).

2.1.6 Firm Performance (FP)

The core of the longevity of a firm is its performance (FP). FP is considered a main factor of interest in business and administration research, which spans across different fields such as human resources (HRs) and marketing, to the field of operations management, international business, strategy and information systems (Magnano et al., 2024). Asiaei et al. (2023) asserted that the performance of the organization is playing a high role in determining its success, and the concentration on performance by managers, researchers and practitioners is a major parameter in success of the organization performance (Odhano et al., 2025). Resource Based View (RBV) is a theory that argues that the differences in the performance of firms lie in the heterogeneity of the firm specific resources. Strategic resource endowed firms are in a better position to engage in competitive strategies and, thus, achieve high performance results. In addition, RBV research has justified that internal capabilities and resource configurations determine financial and operational performance, and it is clear that the firm performance is essentially an outcome of resource heterogeneity and strategic utilization. (Arbelo, Arbelo-Pérez, & Pérez-Gómez, 2024)

2.1.7 Entrepreneurial Orientation (EO)

The notion of EO indicates the business decision-making styles, practices, and conduct of administrators, which result in new business progress, new or recognized market, new or existing commodities, or offerings (Prasannath et al., 2024). Researchers have conceptualized EO as a strategic stance that shows practices of strategy making, management viewpoints, and firm level performances that are entrepreneurial in every aspect (Clark et al., 2024). The concept of EO as an organizational quality was first brought to the academic discourse as a result of the understanding that organizations, similarly to individuals, could become entrepreneurial (Wales et al., 2023). (Kusa, Suder, & Duda, 2024) think of EO not only as one of the fixed resources but as an active behavioral pose that represents a value creating processes pattern. They state that EO is concerned with continuous entrepreneurial processes and experimentation, therefore, it acts as a skill that allows firms to integrate and coordinate resources to generate new values. Thus, EO can be theoretically placed as a mediating factor explaining the effect of organizational resources on the performance of firms. Instead of merely enhancing or undermining the linkages among resources and results, EO is the behavioural and strategic pathway wherein firms can utilize technological, cultural, and outputs of innovation to deliver higher performance. (Ahmed et al., 2024).

3. Hypothesis Development

3.1 Entrepreneurial Orientation and Firm Performance

Companies that are Entrepreneurial oriented attempt to discover and utilize new opportunities continuously, develop new values and emerge as market leaders. As per the earlier studies, entrepreneurial orientation is a significant aspect that supports to the successful emergence of new commodities, high financial and nonfinancial corporate productivity and high social impact (Aftab et al., 2024). EO which is a combination of innovativeness, proactiveness and risk taking is a firm specific feature that allows the company to utilize its resources to identify opportunities, innovate and perform at a high level (Labella-Fernández, Martínez-Egea, & Payán-Sánchez, 2026). Over the past few years, the domain of entrepreneurial orientation (EO) has been critically discussed in terms of theoretical and empirical efforts aimed at comprehending the impact that process of entrepreneurial strategy making has on organizational performance (Lazarte-Aguirre, 2024). It has been established in most studies that EO has a valuable influence on the performance of organizations. Arguably, a business possessing a high EO concentrates on achieving a high performance through developing a value-creating strategy that other competitors cannot replicate the gains, or it is too expensive to do so (Crick & Crick, 2023). A very competitive environment may necessitate an increased levels of entrepreneurial orientation to combat competition (Saiyed et al., 2023). Hence, the succeeding hypothesis is suggested.

H1: Entrepreneurial Orientation has a positive influence on firm performance.

3.2 Digital technology and Entrepreneurial Orientation

Digital technology is seen as the adoption or enhanced use of digital technologies, including cloud computing, artificial intelligence, 3D printing, or mobile computing, by the government or industries or organizations (Kraus et al., 2023). In this way, DT encourages the entrepreneurship. These are activities in different forms, including digital products or services, digital platforms, digital tools or infrastructure, digital art, digital entrepreneurial ecosystems, or Internet service innovation (Triyono et al., 2023). In the RBV perspective, the digital technologies, including data analytics, digital platform, and cloud system, are the strategic resources that a firm can mobilize to enhance their entrepreneurial competencies and strategic orientation. Companies that successfully integrate digital technologies in their business operations are in a better position to formulate entrepreneurial strategies and avail chances of innovations in the changing environments (Wulandari & Wardani, 2024). Using digital technologies facilitates the new possibilities to improve existing entrepreneurial orientation by streamlining processes, managerial, and strategic decision-making (market entry, customer targeting, partnership, pricing choices), and customization (Abdelwahed et al., 2025). Digital technologies made it possible to develop new business enterprises and digital start-ups that use new technology as an essential part of their business processes and operations (Yadav et al., 2024). Therefore, this study proposes the following hypotheses:

H2: Digital Technology has a significant impact on Entrepreneurial Orientation.

3.3 Digital technology and firm performance

One of the ways that the usage of digital technologies can improve organization performance is the ability to interact with customers, as it can be achieved more often (Sudirjo et al., 2023). Researchers are more than ever desperate to prove that digital technologies have an unwavering positive effect on the organizational performance (Bunjak et al., 2024). The organization with an entrepreneurial orientation is especially well-performing in the settings where the product and business model life cycles are short, which is the case with digital technology (Abdelwahed et al., 2025). In this vein of reasoning on the topic of inertia, there has been an allusion to the role of digital technologies and EO that could intersect to drive performance (Yadav et al., 2024). Digital technologies may offer numerous opportunities to firms and more opportunities in question offers a higher possibility of finding high-quality opportunities that can carry high potential. In this way, digitalization will be able to affect the configuration of an entrepreneurial orientation in order to reach high performance (Zahra, Liu, & Si, 2022). According to the resource-based view (RBV), digital technologies are viewed as a strategic organizational resource that would help companies to build valuable capabilities and enhance operational efficiency. With the help of digital technologies, including artificial intelligence, cloud computing, and big data analytics, companies can boost the results of innovation and increase their competitive edge, which in the end results in excellent performance of the firm (Abdurrahman, 2025).

H3: Digital Technology has a significant impact on Firm Performance.

H4: Entrepreneurial orientation mediates the relationship between digital technology and firm performance.

3.4 Cultural diversity and Entrepreneurial Orientation

CD can be considered the co-existence of individuals with different group identities in an organization. Researcher shows that diversity entails the involvement of all groups of people in every level of the organization (Dodd et al., 2024). One can also assume that entrepreneurs have to collaborate with other people to polish their ideas and achieve their objectives (Kabir et al., 2023). Pro-entrepreneurial cultures promote the growth of personal characteristics and attitudes that align with entrepreneurship and, therefore, are more preferred to enhance high EO in companies (Chew, Tang, & Buck, 2021). Those organizations that can successfully utilize cultural diversity as a strategic asset are at higher probabilities of developing an enhanced entrepreneurial orientation and building a sustainable competitive advantage in the shaky and knowledge-based markets (Prenzel et al., 2024).

H5: Cultural Diversity has a significant impact on entrepreneurial orientation.

3.5 Cultural diversity and firm performance

Closely linked with the studies on cultural strength, cultural heterogeneity is viewed as a hindrance to organizational performance by the majority. This school of thought conceives culture as a solution to a complicated coordination challenge and considers heterogeneous cultures to be harmful to organizational performance since they weaken interpersonal and internal integration (Prenzel et al., 2024). Al-Hiyari et al. (2023) examined the influence of culture on EO and firm performance on the organizational level. They emphasized the use of the environmental and organizational variables because they are associated with the knowledge of entrepreneurial orientation to firm performance. In terms of the Resource-Based View (RBV), the superior performance is evidenced when firms make good use of the valuable intangible resources, which are entrenched in the organization, such as human capital, knowledge diversity, and cultural capabilities. Cultural diversity is a significant strategic asset as culturally diverse individuals present a heterogeneous knowledge, experiences, and cognitive outlook that improves the capacity of a firm to develop new ideas and entrepreneurial opportunities (Sinha et al., 2023). It has been discovered in numerous various studies that EO significantly effects firm performance (Gavrić & Braje, 2024). Continuing their arguments, CD can add numerous benefits and extra value to the work of a firm provided that it is utilized correctly with the help of EO (Marino et al., 2024).

H6: Cultural Diversity has a significant impact on Firm Performance.

H7: Entrepreneurial Orientation mediates the relationship between Cultural diversity and a firm performance.

3.6 Innovation capability and firm performance

It has abstracted the idea that the innovation capability is the company ability to create a latest outcome by using an integration of the innovation behavior, strategic capacity and within organization technological process (Manigandan & Raghuram, 2024). Innovation capacity of a firm does not solely rely on the capability of acquiring external knowledge, but rather, by far, depends on the capacity of the firm to identify and evaluate the value of the external knowledge and apply the external knowledge (Osman Zainal Abidin, 2024). The RBV suggests that heterogeneous innovation associated capabilities bring about a sustainable competitive advantage since such capabilities are able to convert internal resources into firm value. The empirical studies based on this theory have demonstrated that innovation-based resources and capabilities that are rich and properly utilized can help to enhance the performance of firms (Wang, Lo, & Huang, 2024). Innovation is said to be the key to the success and existence of companies in this informational age. It is true that it offers the roots on which the firm can improve its performance. Previous literature has found a positive correlation between the FP and firm innovation capability (Tehrani et al., 2024).

H8: Innovation Capability has a significant impact on Firm Performance.

3.7 Open innovation and firm performance

OI in the context of organizational innovation is understood as the intentional procurement and sharing of knowledge thus accelerating the internal innovation pathways and market expansion of externally implemented innovations. This assumption is based on the fact that companies must incorporate outside and inside intellectual resources together with parallel inside and outside market access in search of technological progress (Liu, Shi, & Yang, 2022). The open innovation research is a relatively new topic in the spheres of business sciences and management of innovation. Inbound and outbound are applied in this kind of innovation to speed up internal innovation and enhance competitiveness (Le & Mohiuddin, 2024). As the uncertainty and complexity of technology and the environment keep rising, companies are turning to open innovation to guarantee long-term competitiveness (Lu & Chesbrough, 2022). Considering the RBV perspective, open innovation practices help a firm to utilize and integrate internal resources and external source of knowledge and hence strengthen their strategic resource bases. Such combination of internal and external resource will help in enhancing performance of a firm through sharing of knowledge and building on relationships with stakeholders that enhances continuity of competitive advantage (Tsai et al., 2022). There are works that have discussed the overall effects of OI on the firm performance and validated the beneficial impact of items like the OI involvement of a firm (Mostafiz, Ahmed, & Hughes, 2025).

H9: Open Innovation has a significant impact on Firm Performance.

Conceptual Framework

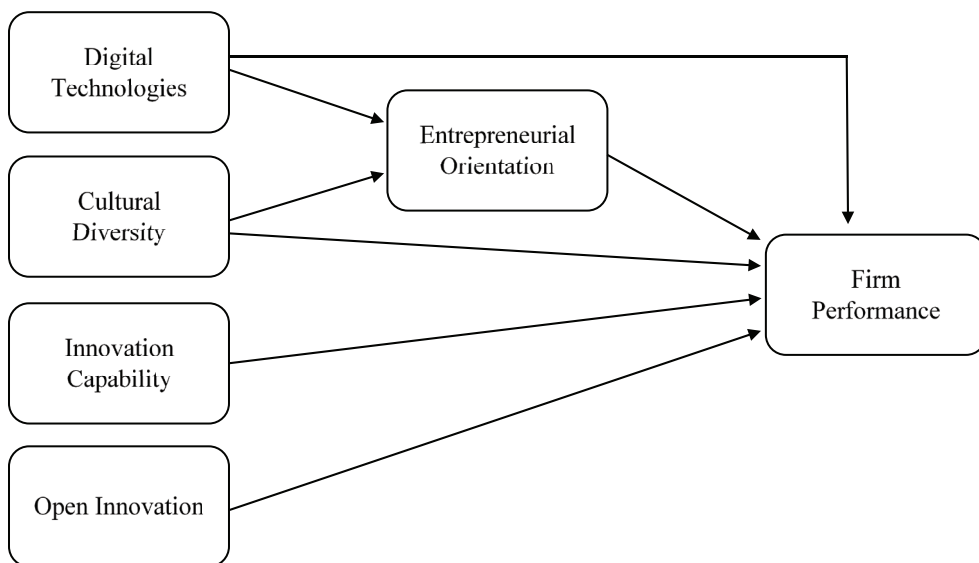


Figure 1: Conceptual Framework

4. Methodology

4.1 Questionnaire Development

The type of instrument used to collect the data in this study was a questionnaire that was self-administered using the web. The questionnaire was divided into parts that covered demographic variables, measures related to the use of DT, EO, IC, OI, SD, and the FP measures. All items used were included after thorough examination of relevant literature. Where validated measures of those before were available, these measures were taken over; otherwise, known scales were modified, adding new items and/or changing existing ones. Everything was carefully revised by a small group of professionals who comprised four researchers who had expertise in the subject matter and 2 practitioners in the industry who had more than two decades of management experience in the industry. To guarantee the validity of the measurement scales and address any possible bias of the researcher, the panel discussed the correspondence of every item to the underlying constructs, validity of the wording of the items, and the possibilities to improve the wording. The attitude of the respondents was measured in a 5-point likert scale that range from 1 = strongly disagree, through 3 = neutral, to 5 = strongly agree.

4.2 Measures

As seen in Table 1, the research utilized previous studies and workshop discussions to develop a scale of items, which were tested in a pilot study and assessed using exploratory factor analysis to ensure content validity.

Table 1
Constructs and Items

S.No	Variable	No.of Items	Sources
1	Firm Performance	4	(Niemand et al., 2021)
2	Entrepreneurial Orientation	7	(Niemand et al., 2021)
3	Innovation Capability	3	(Chi, 2021)
4	Open Innovation	4	(Singh et al., 2021)
5	Culture Diversity	3	(Luijters, Van der Zee, & Otten, 2008)
6	Digital Technologies	4	(Bag et al., 2021; Saunila et al., 2019)

4.3 Sample Size

The sample was taken among the SMEs with a range of employees ranging between 5 and 300 in the province of Sindh, in Pakistan. The rationale behind the selection of SMEs in this study was that they are an important economic involvement of Pakistan. The method of identifying the sample was the stratified proportional random sampling method. Moreover, the researchers employed the simple random sampling technique in the selection of the respondents (Pribadi, Ridwan, & Tjalla, 2025).

4.4 Data Collection

Data collection was done through questionnaires. The respondents were asked to consent to take part in the survey before the data collection took place, 400 questionnaires were distributed randomly among the employees of SMEs. Nevertheless, 388 questionnaires were obtained and two of them are not included in the study due to the lack of a significant part of the questionnaire. Thus, 386 responses were deemed to be utilized in this study. Out of 386 respondents of the survey were Graduate (32.3%), Postgraduate (18%), M Phil (38.4%) and Doctorate (11.3%). The mainstream of the respondents was male (57.2%) and female (42.8%). Most of the respondents fall under the age group of 31-40 which is 35.7%.

Table 2
Respondents' Profile

Variable	Category	Frequency	Percent
Gender	Female	142	36.6%
	Male	244	63.4%
Age Group	21-30 years	102	26.5%
	31-40 years	138	35.7%
	41-50 years	129	33.4%
	More than 50 years	17	4.4%
Education	Graduate	125	32.3%
	Postgraduate	70	18%
	M Phil	147	38.4
	Doctorate	44	11.3%
Marital Status	Single	123	31.8%
	Married	263	68.2%

4.5 Data Analysis Techniques

The information established in this study was handled and analyzed using this analytical tool Smart PLS 4. The smart-PLS-SEM approach to theory development is a typical element of investigative research that is used by researchers. Structural equation modeling (SEM) method supports in the analysis of the linear relationships between the latent constructs and the manifest variables. The partial least squares (PLS-SEM) is used to refer to multivariate statistical solutions to test a measurement model at the same time, such as, the relation between study constructs and its

agreeing pointers with a structural model to signal the relation between the constructs. It can also come up with available parameter estimates that can be used to gauge the relationship between unobserved variables. Typically, in the single proposed models with multiple associations, the computation and testing of many associations are allowed by the SEM technique rather than testing the connections individually. The prospective study used the PLS-SEM method to filter and evaluate the facts received because it assists in empirical assessment of the created model (Abbas et al., 2019).

4.6 Results and Analysis

Internal consistency: The internal consistency has been determined through values of Cronbach alpha in the current research. The findings are of the study are in Table 3. The alpha values of Cronbach were greater than the recommended alpha of 0.70 by (Gadermann, Guhn, & Zumbo, 2012): CD ($\alpha=0.745$), DT ($\alpha=0.701$), EO ($\alpha=0.788$), FP ($\alpha=0.756$), IC ($\alpha=0.718$) and OI ($\alpha=0.732$).

4.7 Convergent validity

The convergent validity was measured using factor loadings, average variance extracted (AVE) index and composite reliability (CR). The gauge of all the factors also within the prescribed value of >0.60 (Hair et al., 2011). Other researchers suggest avoiding the removal of items with values that are > 0.4 and less than 0.7 (F. Hair Jr et al., 2014). According to the statistical analysis, the outer model also received the results that were more than the recommended ones of $CR > 0.7$, whereas constructs with $AVE > 0.5$ are FP, CD, DT, EO, IC and OI.

Table 3
Reliability Analysis and Convergent validity

Variables	Items	Outer Loadings	Cronbach's alpha	Composite reliability	Average variance extracted (AVE)
Cultural diversity	CD1	0.802	0.745	0.684	0.690
	CD2	0.851			
	CD3	0.817			
Digital Technology	DT1	0.772	0.701	0.605	0.653
	DT2	0.728			
	DT3	0.781			
	DT4	0.723			
Entrepreneurial orientation	EO1	0.894	0.788	0.705	0.549
	EO2	0.747			
	EO3	0.778			
	EO4	0.843			
	EO5	0.749			
	EO6	0.794			

Table to be continued...

Firm performance	EO7	0.860			
	FP1	0.767	0.756	0.782	0.575
	FP2	0.838			
	FP3	0.751			
Innovation capability	FP4	0.763			
	IC1	0.791	0.718	0.719	0.640
	IC2	0.797			
	IC3	0.812			
Open Innovation	OI1	0.765	0.732	0.762	0.593
	OI2	0.874			
	OI3	0.783			
	OI4	0.701			

4.8 Cross loadings

It is shown in Table 4 that the item loads on its intended construct are stronger compared to the other items (loads on other constructs); the differences in cross-loadings are also greater than the recommended cut-off of 0.1 (Gefen & Straub, 2005), which also proves discriminant validity

Table 4
Cross loadings

	Cultural diversity	Digital Technology	Entrepreneurial orientation	Firm performance	Innovation capability	Open Innovation
CD1	0.802	0.343	0.287	0.108	0.309	0.390
CD2	0.851	0.456	0.339	0.110	0.294	0.362
CD3	0.317	0.014	0.069	0.140	0.138	0.093
DT1	0.383	0.663	0.418	0.159	0.331	0.426
DT2	0.356	0.729	0.386	0.198	0.351	0.332
DT3	0.244	0.602	0.264	0.169	0.274	0.299
DT4	0.247	0.693	0.446	0.178	0.256	0.397
EO1	0.136	0.269	0.434	0.138	0.209	0.185
EO2	0.161	0.239	0.507	0.146	0.103	0.188
EO3	0.189	0.324	0.611	0.132	0.252	0.227
EO4	0.246	0.347	0.643	0.186	0.266	0.299
EO5	0.204	0.299	0.549	0.197	0.234	0.303
EO6	0.348	0.456	0.695	0.244	0.301	0.382
EO7	0.192	0.382	0.650	0.319	0.288	0.369
FP1	0.107	0.205	0.283	0.768	0.246	0.204
FP2	0.165	0.315	0.320	0.838	0.263	0.288
FP3	0.057	0.106	0.193	0.651	0.102	0.133
FP4	0.106	0.121	0.224	0.764	0.204	0.333
IC1	0.285	0.357	0.343	0.227	0.791	0.465
IC2	0.292	0.350	0.315	0.217	0.797	0.370
IC3	0.305	0.369	0.331	0.231	0.812	0.328
OI2	0.010	0.103	0.184	0.009	0.043	0.094
OI3	0.336	0.343	0.351	0.272	0.421	0.783
OI4	0.387	0.471	0.381	0.190	0.296	0.601
OI1	0.258	0.399	0.341	0.245	0.322	0.766

4.9 Heterotrait-Monotrait ratios (HTMT)

It is necessary to use the HTMT as a criterion where it is compared with a predetermined threshold. In case the value of the HTMT exceeds this level, it is possible to conclude that there is a deficiency of discriminant validity. According to some authors, this threshold is 0.90 (Henseler, Ringle, & Sarstedt, 2015).

Table 5
Heterotrait-Monotrait ratios (HTMT)

Variables	Cultural diversity	Digital Technology	Entrepreneurial orientation	Firm performance	Innovation capability
Cultural diversity					
Digital Technology	0.901				
Entrepreneurial orientation	0.605	0.851			
Firm performance	0.288	0.366	0.889		
Innovation capability	0.634	0.683	0.569	0.834	
Open Innovation	1.020	1.025	0.899	0.519	0.872

4.10 Discriminant validity

The discriminant validity was assessed in accordance with the line of thought suggested by Fornell and Larcker (1981). The assessment identifies the uniqueness of the measurement items. The criterion compared the square root of average variance extracted (AVE) of individual construct (i.e. diagonal items) and inter-construct (off-diagonal) correlations. According to Table 6, no diagonal element was higher than off-diagonal correlation, which proves that the constructs are empirically different.

Table 6
Discriminant validity

	Cultural diversity	Digital Technology	Entrepreneurial orientation	Firm performance	Innovation capability	Open Innovation
Cultural diversity	0.700					
Digital Technology	0.459	0.673				
Entrepreneurial orientation	0.370	0.575	0.590			
Firm performance	0.152	0.261	0.343	0.758		
Innovation capability	0.367	0.449	0.412	0.282	0.800	
Open Innovation	0.443	0.546	0.491	0.329	0.485	0.627

4.11 Structural model

The structural model has been created based on bootstrapping of 5,000 subsections. The structural model is accessible in Figure 2, and the model and hypotheses' outcomes are in succeeding sections.

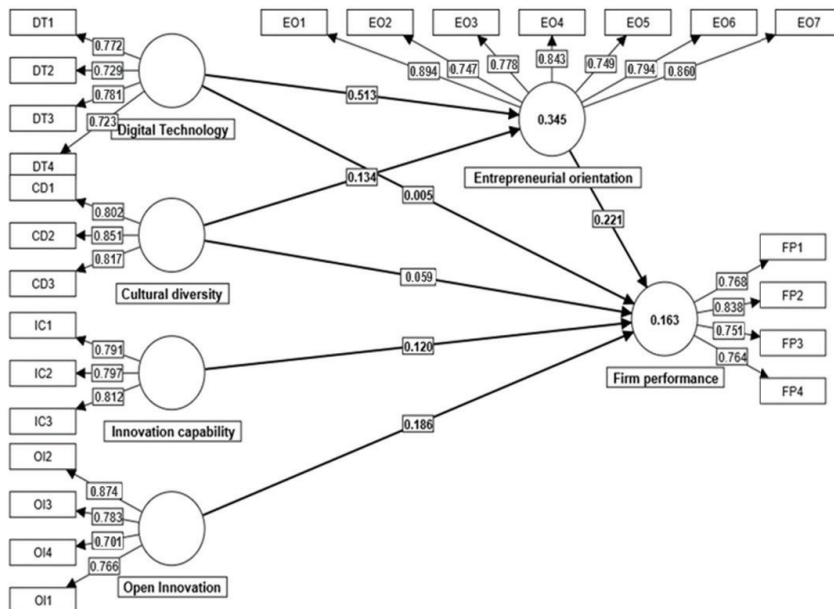


Figure 2: Structural Model

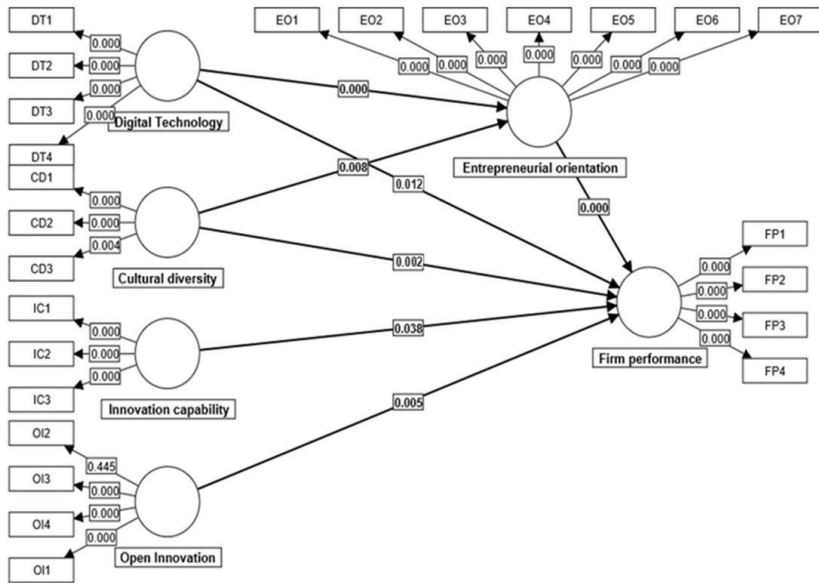


Figure 3: Measurement Model

4.12 Predictability of the model

Table 7 indicates that the adjusted R 2 values of the endogenous constructs are greater than 0.10, which means that the structural model has adequate predictive power.

Table 7
Predictability of the Model

	R-square	R-square adjusted
Entrepreneurial orientation	0.345	0.341
Firm performance	0.163	0.152

4.13 Hypothesis Results

The hypothesis outcomes are sum up in Table 8 with a total of nine out of twelve hypotheses being supported. Path coefficients in the structural model are the specified relations between variables (Crick & Crick, 2023). The results from Table 8 present the hypothesis testing outcomes of the structural model using bootstrapping (re-sampling = 1000). The findings reveal that EO has a significant and positive relationship with FP (H1: $t = 3.703, p = 0.000$). Digital technologies (DT) significantly influence EO (H2: $t = 12.137, p = 0.000$) and FP (H3: $t = 3.081, p = 0.002$), while EO meaningfully arbitrates the relationship between DT and FP (H4: $t = 3.460,$

$p = 0.001$). Cultural diversity (CD) positively affects EO (H5: $t = 2.659$, $p = 0.008$) and FP (H6: $t = 1.969$, $p = 0.012$), and EO mediates their relationship (H7: $t = 1.993$, $p = 0.046$). Moreover, innovation capability (IC) (H8: $t = 2.080$, $p = 0.038$) and open innovation (OI) (H9: $t = 2.790$, $p = 0.005$) both positively and significantly impact FP. Overall, all hypotheses were supported, confirming that EO plays a central mediating role in strengthen firm performance through digital, cultural, and innovation factors.

Table 8

Hypothesis testing

Hypothesis	Hypothesis statement	Path Coefficient	SD	T-values	P-values	Decision
H1	EO -> FP	0.221	0.060	3.703	0.000	Accepted
H2	DT -> EO	0.513	0.042	12.137	0.000	Accepted
H3	DT -> FP	0.005	0.064	3.081	0.002	Accepted
H4	DT -> EO -> FP	0.114	0.033	3.460	0.001	Accepted
H5	CD -> EO	0.134	0.051	2.659	0.008	Accepted
H6	CD -> FP	0.059	0.061	1.969	0.012	Accepted
H7	CD -> EO -> FP	0.030	0.015	1.993	0.046	Accepted
H8	IC -> FP	0.120	0.058	2.080	0.038	Accepted
H9	OI -> FP	0.186	0.067	2.790	0.005	Accepted

5. Discussion

There were nine hypotheses that were tested where all but two were supported. Hypothesis (H1) is the hypothesis that there will be a constructive correlation between the entrepreneurial orientation (EO) and the firm performance (FP). The analysis provided a high $\beta = 0.221$, which supports the extensive previous studies Kusa, Suder and Duda (2024) on the positive effect of EO on FP. Hypothesis (H2) investigate the connection between DT and EO. The statistically significant results ($\beta = 0.513$) support the idea that the adoption of DT can improve EO explored by Yadav et al. (2024). Hypothesis (H3) deals with the correlation between DT and FP. The calculated effect size ($\beta = 0.005$) is also consistent with the previous research that indicates how digital technologies, like social media and e-commerce, may enhance the performance of firms by helping them interact with customers which is evidenced by Abbasi and Hamid (2024). Hypothesis (H4) is a test of EO between the DT and FP. The mediation analysis yielded a positive indirect effect ($\beta = 0.114$) which is in line with literature which suggests that the novel DT initiatives coupled with EO can raise FP, as shown in the study of Han et al. (2024). Hypothesis (H5) claims that there is a significant correlation between corporate diversification (CD) and EO. This statement is justified by the data (the significance of $\beta = 0.134$), which is similar to the study of Prenzel et al. (2024), who stated that the EO of firms is enhanced by unique values produced with the help of CD. Hypothesis (H6) is founded on the association between cultural diversity and FP. The positive influence ($\beta = 0.059$) proves that previous researchers noted that culturally heterogeneous

teams are more likely to produce better performance in comparison to homogenous teams, which results in the more efficient resolution of the problems (Torchia & Solarino, 2025). Hypothesis (H7) examines EO as a mediator variable between CD and FP. There was a significant mediating effect ($\beta = 0.030$) which can be resonant with the resource-based perspective that culture, when unique, valuable and non-imitative, can generate EO as a strategic resource (Hernández-Linares et al., 2024). Hypothesis (H8) looks at how information complexity (IC) affects FP. The findings indicate the positive effect ($\beta = 0.120$), which is consistent with the past research that indicates the impact of IC on the effectiveness of SMEs positively (Manigandan & Raghuram, 2024). Hypothesis (H9) determines the correlation between open innovation (OI) and FP. The analysis shows that the coefficient of determination (OI) is large and positive ($\beta = 0.186$) as it confirms previous studies showing that OI results in more favorable firm performance due to the ability to identify technology, communicate externally, and expand the network with a foreign industrial partner (Mostafiz, Ahmed, & Hughes, 2025).

The study has a contribution to theory by combining the Resource-Based View (RBV) and Entrepreneurial Orientation (EO) in one unified framework, proving that Digital Technologies (DT) and Cultural Diversity (CD) serve as the strategic resources, EO is an organizational ability, and Firm Performance (FP) is a final product. The mediating effect of EO emphasizes that resources do not necessarily lead to performance but EO offers the routines and processes, i.e., innovativeness, proactiveness, and risk-taking, in which the resources are mobilized successfully, which is in line with RBV. Also, the findings build upon the premise that Innovation Capability (IC) and Open Innovation (OI) that allow firms to capitalize on internal and external resources to produce high performance is essential, in the context of maintaining the competitive advantage and achieving high performance outcomes out of heterogeneous resources.

5.1 Theoretical Implications

The research builds on the Resource-Based View (RBV) by hypothesising the strong relations between strategic resources. It assumes that digital technologies and cultural diversity are valuable and heterogeneous resources (Willie, 2025). Their interaction increases the performance of firms and this is through their synergistic interaction which occurs through the entrepreneurial orientation and implemented by the innovation capability and open innovation (Kusa, Suder, & Duda, 2024). The findings refine the RBV theoretically and explain how intangible resources and dynamic capabilities apply co-evolution to create workable competing edge (Ashfaq et al., 2025). The study therefore offers a more comprehensive understanding of the coordination of resources and establishes that complementarities and orchestration of resources, and not their presence, provide the basis of high performance (Abdurrahman, 2025).

5.2 Practical Implications

The outcomes of this study show that firms ought to concentrate on the way resources can be utilized to increase their capabilities that will subsequently lead to improved performance.

Results also motivate the firms to make the risk of newer digital technologies and digitalization trend in industries, by being determined to adopt new digital technologies and enhance digital capabilities to become leaders in innovation as well as to progress the performance of organizations. In relation to the implication of the public policies, the findings indicate that SMEs which form open innovation and eco-innovation increase their performance, resulting in improved financial outcomes. As such, the implementation of such practices should be promoted through the use of public policies (Campos-Núñez & Serrano-Malebrán, 2024). The research on the topic of DT and EO has been extensively discussed in science, but the additional worth of our study is that these dimensions are discussed as one process. The study will be useful in empirically validating the relationship between digitalization and EO by testing a number of hypotheses.

5.3 Managerial Implications

The present research has numerous implications on the managers of industrial firms. The paper has emphasized strategic resources infrastructure especially behaviors of the managers such as EO as being critical in supporting FP. The findings indicate that the resources have a direct impact on FP and competitive advantage. To improve FP, managers are to introduce multiple entrepreneurial behaviors, which include reactivity, innovativeness, and risk-taking (Abdelwahed et al., 2025). The contribution that the manager can make is the most crucial, as it shows that the attempts, investments, and the successful implementation of the innovation model can positively affect EO outcomes and FP. The firms should also strive to enhance their capabilities and absorptive capacity to create competitive advantage using open innovation. The managers should be vigilant and expect their organization to respond to slowing changes because absent articulation of digital strategy may cause ductal agendas and a failure to find unity of purpose with new ventures. The research offers a significant contribution to company's managers who want to enhance IC, preferring quick adjustment to the ongoing market shifts and greater short and long-term performances.

6. Conclusion

Over past few years, complex and competitive environment has ensured organizations embrace innovative activities in order to survive and to have competitive advantage of others as opposed to past to enhance firm performance. In fact, through defining spatial and temporal frames of entrepreneurial actions, DT, CD, OI and IC minimize numerous limitations on the FP achievement. This result adds to the literature development since it explains that entrepreneurially oriented firms are better placed to revitalize and generate new resources, capitalize on riskier opportunities, and stimulate new ideas. The managers should also be able to build the skills in the condition of entrepreneurship. The fear of failure can be the key performance barrier especially to SMEs. Thus, Organizations with a strong entrepreneurial mindset and a supportive environment can respond to environmental changes and seize opportunities. In today's world, open innovation is critical for recognizing skills beyond the business, purchasing external technologies, and

establishing creative activities. Firms should see digital technologies as an opportunity for innovation, risk-taking, and development into new international markets, allowing them to become more aggressive.

6.1 Limitations and Future Research Directions

This study has certain limitations. First, the findings are founded on the sample of SMEs of the country of Pakistan. Even though we did not encounter any evidence of a certain bias in the sample selection and chose this region due to the current tendency of embracing digitalization. The future studies are further open due to the way this research was conducted in SMEs. As an illustration, the analysis can be useful in duplicating the analysis in organizations in other industries, e.g., the technology or food industry, to gain a clearer insight into the applicability of findings. Further studies may also aim at removing the subjectivity in the responses by using more objective measures. e.g., key performance indicators could be obtained empirically in order to be more objective in assessing the achieved results. It may be interesting to make some investigations into how the various political, economic, social and environmental contexts may affect the model relationships. Lastly, the paper has studied the general impact of CD dimensions. Thus, the forthcoming researches are advised to focus on the effects of each dimension separately to confirm the great functions of each dimension in the presented model. In addition, the future research can also test how open innovation or innovation ability affects the performance of firms mediated by EO.

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