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Role of digital leadership towards sustainable business performance: A parallel mediation model

Fahad Saddique^{1,*}, Beenish Ramzan², Shouvik Sanyal³, Jebreel Alamari⁴

¹ Department of Management Science, The Institute of Management Sciences, Lahore 54792, Pakistan

² Department of Economics, National College of Business Administration & Economics, Lahore 54660, Pakistan

³ Department of Marketing and Entrepreneurship, Dhofar University, 211, Oman

⁴ Department of Computer Science, Al-Qunfudah Computer College, Umm Al-Qura University, Mecca 21955, Saudi Arabia

ABSTRACT

After the pandemic (COVID-19), there is a dire need to gain a competitive advantage for tourism organizations which can be accomplished by implementing new technologies to facilitate sustainable healthier services. Given that, the study aims to shed light on the importance of digital leadership to improve sustainable business performance considering the parallel mediation of digital technology and digital technology support in the tourism sector of Pakistan. The sample population consists of technology-based tourism organizations in Pakistan. Cochran's formula was chosen for sampling, in which 37 organizations with 792 employees were selected for data through a random sampling technique. The collected data were analyzed through structural equation modeling, and findings reveal that digital leadership positively influences sustainable business performance. Furthermore, the mediating role of technological leadership support and digital technologies partially mediates the association between digital leadership and sustainable performance.

KEYWORDS

digital leadership; technological leadership; digital technologies; sustainable business performance; tourism

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*CORRESPONDING AUTHOR

Shouvik Sanyal, Department of Marketing and Entrepreneurship, Dhofar University, Oman.
shouviksanyal2000@gmail.com

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1. Introduction

In 2030, the United Nations (UN) has drawn agenda to increase the goal of sustainable development. For this endorsement, many scholars, regional decision-making communities, and politicians have tried to redefine the firm's new urban needs (Wolifson and Drozdowski, 2017; Mu et al., 2022). In short, the emphasis is on enhancing the sustainability and resilience of urban areas. Therefore, sustainable developments are considered the primary channel for sustainable products

and processes, representing an effective and innovative concept (Hall et al., 2010; Nawaz et al., 2021). Now sustainable businesses provide a promising opportunity for addressing unemployment and facilitating innovative economic growth in urban areas (Crittenden et al., 2019; Yu et al., 2020). However, in the context of contemporary urban settings (Nawaz et al., 2020), the role of digital leadership is crucial for the establishment of sustainable enterprises. It is closely linked to developing innovative approaches for enhancing business intelligence (Nawaz et al., 2022b; Fritsch and Kublina, 2018). The advent of novel digital technologies is driving the latest economic boom and exerting a substantial influence on organizational management (Peng, 2022). Meanwhile, after the worldwide COVID-19 outbreak, entities actively seek technology-driven managerial frameworks to ensure enduring organizational efficacy (Yoga and Yudiarta, 2021).

According to previous studies, enterprises that have made significant digital technology steps will earn 32% of their total revenue in 2022, and it is projected that industries that have made considerable progress in digital technology will produce 48% of their revenue through digital channels (Kamalaldin et al., 2020). Digital leadership is defined as doing the right things for the strategic success of digitalization for the enterprise and its business ecosystem. Digital leadership means thinking differently about business strategy, business models, the IT function, enterprise platforms, mindsets and skill sets, and the workplace (Hensellek et al., 2020). In order to remain competitive in this digital era, organizations must change from conventional leadership to digital leadership. It demands enhancing technology skills and organizational growth capacities to ensure long-term sustainability. In this regard, Satya Nadella, the Chief Executive Officer of Microsoft, has indicated that they anticipate accomplishing two years of digital transformation within two months (Adie et al., 2022). A best-fit major example is the development of the Chat GPT chatbot by Open AI, which serves as a language model (Chuma and de Oliveira, 2023). Subsequently, Google followed suit by introducing their AI-based Bard. Electric vehicles and self-driven cars are also on way to replace traditional vehicles (Candra, 2022). Furthermore, Zada (2022) have indicated that the current latest digital technological enhancements and the COVID-19 pandemic influence significant demand for digital transformation for efficient decision-making systems (Zineb et al., 2022). Thereby, digital leadership includes digital competencies and supportive culture, resulting in effective strategic decision-making. As a result, digital leaders are well-suitable for managing organizations sustainably in this modern era (Shin et al., 2023; Zeike et al., 2019). Moreover, by integrating the latest technology, digital leadership performs well at the workplace (Mihardjo et al., 2019).

Digital leadership also refers to integrating the latest leadership digital abilities and skills to influence sustainable organizational productivity (Amelda et al., 2021). As, Roberts (1999) argued that digitalized leadership can effectively resolve disruptive situations and foster innovation through utilizing digital perspectives, awareness, and expertise. Furthermore, Elidjena and Rukmanac (2019) have recognized that digital leadership has the optimization of technological advances to enlarge the value of an organization. A conventional leader relies on a hierarchical structure in decision-making, whereas this approach may encounter restricted information availability and a slow decision-making process. In addition, conventional leadership relies on external consultants, whereas digital leadership is self-directed (Zada et al., 2022). Another study suggested that leaders in this digital era must include innovative thinking, proficiency in digital technologies, strong networking abilities, and a disposition toward cooperation and collaboration (Toduk et al., 2023). Digital leadership

covers development relative to innovative and entrepreneurial leadership and transactions, transforming, and authentic leadership (Hensellek et al., 2020). As a result, leaders must possess a digitalization vision.

As, Amelda et al. (2021) claimed that digital leadership involves integrating digital skills and competencies to maximize the advantages of digitalized technology in enhancing the performance of organizations. Digital leadership supports establishment's growth of up to sixty percent per the implementation of digital technologies in Germans organizations (Hensellek, et al., 2020). Furthermore, many other countries have implemented smart, intelligent technologies in factories for automated systems, such as robots, while artificial intelligence (AI) tools like Chat GPT and Bard are increasingly prevalent in various organizations. In addition, digital leaders must develop a digital strategy agreeable to the workforce. This task can be accomplished through utilizing information technology capabilities and supportive culture. In this regard, a leader with a digital attitude shows a broader disposition toward technological innovation for sustainable performance. Now in this era, digital change necessitates the presence of digital supportive management. Furthermore, digital leaders must own digital technologies to enhance customer service and ensure long-term success (Weill et al., 2002).

Investment in this digital technology also promotes and enhances business performance (Wade and Hulland, 2004; Lu and Ramamurthy, 2011). Moreover, this perspective evaluates the advancements in information technology, persistently explores novel information technologies solutions to enhance the efficiency of its utilization, and it fosters with supportive technologies culture that encourages innovativeness in digital applications for sustainable outcomes (Wade and Hulland, 2004; Galleries et al., 2007; Tran and Pham, 2019; Raudeliuniene et al., 2020). Digital leaders have also seemed experts in building organizational learning and supportive culture to achieve sustainable organizational performance (Akram et al., 2018). Sustainability involves implementing digital technology knowledge within organizations by creating an advanced learning and supportive environment to generate optimal outcomes (Athayde et al., 2017). Thus, sustainability involves adopting effective knowledge management strategies and efficient business process tools through proficiency in digital technologies with a supportive environment ensuring the long-term viability of their organizations (Akram et al., 2018). As Erhan et al. (2022) suggested that digital guidance is aimed at endeavoring organizational performance proficiency. Consequently, this study addresses the identified research gap to examine the influence of digital leadership on sustainable organizational performance considering the mediating roles of digital technology and digital leadership support (**Figure 1**).

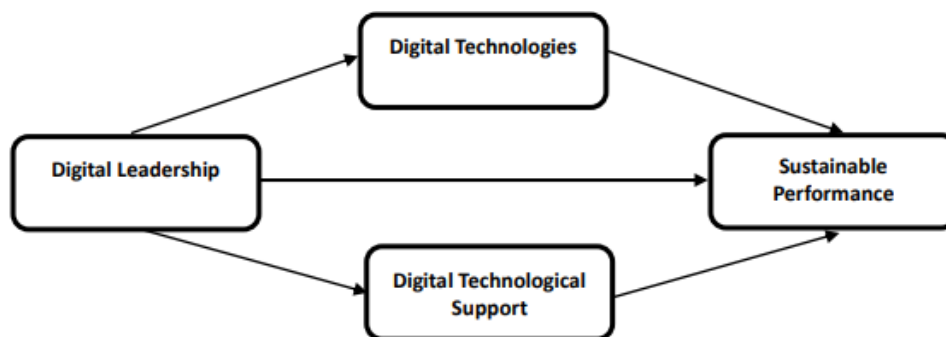


Figure 1. Research model.

2. Literature review and hypothesis developments

2.1. Digital leadership and sustainable organization performance

The modern world is focused on perpetual transformation with the arrival of digital technology. The current worldwide COVID-19 pandemic and the arrival of digital technologies have demanded that companies modify their business models to achieve sustainable performance (Hu et al., 2022). He is also involved in adapting digitalized cultural and skill-based attributes toward optimizing the utilization of the latest technologies to enhance organizational worth (Rudito and Sinaga, 2017). As Mihardjo and Rukmana (2018) defined digital leadership as combining a transformational leadership style and utilizing digital technology. In the contemporary era, organizations prioritize staffing employees with digital competencies, developing their internal information technologies infrastructure, and building organizational learning and supportive abilities to foster innovation and ensure enduring operational efficacy. For this, digital leadership facilitates the enhancement of sustainable performance. As Borah et al. (2022) suggested, he restrains the relationship between social platform usage and sustainable performance, specifically in the context of small and medium-sized enterprise's (SME) sustainable performance. The capability dynamic theory and the based resource view are two significant philosophies that clarify the relationship between resources and their performance.

The creation of coordinated supply chains through the voluntary integration of economic, environmental, and social considerations with key inter-organizational business systems designed to efficiently and effectively manage the material, information, and capital flows (Ahi and Searcy, 2013). According to the Resource-Based View principles, organizational resources with value, non-substitutability, rareness, and inimitability contribute to achieving sustainable performance. Moreover, the Resource-Based View has broadly employed in the prior data systems to clarify that digital technology competencies can be leveraged to augment organizational skills and enhance supply chain performance (Saddique et al., 2023). As Amelda et al. (2021) suggested, digital leadership's impact on organizational performance is contingent on the mediating role of digital marketing capabilities within the banking sector. Furthermore, within the manufacturing sector of Pakistan, digital leadership serves as a protective measure for employee's long-term effectiveness and creative capacities (Sarfranz et al., 2022). Another study suggested that digital leadership seems vital in transforming the digital workplace (Chatterjee et al., 2023). As Benitez et al. (2022) suggest, digital leadership competencies significantly influence European organization's innovation performance. Moreover, another study suggests a positive association between digital leaders and the performance of organizations (Shin et al., 2023). Drawing upon the findings above and existing knowledge, it is evident that there is a research gap between digital leadership and sustainable organization performance in smart cities of Pakistan, thus we hypothesize that:

Hypothesis 1 (H1): There are positive associations between Sustainable Performance and digital leadership in smart cities of Pakistan.

2.2. The mediating role of implementation of digital technologies

In the current age of digital technology, the capacity for information technology is vital for effective digital leadership. The term digital technologies refer to the "set of intelligent and innovative technologies, such as big data analytics, IoT, and cloud computing, that make it possible

to achieve connection, communication, and automation. Digital technologies enable companies to transform their current product or service model into an intelligent model and to adopt data-driven strategies to become more competitive” (Zhang et al, 2018). Digital leadership with information technologies capability is linked to information technology business spanning, where an information technologies proactive approach to managing company innovations (Lu and Ramamurthy, 2011). Furthermore, earlier researchers have established that leadership impacts information technology competence within organizational performance (Colwill and Townsend, 1999). Digital leadership is essential in enhancing information technology capabilities and integrating individual competencies with an organization’s digital resources (Mohamed, 2022). Hence, digital technologies are vital in leadership and standard operating procedures (SOP). Furthermore, many previous studies suggested that organizational learning and supportive culture with digital tools significantly impact organizational performance (Lu and Ramamurthy, 2011).

Organizational digital tools learning with supportive culture is a valuable mechanism for obtaining novel insights in a dynamic situation and for sustainable organizational performance (Bustinza et al., 2010). Digital technologies are essential in the rise of the digital era, and organizational learning employees with supportive culture are expected to impact organizational performance significantly (Robey et al., 2000). The significance of implementing digital technology with digital leadership contributes to enhancing Standard Operating Procedures for sustainable organizational performance. As Tirastittam et al. (2019) has been suggested, there is a positive mediation of information technologies between strategic management and the performance of firms. They also proposed that digital information technology suggestively intermediates the relation between organizational performance and innovation. As Basheer et al. (2019) have determined a positive mediation effect of information technology between total quality management procedures and the performance of supply chain practices in the textile industry of Pakistan. As Lisdiono et al. (2022) have determined, Indonesia’s association between cooperation management skills and enterprise resilience is influenced by the mediating effect of digital information technologies. The study Mollah et al. (2023) suggested that the latest technology-enhanced learning abilities and efficiency. As Lu and Ramamurthy (2011) conducted a study examining information technology’s impact on organizational agility and company efficiency. Therefore, the primary objective of this study was to investigate the implementation of digital technology in the relationship in performance. Thus, the present study suggested the following hypotheses.

Hypothesis 2 (H2): There is a positive association between the implementation of digital leadership and digital technologies in the smart cities of Pakistan.

Hypothesis 3 (H3): There is a positive relationship between the implementation of digital technologies and sustainable organization performances in smart cities of Pakistan.

Hypothesis 4 (H4): There is a positive mediating relationship between the implementation of digital technologies between sustainable performance and digital leadership in smart cities of Pakistan.

2.3. The mediating role of digital leadership support

Digital leadership support of team members is given by upper management and by each team member. It’s related to the appreciation by the leadership of digital skills and attitude toward

digital innovation (Aquino et al, 2023). Providing support for technology leadership from employees is vital for sustainable performance. According to Zhang et al. (2018), the provision of technology leadership support (TLS) to small and medium-sized enterprises (SMEs) is believed to have a positive influence on their capacity for innovation, particularly in response to adverse environmental conditions, thereby enhancing their overall performance. The digital leadership of small and medium-sized enterprises implements distinct strategies depending upon the volatile environment's characteristics to manage supply chain sustainability performance effectively (Le and Lei, 2018). According to Nakayama et al. (2020), the successful implementation of modern technology strategies with digital leadership, such as significant data-driven technology innovation, internet of things embedded system design, and cloud computing optimization, requires strong leadership support from the leadership team. To execute the strategy above, the technological leadership support from team members' endeavors to create a favorable environment for sustainable performance (Smart et al., 2017).

The implementation of technological leadership support from team members and employees helps as a proficient facilitator in the execution of this approach aimed at enhancing the efficacy of the organization process to contributing to improving the performance of the organization performances (Donate and Guadamillas, 2011). Inspiring personalities like digital leadership with emerging technologies implication supports may enhance the organization's performance. Furthermore, this results in both monetary and non-monetary measures of organizational effectiveness. Moreover, the impact of digital supportive culture resulting in technological utilization within an organization is significant (EI Sawy et al., 2016). Additionally, it has been found that there is no considerable mediating impact of supportive organizational culture on the relationship between digital leadership empowerment and employee creativity and performance (Naqshbandi and Tabche, 2018). Another study suggested that digital leaders facilitate the integration of digital capabilities into the proficiency of businesses (Proksch et al., 2021). Thus, following are the emerged hypotheses.

Hypothesis 5 (H5): There is a positive association between digital leadership and technological leadership support from teams in smart cities in Pakistan.

Hypothesis 6 (H6): There is a positive association between digital technological leadership support from teams and organization' sustainable performance in smart cities in Pakistan.

Hypothesis 7 (H7): There is a positive mediating relationship between digital technological leadership support from teams between sustainable performance and digital leadership in smart cities of Pakistan.

3. Methodology

A survey was conducted to collect the data from organizations that offer and promote tourism services in Pakistan. The survey was based on questionnaire tools and data were collected by the corresponding author using a convenience sampling technique (Nawaz et al., 2022a). The convenient sampling technique is used because the exact strength of population is not known (Nawaz et al., 2022a). While collecting the data the author followed the methods outlined by Min et al. (2016) to minimize common method biases. In this regard, the data were collected from multiple sources. Data on digital leadership, the implementation of digital technologies, and the support for

digital leadership were collected from lower-level management of tourism organizations. On the other hand, data on the sustainable performance of organizations were collected from top-level management of the tourism organizations.

The data-gathering procedure adhered to the ethical guidelines provided by Fontana et al. (2003). For instance, during the data collection process, precautions were implemented to minimize any mental or emotional disruptions experienced by the respondents. A total of 1378 surveys were distributed to different organizations, and as a result, only 792 responses were collected. Therefore, response rate was 57.0%. The survey also includes the demographic characteristics of respondents. Most respondents (78%) were identified as males, additionally, a significant proportion (i.e., 52%) of the employees fall within the age range of 26 to 40 years. Furthermore, 51% of them have completed their graduation. Moreover, a considerable number (i.e., 53%) have accumulated over five years of professional experience. Which represents that the respondents were matured, educated, experience enough to understand the items of questionnaire tool.

3.1. Measures

Digital leadership was measured using a six items scale created by (Shin et al., 2023), and items were assessed on a Likert scale ranging from (1) strongly disagree to (5) strongly agree. An example of items comprises “supervisor/leader raises awareness of the technologies that can be used to improve organizational processes”. The assessment of digital technologies involved five items developed by (Xiaoyan et al., 2022), which assessed the scale ranged from (1) strongly disagree to (5) strongly agree. An example of items comprises “is your company’s digital transformation strategy can improve efficiency and performance of operations”.

The third variable pertains to providing digital leadership support from teams, which is facilitated through utilizing four items. These items were evaluated using a scale ranging from Strongly Disagree (1) to Strongly Agree (5) by (Wittmann et al., 2009). An illustrative example of its item is, “I believe that leadership team support is essential to improve performance with digital leadership”. The measurement of sustainable performance in organizations was conducted using a set of six items developed (Mollah et al., 2023). These items were measured using a Likert scale from strongly disagree (1) to strongly agree (5). An example of items comprises “the organization provides high-quality services”.

3.2. Statistical analysis

The leaf and stem methods were used to manage the outliers. Factor loading of items was investigated using the Kaiser Meyer Olkin approach by maximum likelihood technique. We examined validity analysis by using confirmatory factor analysis (CFA), as many previous studies used the AMOS software to perform CFA. We adhered to the recommendations of Hair et al. (2010) regarding the model fit indices with threshold values such as, the Chi-Square/Degree of Freedom ($\chi^2/df < 3.0$), the Adjusted Goodness of Fit Index ($AGFI \geq 0.90$), the Incremental Fit Index ($IFI \geq 0.90$), the Root Mean Square Residual ($SRMR < 0.08$), the Goodness of Fit Index ($GFI \geq 0.90$), the Tucker Lewis Index ($TLI \geq 0.90$), the Comparative Fit Index ($CFI \geq 0.90$), and the Root Mean Square Error of Approximation ($RMSEA \leq 0.08$). Further, the Cronbach’s Alpha, a commonly used measure of internal consistency, was employed to assess the reliability of all study variables (Taber, 2018). According to Nunnally and Bernstein (1994), it is recommended that Cronbach’s Alpha values must

be ≥ 0.70 . In addition, the coefficient correlation of Pearson (r) was used to examine the magnitude of the bivariate associations among the variables. Finally, the structural equations modeling (SEM) was used to examine the research hypotheses.

3.3. Results

Examining data about outliers, multicollinearity, and normality is essential as these factors constitute the fundamental assumptions for SEM. Information needed for the research was obtained through in-person interviews, during which the participants were asked to suggest any values of missing uncertainty applicability. Consequently, the dataset contained all the values. The stem & leaf method was used to recognize the study outliers, identifying 16 responses exhibiting problematic values. Consequently, these responses were excluded from the subsequent analysis. In addition, the analysis revealed that kurtosis and skewness values fell within the acceptable range between (± 1 and ± 3). Additionally, the association coefficients among the variables were below 0.70, indicating an absence of multicollinearity (Tabachnick et al., 2013).

Additionally, our findings indicate that a particular aspect described just over fifty percent of the observed variance. In this study, we addressed the concern of standard method bias by employing a methodological measure, as discussed by (Podsakoff et al. 2003), specifically focusing on the loading of factors and discriminant validity. The factor loading of the items was investigated using Bartlett's test and Kaiser Meyer Olkin, using the likelihood to the maximum extraction method. The exploratory factor analysis (EFA) checks the significance of an item or variable's load on a given factor. These thresholds typically range from 0.30 to 0.40 for estimated standardized factor loadings. Such loadings commonly indicate significant and practically significant associations (Schmitt and Sass, 2011). The value of the Kaiser-Meyer-Olkin (KMO) measure was determined to be 0.914, indicating the adequacy of the item loadings. As Henseler et al. (2015) also proposed a novel method for evaluating discriminant validity, the (hetero-mono trait ratio of correlations HTMT). Furthermore, the HTMT can be computed with relative ease. The input for this analysis solely consists of the correlations among the observed variables. There is no requirement for the utilization of exploratory or confirmatory factor analysis. As Henseler et al. (2015) determined that the HTMT values are below 0.90, indicating the absence of any concerns regarding discriminant validity. CFA is a method used to assess the validity of a theoretical model by examining the relationships between observed variables.

Hair et al. (2010) was followed to check the values for Cronbach's alpha (≥ 0.70), average variance extracted ($AVE \geq 0.50$), and composite reliability ($CR \geq 0.60$). Following are the establishment of the fundamental assumptions the administration of the CFA was undertaken (**Table 1**). The initial values of the model fit did not fall within the standard values, with $\chi^2/df = 4.32$, $RMSEA = 0.83$, $CFI = 0.81$, and $SRMR = 0.18$. Nevertheless, after removing items exhibiting low factor loadings, as depicted in the measures, the model fit values demonstrated improvement ($\chi^2/df = 2.68$, $RMSEA = 0.069$, $CFI = 0.94$ and $SRMR = 0.045$).

Descriptive statistics

The values are shown in **Table 1**. It has been observed that the participants exhibited mean regarding digital leadership ($M = 3.84$), digital technologies ($M = 3.72$), and digital leadership support ($M = 3.74$). However, the means value of sustainable organization performance is ($M =$

3.61). A positive correlation was observed between digital leadership and sustainable organization performance ($r = 0.66$ and $p \leq 0.01$), digital leadership and digital technologies ($r = 0.58$ and $p \leq 0.01$), as well as the correlation between digital technologies and digital leadership support ($r = 0.64$ and $p \leq 0.01$). Similarly, there is a correlation between Digital technologies and Sustainable organization performance ($r = 0.61$ and $p \leq 0.01$). Furthermore, a positive association was observed between leadership support and sustainable performance ($r = 0.67$ and $p \leq 0.01$). The values of Cronbach's Alpha α , Average Variance Extracted (AVE), and Composite Reliability (CR) were observed within the specified ranges.

Table 1. Validity, descriptive, reliability and correlation analysis.

Variables	α	Mean	SD	AVE	CR	1	2	3	4
1-Digital leadership	0.89	3.84	0.89	0.55	0.79	1			
2-Digital technologies	0.83	3.72	0.82	0.53	0.78	0.58**	1		
3-Technological support	0.82	3.74	0.87	0.51	0.81	0.64**	0.62**	1	
4-Sustainable performance	0.80	3.61	0.85	0.59	0.84	0.66**	0.61**	0.67**	1

Note. ** $p < 01$, $\alpha \geq 0.70$.

3.4. Hypotheses testing

Structural equation modeling (SEM) was used to examine the impact of the independent variable on the dependent variables, as depicted in **Table 2**. The study observed significant positive effects of digitization on Sustainable development organization performance ($\beta = 0.49$, $p \leq 0.01$), as well as on Digital technologies ($\beta = 0.64$, $p \leq 0.01$). Additionally, a positive effect was found on digital support for leadership ($\beta = 0.62$, $p \leq 0.01$). These values provide support for hypotheses H1, H2, and H5. Additionally, it was observed that digital technologies have a positive impact on the performance of sustainable organizations ($\beta = 0.569$ and $p \leq 0.01$), as well as digital leadership support having a positive effect on sustainable organization performance ($\beta = 0.587$ and $p \leq 0.01$), thereby providing support for hypotheses H3 and H6.

Table 2. Hypotheses testing through hierarchical regression.

Relationships	β	CR	SE	p	Hypotheses
Digital leadership → Sustainable performance	0.49	13.30	0.053	**	H1 is accepted
Digital leadership → Digital technologies	0.64	14.40	0.045	**	H2 is accepted
Digital leadership → Digital leadership Support	0.62	13.89	0.041	**	H5 is accepted
Digital technologies → Sustainable performance	0.569	12.258	0.038	**	H3 is accepted
Digital leadership Support → Sustainable performance	0.587	11.782	0.037	**	H6 is accepted

The mediating hypotheses were examined using 5,000 bootstrap samples at a confidence level of 95%, allowing for the determination of upper and lower limits (**Table 3**). About the intermediary function of digital technologies between digital leadership and long-term organization performance, it was observed that the indirect effect ($\beta = 0.05$, LL = 0.034, UL = 0.089, and $p \leq 0.01$) was comparatively smaller than the direct effect ($\beta = 0.418$ and $p \leq 0.01$). Nevertheless, it is important to note that the absence of a zero value between the upper and lower limits of the data set allows for the acceptance of H4. Concerning digital leadership support in the partial positive mediating

association between digital leadership and sustainable performance, it was observed that the indirect effect ($\beta = 0.167$, LL = 0.117, UL = 0.198, and $p \leq 0.01$) as compared to the direct effect ($\beta = 0.48$ and $p \leq 0.01$). Nevertheless, it does not include a zero value within its range. Consequently, the acceptance of H7 is suitable.

Table 3. Mediation analysis using bootstrap.

Relationships				Bootstraps @ 95%		
				LL	UL	Hypothesis
Digital leadership	→	Digital technologies	→	Organization performance		
Direct effect		0.403		**	0.418	0.543
Indirect effect		0.05		**	0.034	0.089
Digital leadership	→	Technologies support	→	Organization performance		
Direct effect		0.482		**	0.391	0.563
Indirect effect		0.167		**	0.117	0.198

4. Discussion

In the digital era, the changing nature of organizations is frequent. In line, the digital leadership is crucial in improving technological capabilities and cultivating a supportive organizational culture, ultimately leading to sustainable performance. In this regard, our study offers empirical evidence of a positive association between digital leadership and sustainable organizational performance. Further, our findings suggest that digital leadership is evident at different organizational levels, such as the board of directors, senior and upper-level leaders, and IT leadership. These conclusions are supported by studies conducted by Karippur and Balaramachandran (2022), Klus and Müller (2021), Petry (2018), El Sawy et al. (2013), Temelkova (2018), Bruner et al., (2022), Frankowska and Rzeczycki (2020), and Shah and Patki (2020). In addition, the firm's size also played a crucial role in managing sustainable organizational performance. Moreover, Pakistan is categorized as a developing country, and the utilization of digital applications is restricted here. The process of digitalization requires digital leaders to effectively utilize digital technology systems in order to allocate and supervise tasks. Additionally, these leaders must foster employee's creative capabilities through collaborative teamwork and establish an organizational culture that provides support (Mollah et al., 2023).

By implementing this approach, an association can establish a system where employees possess technical skills, ensuring the business's ability to perform well in the market consistently. Previous literature has provided limited empirical examination of the mediating role of digital technologies in the relationship between sustainable performance and digital leadership. Digital technologies have a partially positive impact on the relationship between digital leadership and sustainable organizational performance. The study also found a noteworthy connection between the support of team members and employees toward digital leadership and the sustainable performance of organizations. Our research findings, as stated in the study conducted by Lu and Ramamurthy (2011), provide a valuable contribution to knowledge management research.

Digital technologies and support for digital leadership are vital in attaining sustainable organizational performance. Moreover, scholars have argued that organizational learning and a

supportive culture are crucial factors in gaining acquisition advantages and are widely recognized as essential for achieving future organizational success (Chiva et al., 2007). Furthermore, these factors actively promote the development, acquisition, dissemination, and integration of information and knowledge (Onag et al., 2014). Research findings play a crucial role in the progress of knowledge-based economies, particularly in nations like Pakistan that have experienced digital industrialization. Pakistan is considered a developing nation that has yet to make much progress in digital advancements in the tourism industry. In addition, companies must consider digital technologies and the organizational culture that promotes support to successfully implement procedures that enhance the long-term performance of smart city organizations in Pakistan.

4.1. Theoretical contribution and practical implications

The undeniable importance of digital leadership in motivating innovation and ensuring sustainable organizational performance is evident in the current era of digital transformation. The current investigation has made noteworthy theoretical advancements in leadership behavior and knowledge management (Erhan et al., 2022; Lu and Ramamurthy, 2011).

This study is based on digital leadership as an independent variable. The mediating variables are digital technologies and digital technological support from the team, and the dependent variable is the sustainable organization performance of smart cities to promote the tourism business after the COVID-19 pandemic. Therefore, this research contributes to knowledge management and the resource-based view (RBV) theory. Digital leadership has significant positive results on sustainable business performance. Our model specifically examined the positive contribution of digital technologies and digital technological support from team members as mediators between sustainable performance and digital leadership in smart cities in Pakistan. As Nwankpa et al. (2016), businesses with digital technology capabilities can initiate digital change by reevaluating and reconstructing existing business processes.

Additionally, these companies can facilitate digital change with digital leadership by providing conventional products, services, and customer offerings into digital layouts for better performances. This study implementing digitalization in both service and manufacturing sectors that has proven to be highly satisfactory across all organizational levels, particularly within the tourism industry in smart cities of Pakistan. The integration of digital technologies has had a substantial impact on the sustainable performance of organizations. Nevertheless, implementing IT-related upgradation necessitates financial investment and acquiring new expertise, particularly in digital leadership within smart cities, to enhance overall performance. Furthermore, digital leaders consistently prioritize competitive advantages to enhance information technology capabilities and foster sustainable organizational performance.

Consequently, this study aims to support the advancement of smart cities in Pakistan for tourism development after the COVID-19 pandemic. Furthermore, our study can provide advantages to both management and organizations. This study will have practical implications for executives and managers facing challenges implementing and integrating digital technology within their organizational workflows. The present study offers empirical support for the notion that digital leadership substantially impacts sustainable organizational performance (Shin et al., 2023). This statement highlights the significance of digital leadership skills and knowledge in facilitating sustainable organizational performance in smart cities of Pakistan.

Moreover, Zhang et al. (2008) suggested that digital technologies influence the small and medium-sized enterprises (SMEs) in China. The present study has found that digital technologies positively impact on organizational performance in Pakistani context. It implies that the process of digitalization plays a significant role in improving the overall performance of organizations. Digital technologies are enlarging output, fostering association, facilitating problem-solving, and improving decision-making. The objective is to enhance product and service innovation and sustainable performance. Finally, it is valuable in the context of smart cities to implement technological advancements with a supportive culture for sustainable performance. Information technology enterprises need to grow toward innovativeness in these operational systems dynamically. Alternatively, the government has the option to provide subsidies or tax rebates as incentives for the adoption of emerging technologies. In order to sustain innovation and maintain a leading position, enhancing the existing digital system.

4.2. Limitations and future research directions

This research study presents empirical evidence regarding digital leadership's impact on organization's sustainable performance, explicitly focusing on managers. Nevertheless, it is essential to note that the present study is cross-sectional, and further long-term investigations are necessary to establish a definitive link between the variables under consideration. This study demonstrates the practical significance of digital leadership in fostering sustainable organizational performance in Pakistan, with potential applicability to other nations. Additionally, it is worth noting that this study was carried out within a broad range of organizations. However, it is essential to consider that the outcomes may vary when examining the findings through a techno-based organizational view. In a recent studies investigation conducted (e.g., Baierle et al., 2022), the impact of digital technology on the food industry was examined, with a particular focus on the influence of technological advancements in the agricultural sector.

The study employed mathematical models to analyze these effects comprehensively. Nevertheless, it is essential to note that this particular study exclusively examined the perspectives of employees within an organization regarding performance. Consequently, the findings may not encompass effects that can be universally applied or generalized. Moreover, in the context of this study, the examination of the impact of digital leadership on performance could be enhanced by incorporating additional variables. Based on the empirical evidence presented, there is a potential avenue for future investigation into the impact of digital platform management and the competencies of digital leaders on enhancing sustainable organizational performance. Moreover, it is imperative to conduct additional research to examine the potential correlation between organizational financial support and the enhancement of digital leadership skills. Further research is necessary to validate the correlation between digital leadership and innovations, particularly in contexts with uncertain digital supportive cultures. Ultimately, further investigation is essential to ascertain the impact of collaborative governmental assistance on the expansion and implementation of digital environmental initiatives.

5. Conclusion

In recent years, there has been a growing focus on evaluating the influence of digital leadership to improve sustainable organizational performance. So, this study examines the association

between digital leadership and sustainable organizational performance by considering the parallel mediation of digital technologies and digital leadership support from team members in smart cities of Pakistan. Many studies have been conducted on digital leadership, sustainable performance, digital technologies, and digital leadership support from employees with different frameworks (e.g., Sanders et al., 2005; Chen et al., 2014; Lu and Ramamurthy, 2011). Therefore, the present study has a novel framework between variables to check these implications on the smart city beneficiaries.

This study's results show that digital leadership positively influences sustainable organizational performance. Further, the parallel mediation of digital technologies and digital leaders' support has partial mediation between digital leadership and sustainable business performances in smart cities of Pakistan. The results of our study suggested that adopting digital leadership practices has a favorable influence on the enduring of a sustainable organization's performance. Adopting digital leadership in smart cities has enhanced overall performance in the digital era. In the digital transformation era, organizations must prioritize digital leadership, foster an organizational culture that supports digital initiatives, and enhance digital technologies. These efforts are crucial for the effective and sustainable management of organizations in smart cities, aiming to promote the tourism industry and provide better-quality facilitation to their users. Organizations demonstrate a high level of proactivity in embracing IT-related changes and exhibit a strong awareness of current information. In the contemporary era of digital advancements, the significance of digital leadership, digital technologies, and their support for digital leadership cannot be underestimated its role in enhancing innovation and promoting sustainable performance within smart cities.

Author contributions

Conceptualization, Fahad Saddique and Beenish Ramzan; methodology, Fahad Saddique; software, Beenish Ramzan; validation, Fahad Saddique, Beenish Ramzan and Shouvik Sanyal; formal analysis, Fahad Saddique; investigation, Fahad Saddique; resources, Jebreel Almari; data curation, Fahad Saddique; writing—original draft preparation, Fahad Saddique; writing—review and editing, Beenish Ramzan; visualization, Shouvik Sanyal; supervision, Fahad Saddique; project administration, Jebreel Alamari; funding acquisition, Fahad Saddique and Beenish Ramzan. All authors have read and agreed to the published version of the manuscript.

Conflict of interest

The authors declare no conflict of interest.

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Appendix

Table A1. Factor loading.

Variables	Items	Factor loadings
Digital leadership	Supervisor/leader raises the awareness of the employees of the institution about the risks/ benefits of information technologies	0.65
	Supervisor/leader raises awareness of the technologies that can be used to improve organizational processes	0.579
	Supervisors/leaders determine the ethical behaviors required for informatics practices together with all stakeholders	0.69
	The supervisor plays an informative role in reducing resistance to innovations brought by information technologies	0.66
	Leaders share his/her own experiences about technological possibilities that will increase the contribution of their colleagues to the learning of organizational	0.614
	In order to increase participation in the corporate vision, a digital leader guides the employees of the institution about the technological tools that can be used	0.514
Digital technologies	Is your company's, digital transformation strategy can improve efficiency and performance of operations	0.75
	Is artificial intelligence and block chain technologies helps to improve efficiencies and performance	0.736
	Are cloud computing technologies, Internet of things (IoT) and big data analysis helps to improve operational performance	0.705
	Are smart Phone and social media helps to improve efficiencies and performance	0.734
	Is cyber security technologies helps to increase efficiencies and performance of your organization	0.784
Technological leadership support	Are you believe that technological leadership support from employees is helpful for organization	0.76
	Are you believe that digital leadership is enhance with technological leadership support from employees	0.677
	Are you believe that technological leadership support from employees enhance the sustainable organization performance	0.634
	I believe that leadership team support is essential to improve performance with digital leadership	0.562
Sustainable performance	The organization provides high-quality services	0.664
	The organization can adopt new manufacturing & services opportunities	0.696
	The organization performs well in improving the effectiveness of services delivered	0.653
	The organization adapts quickly to unanticipated changes	0.75
	The organization can compete in the current market	0.671
	The organization is considered profitable in the industry	0.737

Table A2. Conceptual definitions.

Variable	Conceptual definition
Digital technologies	“The term digital technologies refer to the set of intelligent and innovative technologies, such as big data analytics, IoT, and cloud computing, that make it possible to achieve connection, communication, and automation. Digital technologies enable companies to transform their current product or service model into an intelligent model and to adopt data-driven strategies to become more competitive” (Zhang et al, 2018).
Digital leadership	“We define digital leadership as doing the right things for the strategic success of digitalization for the enterprise and its business ecosystem. Digital leadership means thinking differently about business strategy, business models, the IT function, enterprise platforms, mindsets and skill sets, and the workplace” (Hensellek, 2020).
Digital leadership support	“Digital Leadership Support of team members is given by upper management and by each team member. It’s related to the appreciation by the leadership of digital skills and attitude toward digital innovation” (Aquino et al., 2023).
Sustainable supply chain performance	“The creation of coordinated supply chains through the voluntary integration of economic, environmental, and social considerations with key inter-organizational business systems designed to efficiently and effectively manage the material, information, and capital flows” (Ahi and Searcy, 2013).