Digital Entrepreneurship! Nexus among Industry 4.0 enablers, environmental dynamism, and SMEs environmental performance: A mediated-moderated perspectives

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Digital Entrepreneurship! Nexus among Industry 4.0 enablers, environmental factors, and SMEs environmental performance

Abstract:

Purpose: There is currently a lack of comprehensive examination in the research field exploring the relationship between digitalization and environmental performance (EP) in manufacturing small and medium-sized enterprises (SMEs). This study investigates the relationship between digital technologies, digital organizational culture (DOC), environmental dynamism, and EP through the mediation of innovation capacity (IC) and moderation of perceived environmental volatility and green strategic intent (GSI).

Design/ methodology/approach: The data were garnered from 473 managers of manufacturing SMEs in Pakistan. Partial Least Square Structural Equation Modeling (PLS-SEM) was applied to examine the mediation and moderation effects. Multiple regression analysis was used to see the influence of digital technologies, DOC, environmental dynamism, innovation capacity, perceived environmental volatility, and GSI on SMEs environmental performance.

Results: Results indicate a statistically significant direct relationship between digital technologies, environmental dynamism, and EP. While an insignificant direct relationship between DOC and EP. Furthermore, the results reported a significant result between digital technologies, DOC, environmental dynamism, and IC. Similarly, IC significantly mediated the relationship between digital technologies, DOC, environmental dynamism, and EP. Moreover, results reported that perceived environmental volatility does not moderate the relationship between IC and EP, while GSI significantly moderates between IC and EP.

Practical Implications: Policymakers must emphasize advancing digital integration to enhance manufacturing SMEs' efficiency and environmental effectiveness.

Originality/value: This is the first research that incorporates digital technologies, environmental factors, and innovation capacity to measure environmental performance in line ~~of~~ with Natural Resource Orchestration Theory (natural ROT). All the variables significantly measure environmental performance instead of digital organizational culture. Perceived environmental volatility also does not moderates.

Keywords: Industry 4.0 enablers, digital organizational culture, environmental dynamism, innovation capacity, SMEs environmental performance

1. Introduction

Industry 4.0 has emerged because of rapid advancement in technologytechnological advancements and digital transformation observed across various industries. The rapid advancement of digital technology is causing significant changes in multiple industries (Rehman *et al*., 2023b), forcing the manufacturing sector to make crucial decisions (Merhi and Harfouche, 2023). These decisions include the need to be digitalized, which will help gain sustainability (Rehman *et al*., 2023b). While manufacturing SMEs recognize the potential of digitalization to enhance efficiency and competitiveness (Riaz et al., 2023b), the impact on environmental performance (EP) remains poorly comprehended due to its intricate nature. One possible reason for the poor comprehension of EP is rapid technological change. Understanding how digital enablers promote adopting eco-friendly practices in SMEs is crucial.

Digitalization catalyzes innovation capacity, creating a creative environment. Digital technologies streamline processes, boost efficiency, and collect valuable data, laying the groundwork for innovation (Yang *et al*., 2024). In a digital world, data analytics, AI, and automation can help businesses innovate by providing insights and making informed decisions (Rehman *et al*., 2023b). Similarly, Troise *et al*. (2022) argued about the role of digital technologies and innovation in making SMEs agile. Digital tools and platforms make companies more agile and responsive to market demands, allowing them to adapt faster to trends and technological shifts *(Giacosa et al*., 2022). Moreover, DOC improves collaboration, which leads to enhanced innovation capacity. Interconnectedness allows diverse perspectives to converge and inspire new ideas. Digitally fluent workers can also use AI and data analytics to gain insights and solve problems creatively.

SMEs face constant change, uncertainty, and changing market conditions (Lei and Bustami, 2023; Zhao and Kakhai, 2023; Almerri, 2023; Thuy et al., 2023; Khababa and Jalingo, 2023; Zighan and Ruel, 2023). Furthermore, SMEs encounter numerous challenges, including insufficient financial resources, contacts, and information (Troise *et al*., 2023). These challenges make SMEs more dynamic (Riaz et al., 2023b), and dynamicity often spurs innovation in SMEs and lets them adapt quickly to external changes, encouraging innovation to stay competitive (Scuotto *et al*., 2024). In dynamic environments, SMEs face market fluctuations, technological advances, and changing consumer preferences. To navigate and capitalize on these changes, these businesses must find innovative solutions (Riaz et al., 2023a). SMEs develop new products, services, and processes to differentiate themselves in a fast-changing environment, contributing to innovation. This study takes on a major challenge by exploring the complex factors that affect digitalization and EP. The study framework goes beyond individual technological solutions and includes digital technologies and DOC as key IC drivers, improving EP.

Digital entrepreneurship is essential for SMEs because it improves their environmental performance by facilitating effective resource management and minimizing waste with innovative technologies (Olan *et al*., 2024b). Adopting digital tools can result in more environmentally friendly corporate practices and a reduced carbon impact (Olan *et al*., 2024a). Moreover, researchers showed that advanced technologies reduce costs (Abd Alhadi and Fllayih, 2023). This research demonstrates substantial advancements across various previously ignored dimensions (Yang et al., 2024; Rehman et al., 2023b). Firstly, it offers a comprehensive framework encompassing both digital enablers and organizational factors within the natural ROT framework. Moreover, it highlights the crucial role of IC as a mediator, demonstrating how digital resources are converted into quantifiable environmental improvements. Finally, it examines how perceived environmental volatility and GSI moderate the effects, providing valuable insights into the contextual factors that affect the effectiveness of digitalization in promoting sustainable practices. This study examines more than just technological solutions Jian and Afshan (2023) and the complex factors Zhang et al. (2022) that affect EP from digitalization. This resource gives policymakers and practitioners the skills to navigate this crucial moment. By using digitalization to innovate and aligning strategic goals with environmental stewardship, we can help small and medium-sized manufacturing companies lead the way to a sustainable future.

Based on studies mentioned above, this research proves that previous researchers ignored the influence of digital technologies, DOC, environmental dynamism, innovation capacity, perceived environmental volatility, and GSI to determine SMEs environmental performance in light of natural ROT (Kastelli et al., 2022; Leal-Rodríguez et al., 2023; Riaz et al., 2023b). This research will cover this gap by concentrating on digital technologies, DOC, environmental dynamism, innovation capacity, perceived environmental volatility, and GSI that can enhance the environmental performance of SMEs. Based on the above discussion, the following are the research questions and objectives of the study.

The following are the research questions;
RQ1: Do digital technologies, DOC, and environmental dynamism affect EP?
RQ2: Do digital technologies, DOC, and environmental dynamism affect innovation capacity?
RQ3: Does innovation capacity significantly mediate between digital technologies, DOC, environmental dynamism, and EP?
RQ4: Does perceived environmental volatility and GSI significantly moderate between innovation capacity and EP?

The following are the research objectives;
RO1: To identify the relationship between digital technologies, DOC, environmental dynamism, and EP.
RO2: To identify the relationship between digital technologies, DOC, environmental dynamism, and innovation capacity.
RO3: To identify whether innovation capacity significantly mediates between digital technologies, DOC, environmental dynamism, and EP.
RO4: To identify whether perceived environmental volatility and GSI significantly moderate~~s~~ innovation capacity and EP.

The results of this study will provide new and valuable information about the impact of digital technologies, DOC, environmental dynamism, and IC on enhancing EP. Additionally, it will offer practical guidance for managers who aim to enhance their organization's environmental performance. Industrial practitioners, environmental policymakers, businessmen and scholars agree that there should be a focus on the environment (Rehman et al., 2022b; Kraus et al., 2020; Bresciani et al., 2023; Bresciani et al., 2022). Hence, this study focuses on factors that determine environmental performance. This study aims to improve the comprehension of the intricate connections among digital technologies, DOC, environmental dynamism, IC, and EP in manufacturing SMEs. The owners of Pakistani manufacturing SMEs can ~~get the advantage of~~benefit from improved EP by utilizing digital technologies, DOC, environmental dynamism, IC, perceived environmental volatility, and GSI. The findings of this study can provide valuable insights for future research and contribute to the formulation of efficient strategies for promoting sustainable practices based on the natural ROT.

2. Theoretical background

2.1 Natural Resource Orchestration Theory

The natural ROT posited a correlation between natural resources, strategies, environmental practices, and business performance (Asiaei *et al*., 2023). Digital technologies, DOC, and environmental dynamism are all viable resources businesses can utilize to achieve environmental performance (Leal-Rodríguez et al., 2023). These resources can be regarded as assets that organizations can align and coordinate to attain exceptional performance (Asiaei *et al*., 2022). In this context, digital technologies refer to the resources that help organizations in sustainability and environmental stewardship (Rehman *et al*., 2023b). Businesses utilize technological tools and platforms to manage and analyze sustainability-related data effectively. Environmental dynamism forces organizations to develop methodologies and strategies to innovate capacity and mitigate their ecological footprint (Yang *et al*., 2024). Organizations can optimize their sustainability and environmental stewardship performance by harmonizing and synchronizing these resources (Asiaei *et al*., 2023). Organizations can utilize their digital technologies, for example, to develop and implement efficient innovation strategies or employ green strategic initiatives to reduce environmental impact in conjunction with digital technologies (Jirakraisiri *et al*., 2021). Innovation capacity is essential for effectively coordinating resources and achieving sustainable performance. This facilitates the connection between these resources and sustainable performance, yielding more precise outcomes. This study examines the constructs in the context of natural ROT.

3. Hypotheses development

3.1 Digital Technologies, Environmental Performance, and Innovation Capacity

Digital technologies are crucial for innovation and environmental performance (Hung and Nham, 2023). Technology ~~plays a~~ crucial ~~role in~~to organizations success (Hien et al., 2023). Advanced technologies improve firms performance (Alqasa and Talat, 2023; Majeed et al., 2023). Pascucci *et al*. (2023) reported the importance of digital technologies in restructuring the processes of organizations and innovation. Restructuring boosts operational efficiency and product and service innovation capacity. According to Riaz et al. (2023b), digital platforms, big data analytics, and artificial intelligence drive innovation. These technologies allow firms to analyze massive amounts of data, find patterns, and gain actionable insights to create new and improved products. Chen *et al*. (2023) link digital technologies to sustainability and environmental performance. Organizations can optimize processes, reduce waste, and improve environmental efficiency by using digital tools to monitor resource usage in ~~real time~~real-time. Aqmala and Putra (2023) show how digital technologies help businesses reduce their environmental impact by promoting eco-friendly practices. Furthermore, it was argued that digitalization could improve environmental performance by optimizing resource use, promoting circular economy practices, and encouraging sustainable business models (Mondal *et al*., 2023). The literature strongly suggests that adoption of digital technology, innovation capacity, and environmental performance are positively correlated. Integration of these technologies drives innovation and facilitates environmentally sustainable strategies, aligning with economic and ecological harmony goals (Mondal et al., 2023; Zhang et al., 2022; Giacosa et al., 2022). Thus, we propose the following hypotheses:

H_1: Digital technologies are positively related to environmental performance.

H_2: Digital technologies are positively related to innovation capacity.

3.2 Digital Organizational Culture, Environmental Performance, and Innovation Capacity

Digital organizational culture is a workplace's values, attitudes, and practices prioritizing digital technology integration and use. It emphasizes adaptability, continuous learning, and digital tools to improve efficiency, innovation, and collaboration. Leal-Rodríguez *et al*. (2023) have examined how a digital culture, which embraces digital tools and mindsets, boosts innovativeness. Staff is more likely to solve problems creatively and innovate in a culture that values digital fluency and encourages experimentation (Auernhammer and Hall, 2014). Rehman *et al*. (2023b) show that organizational culture affects environmental management practices. A digital organizational culture that emphasizes adaptability and continuous improvement may benefit environmental initiatives. Digital technologies can streamline processes, promote sustainability, and help organizations monitor and reduce their environmental footprint (Martínez-Caro *et al*., 2020). Martínez-Peláez *et al*. (2023) also emphasize the role of digital culture in promoting sustainability through innovation and environmental responsibility. A digitally mature organizational culture encourages innovative use of digital tools and aligns them with environmental goals, creating a more comprehensive and sustainable business strategy. The literature suggests that digital organizational culture, innovation capacity, and environmental performance are positively correlated. Innovative and environmentally responsible practices often work together in digitally ready and sustainable organizations. To understand this relationship's complexities and trade-offs, ongoing research is needed. Thus, the following are the research hypotheses:

H_3: DOC is positively related to environmental performance.

H_4: DOC is positively related to innovation capacity.

3.3 Environmental Dynamism, Environmental Performance, and Innovation Capacity

The environment's change, uncertainty, and turbulence are called environmental dynamism. It shows the speed and unpredictability of technological advances, market conditions, competition, regulations, and social trends. Organizations must be flexible and adaptable to handle rapid changes in a dynamic environment. Recent studies have examined the relationship between environmental dynamism and innovation (Chaudhuri *et al*., 2023). Rapid and unpredictable changes in the external environment critically affect organizational outcomes. Since they must adapt to changing challenges, dynamic organizations are more likely to innovate (Zhang *et al*., 2023). Furthermore, it was argued that an organization's ability to create and implement new ideas is thought to thrive in changing and uncertain environments (Sheng, 2017). The literature suggests that environmental dynamism positively affects IC and performance (Chaudhuri et al., 2023; Yu et al., 2022; Saeed et al., 2021). Dynamic organizations innovate more, which improves environmental performance. This review provides a foundation for empirical research to understand how organizations navigate complex and rapidly changing environments. The following are the study hypotheses:

H_5: Environmental dynamism is positively related to environmental performance.

H_6: Environmental dynamism is positively related to innovation capacity.

3.4 Innovation Capacity and Environmental Performance

Innovation is crucial to developing eco-friendly technologies and processes that reduce environmental footprints (Paparoidamis and Tran, 2019; Saqib et al., 2024). According to

Bresciani et al. (2023), organizations with strong innovation capacities are better able to develop and implement environmentally friendly practices, improving environmental performance (Rehman *et al*., 2021). IC includes organizational processes, management strategies, stakeholder engagement, and technological advances. Innovative companies are more environmentally responsible and use sustainable practices to improve ~~their ~~performance. Sustainable innovation positively influences a firm's competitiveness. Innovation is an important indicator ~~for ~~of organizational~~s~~ success (Le et al., 2024b). Furthermore, researchers show that innovation helps organizations adapt to dynamic landscapes and societal expectations, aligning their operations with environmental goals (de Oliveira *et al*., 2023). The literature consistently shows that innovation capacity improves environmental performance (Broadstock *et al*., 2020). Innovative organizations can develop and implement sustainable practices, improving ecological well-being and long-term success. This review provides a solid foundation for empirical research on organizational innovation and environmental performance dynamics.

H_7: IC is positively related to environmental performance.

3.5 Mediating role of Innovation capacity

Integrating digital technologies into an organization promotes innovation Zahra *et al*. (2023) as technology streamlines processes and allows creative problem-solving and transformation (Allioui and Mourdi, 2023). Furthermore, studies have suggested that innovation and innovation capacity lead to competitiveness and environmental performance in manufacturing firms (Rehman *et al*., 2021). Moreover, it was argued that digital technologies and a positive digital organizational culture boost innovation (Velyako and Musa, 2023). Studies reported that organizations that value experimentation, collaboration, and learning foster innovation and adaptability. This culture supports digital tools and encourages change and innovation for organizational success (Kucharska and Bedford, 2020). Additionally, it was argued that environmental dynamism is key to organizational agility as the unpredictable external environment requires organizational innovation. This lets them proactively address dynamic external factors, ensuring flexibility and durability in unexpected situations. Innovation capacity and environmental performance are studied in the context of digital technologies, organizational culture, and environmental changes (Chirumalla, 2021). Innovation capacity affects environmental performance as advanced digital tools and an innovative culture help organizations improve environmental performance through innovation (Chirumalla, 2021). Thus, based on the above discussion, the following are the research hypotheses:

H_8: IC significantly mediates between digital technologies and environmental performance.

H_9: IC significantly mediates between DOC and environmental performance.

H_{10}: IC significantly mediates between environmental dynamism and environmental performance.

3.6 Moderating R~~r~~ole of Perceived Environmental Volatility and Green Strategic Intent

An organization's approach to sustainability issues is heavily influenced by its perception of environmental volatility, which can be defined as the frequency and unpredictability of changes, uncertainties, and disruptions in the business environment (Vecchiato, 2012). Strategic initiatives, especially those about environmental performance, are known to be highly dependent on firms' perceived levels of volatility (De Villiers *et al*., 2011). Organizations now include green strategies in response to the ever-changing environmental landscape (Prastacos *et al*., 2002). G~~The g~~reen investment significantly boosts sustainable firms' performance. A firm's GSI is its stated goal of making ecologically responsible decisions and actions an integral part of its business model. This level of commitment to sustainability affects organizational strategy, resource allocation, and decision-making. The correlation between a company's innovative capacity and environmental performance outcomes is strongly impacted by its dedication to eco-friendly strategies (Dangelico and Pontrandolfo, 2015). Thus, it is evident from the above literature review that GSI and perceived environmental volatility may be used as a moderating variable between innovation and environmental performance. Therefore, we propose the following hypotheses:

H_{11}: Perceived environmental volatility significantly moderates between innovation capacity and environmental performance.

H_{12}: GSI significantly moderates between innovation capacity and environmental performance.

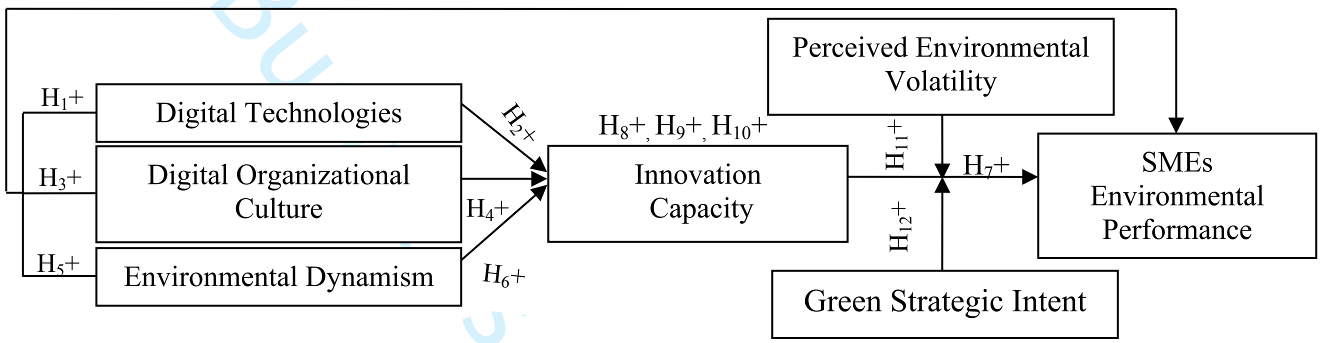

Figure 1 Research Framework

4. Methodology

Research methodology plays a crucial role in ~~any kind of research to determine~~determining research objectives. In the current study, to examine thesee nature, objectives, and research problem, the researchers used a quantitative approach ~~as well as~~and a cross-sectional design chosen to collect data through a questionnaire.

4.1 Sample and data collection

The study focuses on manufacturing SMEs. The data was collected from the Punjab province of Pakistan, ~~which is~~ a most populous province with 65.27% of SMEs (Riaz et al., 2023a). A total of 61% of the manufacturing SMEs are working in Punjab. In Pakistan, manufacturing SMEs have a significant ecological footprint because these organizations are concerned with producing, processing, and consuming environmental resources (Riaz et al., 2023b). In Pakistan, SMEs contribute 40% of the country's Gross Domestic Product (GDP) and approximately 78% of their workers are young people (Manzoor et al., 2021). Digital technologies ~~have a significant impact on~~significantly impact Pakistan SMEs (Shah et al., 2024). The population framework was acquired from the chamber of commerce of the respective districts in the Punjab province. Data collection was conducted using simple random sampling. The data was collected from October 2023 to December 2023. A total of 700 questionnaires were distributed to the owners/managers of SMEs, which is considered a substantial sample size (Comrey and Lee, 2013). Due to the time constraints of managers, 485 questionnaires were received. Out of 481 questionnaires, only 473 responses were deemed suitable for further analysis due to misleading values in the remaining nine questionnaires. The respondents' demographic profile is presented in Table 1.

Table 1 Demographic data of respondents

Demographics	Category	Frequency	%
Gender	Male	451	95.3
	Female	22	4.7
Hierarchy Level	Senior Manager	454	96.0
	Junior Manager	19	4.0
Firm Type	Textile	252	53.3
	Leather & Fashion	111	23.5
	Chemical	67	14.2
	Automobile	43	9.1
Education Level	Bachelors	31	6.6
	Masters	401	84.8
	MPhil	7	1.5
	Others	34	7.2
No. of Employees	20-100	13	2.7
	101-150	241	51.0
	151-250	219	46.3

Regarding gender distribution, the male population constitutes the majority, accounting for 95.3%, while females comprise a smaller proportion of 4.7%. The majority of the hierarchy level within the group consists of senior managers, accounting for 96.0%, while junior managers make up a smaller proportion at 4.0%. When examining the firm type, most individuals are involved in the textile sector (53.3%), followed by the leather & fashion (23.5%), chemical (14.2%), and automobile (9.1%) industries. The majority of individuals have achieved a master's degree (84.8%), while smaller proportions possess bachelor's degrees (6.6%) and MPhil qualifications (1.5%) or are categorized as "Others" (7.2%). Finally, when analyzing the number of employees in each organization, it can be observed that they are divided into three main categories: 20-100 employees (2.7%), 101-150 employees (51.0%), and 151-250 employees (46.3%). This data offers valuable insights into the composition of this group, enabling a nuanced comprehension of their gender, professional hierarchy, industry affiliations, educational backgrounds, and organizational sizes.

4.2 Measures

Figure 1 depicts that the study is based on seven first-order constructs. Digital technologies, digital organizational culture, and environmental dynamism are the study's independent variables. Similarly, SMEs environmental performance is used as a dependent variable. Furthermore, innovation capacity is used as a mediator variable in the study. Moreover, the study examines GSI and perceived environmental volatility as moderator variables. All the items were measured using five-point Likert scale items. Previous studies used a five-point Likert scale (Muthuswamy and Sudhakar, 2023; Zhang and Rudnák, 2023; Rasool et al., 2021; Khatami et al., 2020) and few used five-Likert scale while testing SMEs and environmental performance using SEM (Rehman et al., 2023b). The survey questions used in the study were acquired from various sources. The scales employed in the study had undergone prior validation, and the face validity of the questionnaire was established through expert confirmation. Five items related to digital technologies were obtained (Trujillo-Gallego et al., 2022). The measurement of DOC was conducted using four items that were adapted from (Martínez-Caro *et al*., 2020). Furthermore, environmental dynamism was assessed based on five items (Li et al., 2020; Chan et al., 2016). Similarly, IC encompasses four elements, as stated by (Fidel *et al*., 2016). In addition, the evaluation of perceived environmental volatility was conducted using three items from (Ganesan, 1994; Matanda and Freeman, 2009). Moreover, GSI was measured with the help of seven items from (Johnson and Sohi, 2001). Lastly, EP was measured with the help of four items from (Dubey *et al*., 2019).

4.3 Common method variance and endogeneity issue

Since the data was obtained from self-reported questionnaires, Common method variance (CMV) could influence the results (Podsakoff and Organ, 1986). The threshold for Herman's single-factor test is set at 50%. However, in our study, the value is significantly lower, specifically 43.085% below the threshold (Kraus et al., 2020; Rehman et al., 2024b; Rehman et al., 2022a; Rehman et al., 2023a). This method is obsolete. Hence, this study used some other methods for CMV. In addition, full collinearity is employed in the context of CMV due to research findings indicating that if the variance inflation factor (VIF) or full collinearity value is below 3.3, CMV is not a concern. The results indicated that the collinearity value is below 3.3, signifying the absence of any CMV. Furthermore, the Unmeasured Latent Method Construct (ULMC) was employed to assess CMV. The R^2 values of the measured and unmeasured latent variable were compared, and the discrepancy in R^2 values was less than 7% (Lindell and Whitney, 2001). This suggests that the data is devoid of any CMV.

Endogeneity is a significant concern when estimating regression models, such as structural equation modeling. Endogeneity refers to the issue of a variable that is supposed to be independent and connected with the error term (Bascle, 2008). Recently, researchers have begun examining this issue, specifically within the framework of PLS-SEM (Sarstedt *et al*., 2020). Various techniques exist to address endogeneity in SEM. One such method is the Gaussian copula approach Park and Gupta (2012), which handles endogeneity by explicitly modeling the correlation between the endogenous variable and the error term using a copula. By employing the Gaussian copula technique in SmartPLS, the researchers discovered that the copula coefficients for the constructs were not statistically significant. This suggests that there is no presence of endogeneity issue in the model.

5. Data analysis and results

5.1 Measurement model analysis

We employed the SEM technique utilizing SmartPLS 3.3.3 to examine the hypotheses. PLS is considered a suitable approach when the normality assumptions are unmet (Becker *et al*., 2022). When there are limitations in the data, such as multicollinearity issues and missing values, the results produced by the PLS model are more desirable than the OLS model (Hair *et al*., 2021). Due to the constraints, we employed PLS. PLS-SEM encompasses measurement (outer) and structural (inner) models. The PLS-SEM is extensively accepted and followed by various researchers in different areas (Bhatti and Juhari, 2023; Sawheny, 2023; Rusidah, 2023; Muthuswamy and Varshika, 2023; Altememy et al., 2023; Hartoto et al., 2023; Awad and Ibrahim, 2023; Hajar et al., 2023; Le et al., 2024a; Rehman et al., 2024a). The data was collected from managers in the Pakistani context, and PLS-SEM is considered a suitable approach (Shahbaz et al., 2024). The measurement model includes assessments of the reliability of individual items, the internal consistency of the measurements, the extent to which different measurements converge, and the extent to which measurements are distinct from one another (Becker *et al*., 2022). ~~According to~~ Hair *et al*. (2021), state that the factor loadings must be at least 0.50. According to Table 2, the highest factor loading observed is 0.907, while the lowest loading is 0.546, which exceeds the standardized threshold. Cronbach's alpha and composite reliability are utilized to assess internal consistency and reliability. All constructs have a CR and Cronbach's alpha greater than 0.70, satisfying the internal consistency criterion.

Table 2 Convergent Validity

Constructs	Items	Factor Loading	AVE	CR	VIF	α
Digital Technologies	Internet-of-things	0.549	0.544	0.852	1.630	0.778
	Big Data Analytics	0.873				
	Cloud Computing	0.842				
	Digital Platforms	0.546				
	Blockchain Technology	0.806				
Digital Organizational Culture	DOC1	0.650	0.538	0.823	1.777	0.791
	DOC2	0.765				
	DOC3	0.782				
	DOC4	0.731				
Environmental Dynamism	ED1	0.842	0.630	0.893	1.617	0.853
	ED2	0.907				
	ED3	0.904				
	ED4	0.601				
	ED5	0.664				
Innovation Capacity	IC1	0.738	0.579	0.846	1.314	0.758
	IC2	0.790				
	IC3	0.750				
	IC4	0.766				
Perceived Environmental Volatility	PEV1	0.905	0.727	0.888	1.176	0.816
	PEV2	0.847				
	PEV3	0.802				
Green Strategic Intent	GSI1	0.662	0.556	0.882	1.126	0.844
	GSI2	0.739				
	GSI3	0.771				
	GSI4	0.750				
	GSI5	0.809				
	GSI6	0.735				
SMEs Environmental Performance	EP1	0.750	0.677	0.893	---	0.839
	EP2	0.885				
	EP3	0.812				
	EP4	0.837				

The minimum criterion for measuring AVE is 0.50 (Becker *et al*., 2022). Convergent validity refers to the degree to which different measures of the same construct are positively related (Hair *et al*., 2011). The AVE of all the variables exceeds 0.50, as indicated in Table 2. Furthermore, the cross-loadings of all the constructs are depicted in Table 3. The Variance Inflation Factor (VIF) is employed to identify the presence of multicollinearity in statistical models. According to the standard set by (Hair *et al*., 2021), the VIF should be below 5. The data in Table 2 demonstrates that all VIF values are below the threshold of 5, indicating the absence of multicollinearity. There are no outliers in the study. The measurement model is illustrated in Figure 2.

Table 3 Cross Loadings

Variables	Items	DT	GSCM	ED	EP	GSI	IC	PEV
Digital Technologies	Big Data Analytics	0.873	0.461	0.351	0.348	0.227	0.288	0.110
	Blockchain Technology	0.806	0.314	0.267	0.365	0.187	0.304	0.041
	Cloud Computing	0.842	0.447	0.351	0.375	0.126	0.322	0.097
	Digital Platforms	0.546	0.358	0.541	0.232	0.192	0.257	0.001
	Internet-of-things	0.549	0.336	0.492	0.237	0.181	0.233	0.080
Digital Organizational Culture	DOC1	0.164	0.650	0.354	0.226	0.129	0.188	0.316
	DOC2	0.206	0.765	0.410	0.237	0.117	0.205	0.315
	DOC3	0.236	0.782	0.421	0.268	0.142	0.232	0.307
	DOC4	0.626	0.731	0.345	0.349	0.257	0.301	0.179
Environmental Dynamism	ED1	0.390	0.419	0.842	0.433	0.093	0.380	0.111
	ED2	0.457	0.479	0.907	0.459	0.135	0.389	0.104
	ED3	0.464	0.481	0.904	0.395	0.152	0.349	0.058
	ED4	0.316	0.283	0.601	0.175	0.088	0.200	0.040
	ED5	0.438	0.281	0.664	0.261	0.103	0.245	0.100
	EP1	0.391	0.382	0.496	0.750	0.220	0.569	0.240
SMEs Environmental Performance	EP2	0.320	0.285	0.335	0.885	0.172	0.641	0.093
	EP3	0.253	0.226	0.259	0.812	0.152	0.606	0.087
	EP4	0.441	0.423	0.410	0.837	0.192	0.646	0.114
	GSI1	0.115	0.160	0.101	0.113	0.662	0.141	0.164
Green Strategic Intent	GSI2	0.132	0.150	0.122	0.198	0.739	0.180	0.154
	GSI3	0.181	0.128	0.052	0.158	0.771	0.127	0.124
	GSI4	0.186	0.179	0.050	0.116	0.750	0.125	0.109
	GSI5	0.208	0.264	0.181	0.224	0.809	0.225	0.227
	GSI6	0.266	0.204	0.091	0.144	0.735	0.180	0.075
	IC1	0.252	0.289	0.255	0.560	0.195	0.738	0.223
Innovation Capacity	IC2	0.322	0.257	0.363	0.591	0.199	0.790	0.080
	IC3	0.270	0.285	0.293	0.592	0.160	0.750	0.022
	IC4	0.320	0.310	0.327	0.538	0.136	0.766	0.089
	PEV1	0.069	0.308	0.048	0.170	0.144	0.143	0.905
Perceived Environmental Volatility	PEV2	0.096	0.250	0.026	0.087	0.197	0.096	0.847
	PEV3	0.080	0.282	0.067	0.134	0.187	0.089	0.802

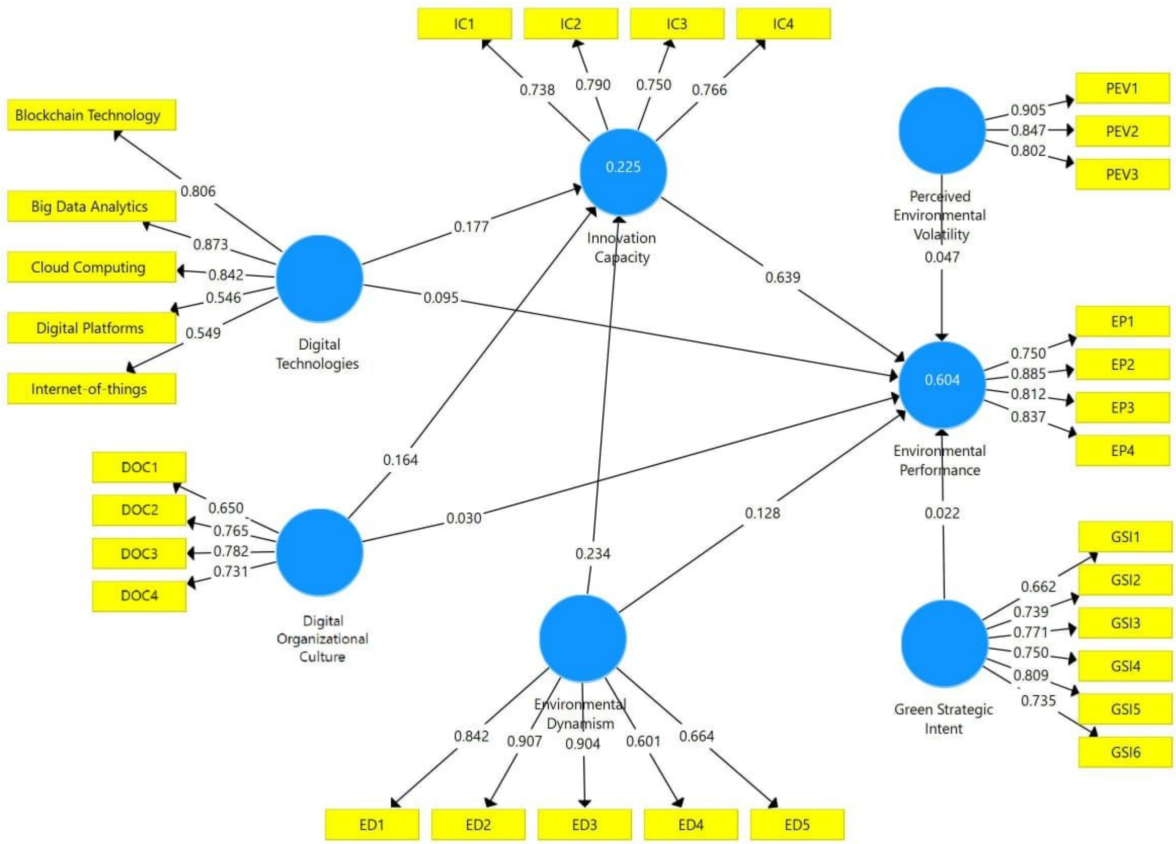

Figure 2 Measurement Model

Previously, researchers utilized the conventional metrics introduced by Fornell and Larcker in 1981 to assess discriminant validity see Table 4. Henseler *et al*. (2015) argue that traditional metrics have significant drawbacks. In response, some researchers have developed a new method called heterotrait-monotrait discriminant validity (HTMT) to calculate discriminant validity. Conventional methods for assessing discriminant validity are ineffective when there is only a small difference in loadings (Henseler *et al*., 2015). The HTMT value is 0.90 for constructs that are essentially similar and 0.85 for constructs that are different (Henseler *et al*., 2015). Table 5 indicates no concerns regarding discriminant validity in this investigation. Hence, there is ~~a~~ no ~~issue of~~ discriminant validity issue in both methods, ~~such as~~ Fornell-Larker and HTMT.

Table 4 Discriminant validity (Fornell-Lacker)

Variables	DOC	DT	ED	EP	GSI	IC	PEV
Digital Organizational Culture	**0.733**						
Digital Technologies	0.432	**0.737**					
Environmental Dynamism	0.424	0.518	**0.794**				
SMEs Environmental Performance	0.086	0.299	0.308	**0.823**			
Green Strategic Intent	0.297	0.477	0.409	0.516	**0.746**		
Innovation Capacity	0.361	0.399	0.605	0.717	0.581	**0.761**	
Perceived Environmental Volatility	0.417	0.099	0.312	0.485	0.401	0.608	**0.853**

Table 5 Discriminant Validity (HTMT)

Variables	DOC	DT	ED	EP	GSI	IC	PEV
Digital Organizational Culture							
Digital Technologies	0.608						
Environmental Dynamism	0.595	0.686					
SMEs Environmental Performance	0.469	0.526	0.510				
Green Strategic Intent	0.275	0.307	0.159	0.251			
Innovation Capacity	0.455	0.502	0.488	0.740	0.272		
Perceived Environmental Volatility	0.426	0.127	0.116	0.184	0.238	0.180	

5.2 Structural model analysis

This section provides an analysis of hypothesis testing. Table 6 presents the beta value, t-value, and p-value for assessing the soundness of the hypotheses. This section also incorporates a structural model for testing research hypotheses. Furthermore, Table 6 presents the hypotheses' findings, while Figure 3 illustrates the structural model.

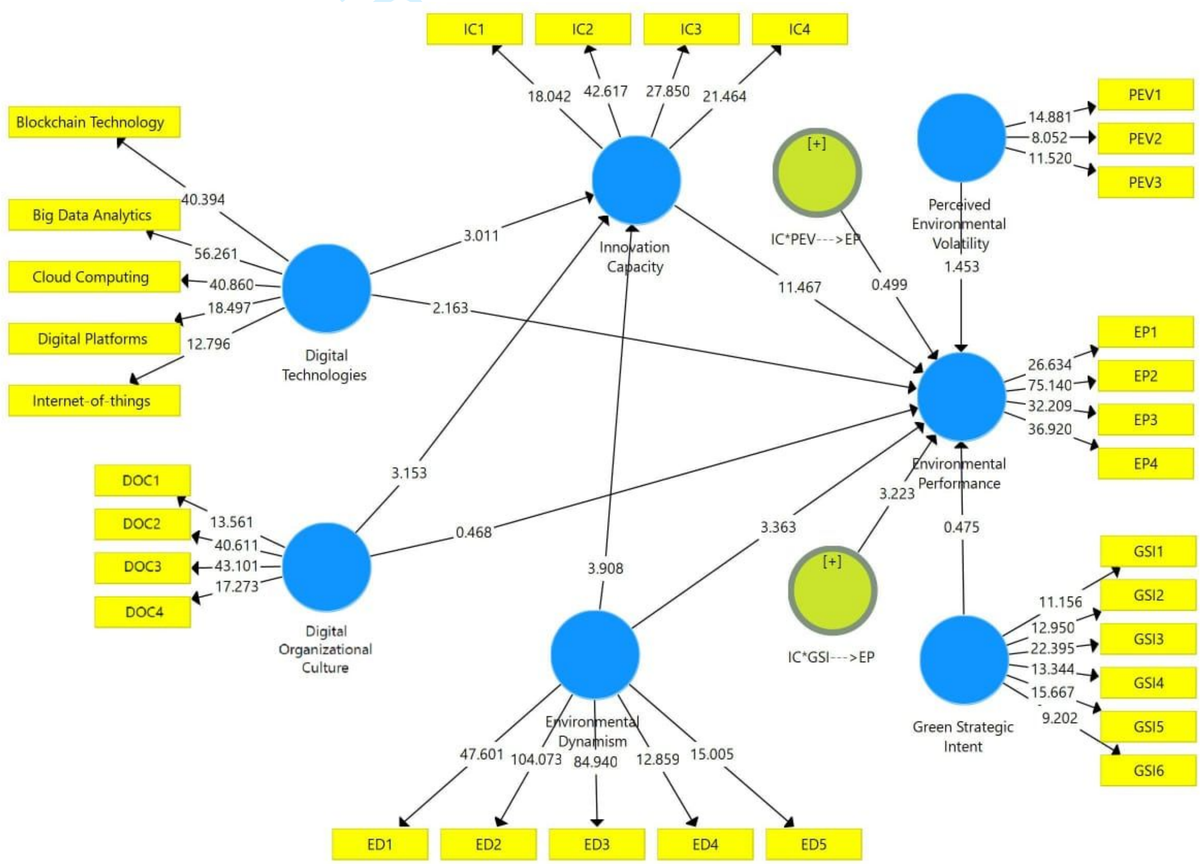

Figure 3 Structural Model

The results of the bootstrapping analysis conducted on 5000 sub-samples are presented in Table 6. The analysis shows a significant association between digital technologies and EP (p-value = 0.045; β-value=0.111) and IC (p-value = 0.000; β-value=0.177), supporting H_1 and H_2. Similarly, the statistical analysis shows an insignificant relationship between DOC and EP (p-value = 0.549; β-value=0.027), while a significant relationship between DOC and IC (p-value = 0.007; β-value=0.164). Consequently, H_3 is not supported, and H_4 is supported. Furthermore, there is a strong correlation between environmental dynamism and EP (p-value = 0.017; β-value=0.118) and between environmental dynamism and IC (p-value = 0.004; β-value=0.234). Therefore, H_5 and H_6 are supported. Moreover, the relationship between IC and EP is significant, as indicated by a p-value of 0.000 and a β-value of 0.616, confirming H_7. In terms of mediation results, the mediation of IC between digital technologies and EP is significant (p-value = 0.000; β-value=0.109), and H_8 is supported. Similarly, IC significantly mediates between DOC and EP (p-value = 0.020; β-value=0.101) and H_9 is supported. As the direct path between DOC and EP is not supported, while the indirect path between DOC and EP through the mediation of IC is supported, the results show a full mediation. Additionally, IC significantly mediates between environmental dynamism and EP (p-value = 0.002; β-value=0.144), and H_{10} is supported. Furthermore, the moderation analysis showed mixed results; the relationship between IC*PEV and EP is insignificant (p-value = 0.503; β-value=0.027), and H_{11} is not supported. Conversely, the relationship between IC*GSI and EP is significant (p-value = 0.001; β-value=0.134), and H_{12} is supported.

Table 6 Testing for Direct and Indirect Effects

Hypotheses	Paths	Beta-Value	T-values	P-values	BCI LL	BCI UL	f^2	Remarks
H_1	DT-->EP	0.111	2.089	0.045	0.003	0.226	0.021	Yes
H_2	DT-->IC	0.177	4.217	0.000	0.087	0.266	0.026	Yes
H_3	DOC-->EP	0.027	0.610	0.549	-0.068	0.123	0.001	No
H_4	DOC-->IC	0.164	3.009	0.007	0.047	0.281	0.023	Yes
H_5	ED-->EP	0.118	2.612	0.017	0.021	0.215	0.026	Yes
H_6	ED-->IC	0.234	3.209	0.004	0.078	0.390	0.046	Yes
H_7	IC-->EP	0.616	12.588	0.000	0.511	0.721	0.784	Yes
H_8	DT-->IC-->EP	0.109	4.542	0.000	0.058	0.160	---	Yes
H_9	DOC-->IC-->EP	0.101	2.652	0.015	0.020	0.183	---	Yes
H_{10}	ED-->IC-->EP	0.144	3.582	0.002	0.058	0.230	---	Yes
H_{11}	IC*PEV-->EP	0.027	0.683	0.503	-0.057	0.111	---	No
H_{12}	IC*GSI-->EP	0.134	3.847	0.001	0.060	0.209	---	Yes

5.3 The Eexplanatory and Predictive Power of the Model

To assess the degree to which the research framework can explain the phenomenon under investigation, the coefficient of determination (R^2) was computed. Based on the findings of Falk and Miller (1992), researchers have established that the standardized value of R^2 should not be below 10%. R^2 is the variance explained by all the exogenous constructs (Kanan et al., 2023; Bhatti and Alawad, 2023). The current study shows that IC has an R^2 coefficient of determination of 0.225, whereas EP has an R^2 value of 0.605. Moreover, Table 6 illustrates the f^2 value. Cohen (1988) classified f^2 into three distinct categories based on their magnitude: large (f^2 ≥0.35), moderate (f^2 ≥0.15), and small (f^2 ≥0.02). Values of all the paths are between small to large effect sizes.

Table 7 PLS-predict

	PLS		LM		PLS-LM		
	RMSE	MAE	RMSE	MAE	RMSE	MAE	Q^2-predict
EP1	0.886	0.673	0.899	0.714	-0.013	-0.041	0.244

EP2	1.126	0.876	1.173	0.884	-0.047	-0.008	0.123
EP3	0.957	0.712	0.983	0.742	-0.026	-0.030	0.155
EP4	1.047	0.855	1.094	0.862	-0.047	-0.007	0.061

In addition, researchers have proposed a novel calculation method to determine the predictive relevance of the research model, specifically tailored to PLS-SEM's prediction-oriented nature (Shmueli and Koppius, 2011). Additionally, it is necessary to compute the Q2 of LVs initially. If the Q^2 value ~~is larger than~~exceeds zero, proceed with the item calculation (Shmueli and Koppius, 2011). The predictive power of a model can be assessed by examining the Partial Least Squares-Loadings Magnitude (PLS-LM) of its items. A smaller PLS-LM for fewer or minority items indicates low predictive power, while a higher PLS-LM for all items suggests no predictive power. Conversely, a lower PLS-LM for all items indicates greater or higher predictive power (Shmueli and Koppius, 2011). Table 7 shows that the PLS-LM of all items has a lower value, while the Q^2-predict is greater than zero. This indicates a higher level of predictive power. Furthermore, this study acknowledges that the IC score for Q^2 is 0.125, and the EP score is 0.406, ~~both of~~ which are above zero. Table 8 indicates ~~that~~ they possess a higher ~~level of~~ predictive ability at the construct level.

Table 8 Predictive relevance of the study model

	SSO	SSE	Q^2 (=1-SSE/SSO)
Innovation Capacity	1336.000	1169.251	0.125
Green Competitive Advantage	1336.000	793.695	0.406

6. Discussion

The study's findings suggest that digital technologies are significantly related to environmental performance and innovation capacity, supporting H_1 and H_2. These results are consistent with previous studies; for instance, Kastelli *et al*. (2022) argued that digital technologies are significantly related to innovation. Furthermore, Rehman *et al*. (2023b) argued that digital technologies are significantly related to green initiatives and environmental performance. Similarly, the study reported that DOC is insignificantly related to environmental performance and significantly related to innovation capacity; therefore, H_3 is not supported, and H_4 is supported. The results reported that DOC is unrelated to EP, meaning that innovation capacity fully mediates the relationship between these constructs. It can be said that DOC is not related to EP; however, when innovation capacity came into play, this relationship became significant. Similarly, Leal-Rodríguez *et al*. (2023) have examined how a digital culture, which embraces digital tools and mindsets, boosts innovativeness. Staff is more likely to solve problems creatively and innovate in a culture that values digital fluency and encourages experimentation (Auernhammer and Hall, 2014). Moreover, the result of the study reported that environmental dynamism is significantly related to innovation capacity and EP. Therefore, H_5 and H_6 are supported. These results are ~~in accordance with~~ from previous studies. For instance, it was argued that rapid and unpredictable changes in the external environment critically affect organizational outcomes. Since they must adapt to changing challenges, dynamic organizations are more likely to innovate (Zhang *et al*., 2023). Furthermore, it was argued that an organization's ability to create and implement new ideas is thought to thrive in changing and uncertain environments (Sheng, 2017). Similarly, the study reported that innovation capacity is significantly related to EP, and H7 is supported. It was argued that Innovation is crucial to developing eco-friendly technologies and processes, reducing environmental footprints

(Paparoidamis and Tran, 2019; Saqib et al., 2024). According to Bresciani et al. (2023), organizations with strong innovation capacities are better able to develop and implement environmentally friendly practices, improving environmental performance (Rehman *et al*., 2021).

Additionally, the study conducted the mediation analysis of innovation capacity between digital technologies, DOC, environmental dynamism, and environmental performance, and therefore, H_8, H_9, and H_{10} are supported. It was argued that Integrating digital technologies into an organization promotes innovation Zahra *et al*. (2023) as technology streamlines processes and allows creative problem-solving and transformation (Allioui and Mourdi, 2023). Furthermore, studies have suggested that innovation and innovation capacity lead to competitiveness and environmental performance in manufacturing firms (Rehman *et al*., 2021). Moreover, it was argued that digital technologies and a positive digital organizational culture boost innovation (Velyako and Musa, 2023). Studies reported that organizations that value experimentation, collaboration, and learning foster innovation and adaptability. This culture supports digital tools and encourages change and innovation for organizational success (Kucharska and Bedford, 2020). Additionally, it was argued that environmental dynamism is key to organizational agility, as the unpredictable external environment requires organizational innovation. This lets them proactively address dynamic external factors, ensuring flexibility and durability in unexpected situations. Lastly, the study conducted a moderation analysis of perceived environmental volatility and GSI between innovation capacity and environmental performance. Therefore, the perceived environmental volatility showed an insignificant relationship, while GSI reported a significant moderation between innovation capacity and EP. Consequently, H_{11} is not supported, and H_{12} is supported. One possible reason for an insignificant relationship of perceived environmental volatility between IC and EP may be the dynamic and complex nature of innovation processes (Lane, 2011). Furthermore, organizations with strong innovation capacities may have adaptive capabilities that allow them to navigate environmental changes despite perceived volatility. The link between innovation and environmental performance may depend more on internal organizational factors than perceived external volatility (Menguc *et al*., 2010). Lastly, ~~in terms of the~~regarding the moderation of GSI, previous studies reported that a firm's GSI is its stated goal of making ecologically responsible decisions and actions an integral part of its business model (Khan et al., 2021). This level of commitment to sustainability affects organizational strategy, resource allocation, and decision-making. The correlation between a company's innovative capacity and environmental performance outcomes is strongly impacted by its dedication to eco-friendly strategies (Dangelico and Pontrandolfo, 2015).

6.1 Conclusion

This study thoroughly examines the relationship between digital technologies, DOC, environmental dynamism, innovation capacity, perceived environmental volatility, GSI, and SMEs EP. The natural ROT is used to explain the research framework. The results reveal that digital technologies ~~have a significant positive influence on~~significantly positively influence EP and innovation capacity. Moreover, DOC has an insignificant influence on EP. DOC significantly determines innovation capacity. Environmental dynamism has a positive impact on EP and innovation capacity. Innovation capacity highly significantly improves EP. Innovation capacity significantly mediates between digital technologies, DOC, environmental dynamism, and EP. Perceived environmental volatility does not moderate between innovation capacity and EP. Finally, GSI significantly moderates between innovation capacity and EP.

6.2 Theoretical Implications

This research contributed theoretically in various ways. First, this study extends Zighan and Ruel (2023), which determines SMEs sustainable performance through Industry 4.0 adoption, environmental, technological, and organizational factors. This research adds value to digital technologies, DOC, environmental dynamism, innovation capacity, perceived environmental volatility, GSI, and EP literature. This is initial research that incorporates digital technologies, DOC, environmental dynamism, innovation capacity, perceived environmental volatility, and GSI are used to measure SMEs EP in light of ROT that prior researchers overlooked (Leal-Rodríguez et al., 2023; Rehman et al., 2024d; Rehman et al., 2024c; Rehman et al., 2023b). Besides, innovation capacity is used as a mediator between digital technologies, DOC, environmental dynamism, and SMEs EP, which was overlooked previously (Zahra et al., 2023). Moreover, perceived environmental volatility and GSI are used as moderators between innovation capacity and SMEs EP, which was previously ignored (Otache, 2024). Hence, this study answers the call for further research to expand our understanding of digital technologies, DOC, environmental dynamism, innovation capacity, perceived environmental volatility, GSI, and SMEs EP.

Second, this study establishes a direct and statistically significant link between digital technologies, environmental dynamism, and EP. This emphasizes the critical role of digital technologies in influencing environmental performance and the importance of SMEs integrating and leveraging these technologies for sustainable practices. Third, discovering an insignificant direct relationship between DOC and EP calls for further research into the nuances of digital organizational culture in the context of environmental performance. This emphasizes the importance of considering organizational cultural aspects beyond digitization for effective environmental outcomes. Furthermore, the study reveals a significant correlation between digital technologies, DOC, environmental dynamism, and innovation capacity. This implies that the combined influence of digital technologies and organizational culture shapes SMEs' innovation capacity, which mediates their environmental performance. The fact that perceived environmental volatility has no significant moderating effect on the relationship between IC and EP suggests that the impact of innovation capacity on EP remains consistent regardless of perceived environmental uncertainties. This demonstrates the resilience and consistency of innovation in contributing to environmental outcomes. Lastly, GSI significantly moderates the relationship between IC and EP, emphasizing the importance of strategic environmental considerations. SMEs with a strong GSI use their innovation capacity more effectively, leading to improved environmental performance.

6.3 Practical Implications

This study has significant practical implications, providing valuable insights for policymakers, managers, and practitioners seeking to improve the EP of manufacturing SMEs. The identified direct and significant relationship between digital technologies and EP emphasizes the importance of embracing digitalization in SMEs. The management should concentrate on the internet-of-things, big data analytics, cloud computing, digital platforms, and blockchain technology if their aim is to enhance SMEs EP. Moreover, DOC has a significant influence on SMEs EP. This raises attention in the eyes of management that organizational culture should be like that their teams collaborate functionally in innovation and digital transformation initiatives.

There should be clear orientation to digital technology changes and organization shares with the employees the digital strategy. These things can improve SMEs EP.

Environmental dynamism has a positive influence on SMEs EP. If the management wants to enhance their SMEs EP, then they should focus on environmental changes in the market, see clients demand for new products, changes in government regulations, and high rate of innovation in existing industry. When management covers these things, then their SMEs performance should boost up. Innovation capacity has a highly significant influence on SMEs EP. Thus, management should not overlook this when they aim to enhance their EP. The organization top management should introduce innovative products/services, innovate production processes (i.e., adoption of new technologies and improved processes), innovate management processes (i.e., administrative area, human resources, new departments, and project management), and innovate marketing aspects (i.e., commercialization, penetrate in new markets, new distribution channels, and new methods or pricing strategies).

The non-significant moderation effect of perceived environmental volatility on the relationship between IC and EP implies that innovation contributes to environmental outcomes regardless of perceived uncertainties. This insight encourages managers to keep their focus on innovation initiatives even in the face of environmental uncertainty. In contrast, GSI plays a significant moderating role, emphasizing the strategic importance of environmentally conscious decision-making. Policymakers and managers should incorporate GSI into organizational goals and strategies because it improves innovation capacity in achieving environmental sustainability. Lastly, the results indicate that a deliberate emphasis on environmental objectives, represented by GSI, can greatly amplify the beneficial influence of IC on EP. Therefore, it is crucial for manufacturing SMEs to implement strategies that promote digital transformation and cultivate a green strategic mentality to enhance their sustainability and competitiveness.

6.4 Limitations and Future Recommendations

Like other studies, our research is susceptible to various constraints. Originally, data was collected from manufacturing SMEs. Hence, the conclusions derived from this research cannot be generalized to diverse settings and sectors, such as those prevalent in advanced economies. In addition, a cross-sectional methodology is utilized, which does not definitively establish causal relationships. The results include significant but insufficient factors to establish causality. Therefore, it is crucial to examine ~~examining~~ the evidence that emerges and interpret~~ing~~ it in relation to theoretical frameworks and possible correlations~~ is crucial~~. Future researchers can employ big data in their studies. Future studies may use responsible innovation as a mediator (Özbek *et al.*, 2024). Moreover, various institutional drivers are considered while studying SMEs; future studies may incorporate various institutional drivers. Finally, future research could perform cross-sector or cross-country comparisons to investigate the relationships between the constructs.

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Dear Dr. Rehman:

Manuscript ID JSBED-01-2024-0049.R1 entitled "Digital Entrepreneurship! Nexus among Industry 4.0 enablers, environmental dynamism, and SMEs environmental performance: A mediated-moderated perspectives" which you submitted to the Journal of Small Business and Enterprise Development, has been reviewed. The comments of the reviewer(s) are included at the bottom of this letter.

Referee 1:
Recommendation: Minor Revision

Comments: The current version of the paper has been improved significantly compared with the previous version. However, there are two minor issues that need to be addressed.

1. The implication needs more elaboration and improvement.

Answer:

- This research contributed theoretically in various ways. First, this study extends Zighan and Ruel (2023), which determines SMEs sustainable performance through Industry 4.0 adoption, environmental, technological, and organizational factors. This research adds value to digital technologies, DOC, environmental dynamism, innovation capacity, perceived environmental volatility, GSI, and EP literature. This is initial research that incorporates digital technologies, DOC, environmental dynamism, innovation capacity, perceived environmental volatility, and GSI are used to measure SMEs EP in light of ROT that prior researchers overlooked (Leal-Rodríguez et al., 2023; Rehman et al., 2024d; Rehman et al., 2024c; Rehman et al., 2023b). Besides, innovation capacity is used as a mediator between digital technologies, DOC, environmental dynamism, and SMEs EP, which was overlooked previously (Zahra et al., 2023). Moreover, perceived environmental volatility and GSI are used as moderators between innovation capacity and SMEs EP, which was previously ignored (Otache, 2024). Hence, this study answers the call for further research to expand our understanding of digital technologies, DOC, environmental dynamism, innovation capacity, perceived environmental volatility, GSI, and SMEs EP.

- The identified direct and significant relationship between digital technologies and EP emphasizes the importance of embracing digitalization in SMEs. The management should concentrate on the internet-of-things, big data analytics, cloud computing, digital platforms, and blockchain technology if their aim is to enhance SMEs EP. Moreover, DOC has a significant influence on SMEs EP. This raises attention in the eyes of management that organizational culture should be like that their teams collaborate functionally in innovation and digital transformation initiatives. There should be clear orientation to digital technology changes and organization shares with the employees the digital strategy. These things can improve SMEs EP.

- Environmental dynamism has a positive influence on SMEs EP. If the management wants to enhance their SMEs EP, then they should focus on environmental changes in the market, see clients demand for new products, changes in government regulations, and high rate of innovation in existing industry. When management covers these things, then their SMEs performance should boost up. Innovation capacity has a highly significant influence on SMEs EP. Thus, management should not overlook this when they aim to enhance their EP. The organization top management should introduce innovative products/services, innovate production processes (i.e., adoption of new technologies and improved processes), innovate management processes (i.e., administrative area, human resources, new departments, and project management), and innovate marketing aspects (i.e., commercialization, penetrate in new markets, new distribution channels, and new methods or pricing strategies).

2. The paper needs a professional proofreading.

Answer: Proofreading is done.