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ASSESSING THE MEDIATING ROLE OF ORGANIZATIONAL DIGITALIZATION BETWEEN TECHNOLOGY SKILL DEVELOPMENT AND ORGANIZATIONAL SUSTAINABILITY PERFORMANCE: EVIDENCE FROM TEXTILE INDUSTRY.

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Abstract
In today's digital and competitive business environment, organizational sustainability performance (OSP) has become a strategic priority for small and medium-sized enterprises (SMEs). Technology skill development (TSD) is recognized as a key capability that enables firms to adopt digital technologies and implement sustainable practices. However, the mechanisms through which technology-related skills influence sustainability outcomes remain underexplored. This study examines the impact of TSD on OSP, with organizational digitalization (OD) serving as a mediating mechanism. Grounded in Dynamic Capability Theory and the Resource-Based View, the study hypothesizes that TSD enhances OD, which subsequently improves sustainability performance across economic, environmental, and social dimensions. Data were collected from textile SMEs in Punjab, Pakistan, using structured questionnaires, and analyzed through Partial Least Squares Structural Equation Modeling (PLS-SEM) in SmartPLS. The findings indicate that TSD significantly improves both OD and OSP, and OD partially mediates the relationship between TSD and sustainability performance. The study contributes to the literature by empirically validating OD as a critical mechanism linking technology skills to sustainability outcomes. For managers, the results emphasize the importance of continuous investment in employee technology skills and digital transformation to enhance long-term sustainability in SMEs

INTRODUCTION

Organizational sustainability performance (OSP) has become a central strategic concern for firms operating in an increasingly competitive, technology-intensive, and environmentally conscious global economy (Elkington, 1997; Hart & Dowell, 2011). Sustainability-oriented organizations are expected to simultaneously achieve economic growth, environmental protection, and social well-being in order to ensure long-term survival and legitimacy (Bansal & DesJardine, 2014; Schaltegger et al., 2016). These expectations are particularly challenging for small and medium-sized enterprises (SMEs), which play a critical role in economic development and employment creation but often operate under severe financial, technological, and human capital constraints (OECD, 2019; Kraus et al., 2021).

The rapid diffusion of digital technologies has significantly reshaped organizational processes, business models, and competitive dynamics across industries (Vial, 2019; Verhoef et al., 2021). Digital technologies enable firms to improve operational efficiency, enhance data-driven decision-making, reduce resource

consumption, and respond proactively to environmental and social pressures (Bharadwaj et al., 2013; George et al., 2021). Prior studies suggest that digital transformation can act as a catalyst for sustainable value creation by aligning operational performance with sustainability objectives (Schniederjans et al., 2020; Bresciani et al., 2021). However, evidence also indicates that technology adoption alone does not automatically result in improved organizational performance or sustainability outcomes (Kane et al., 2015; Warner & Wäger, 2019).

Technology skill development (TSD) has therefore emerged as a critical organizational capability that enables firms to effectively leverage digital technologies (Mikalef et al., 2019; Côrte-Real et al., 2020). Technology skill development refers to the continuous process through which employees acquire, update, and apply digital knowledge and competencies required to operate and exploit digital tools (Bharadwaj, 2000; OECD, 2020). From a resource-based view (RBV), employee technology skills constitute valuable, rare, and difficult-to-imitate resources that can generate sustained competitive advantage when properly deployed (Barney, 1991; Wade & Hulland, 2004). Empirical research demonstrates that technology-related skills enhance innovation capability, productivity, and operational efficiency, thereby contributing to superior organizational performance (Ravichandran, 2018; Mikalef et al., 2020).

Nevertheless, the presence of skilled employees does not automatically translate into organizational sustainability performance (Kane et al., 2015; Warner & Wäger, 2019). Dynamic capability theory suggests that firms must integrate, reconfigure, and institutionalize individual-level skills into organizational routines and processes in order to generate performance outcomes in rapidly changing environments (Teece, 2007; Teece et al., 2016). Without appropriate organizational mechanisms, technology skills may remain fragmented and underutilized, limiting their contribution to sustainability-related goals (Schilke et al., 2018; Karimi & Walter, 2015).

Organizational digitalization (OD) represents one such critical mechanism that enables firms to convert individual technological skills into organization-wide capabilities (Verhoef et al., 2021; Kraus et al., 2022). Organizational digitalization refers to the extent to which firms integrate digital technologies into core business processes, organizational structures, and decision-making systems (Vial, 2019; Sebastian et al., 2017). Through digitalized workflows, data analytics, and interconnected systems, firms can enhance operational transparency, optimize resource utilization, reduce environmental impact, and improve economic and social performance (Schniederjans et al., 2020; George et al., 2021). Prior studies indicate that digitalization strengthens organizational agility and responsiveness, which are essential for achieving sustainability outcomes in dynamic markets (Tallon et al., 2019; Li et al., 2023).

Despite the growing literature on digital transformation and sustainability, empirical research examining the mechanisms linking technology skill development to organizational sustainability performance remains limited (Mikalef et al., 2020; Bresciani et al., 2021). In particular, the mediating role of organizational digitalization has received insufficient empirical attention, especially within the context of SMEs operating in developing economies (Kraus et al., 2021; Côrte-Real et al., 2020). This gap is notable, as SMEs often face greater challenges related to digital readiness, workforce capability development, and sustainability compliance compared to large organizations (OECD, 2019; Santos et al., 2022).

Research Questions

This study seeks to address the following research questions:

RQ1: Does technology skill development significantly influence organizational digitalization among textile SMEs?

RQ2: Does technology skill development have a direct effect on organizational sustainability performance?

RQ3: Does organizational digitalization significantly contribute to organizational sustainability performance?

RQ4: Does organizational digitalization mediate the relationship between technology skill development and organizational sustainability performance?

Research Objectives

To systematically address the above research questions, the study pursues the following research objectives:

RO1: To examine the effect of technology skill development on organizational digitalization in textile SMEs.

RO2: To investigate the direct relationship between technology skill development and organizational sustainability performance.

RO3: To analyze the impact of organizational digitalization on organizational sustainability performance.

RO4: To assess the mediating role of organizational digitalization in the relationship between technology skill development and organizational sustainability performance.

Background of study

This study is grounded in the Resource-Based View (RBV) and Dynamic Capability Theory (DCT) to explain how technology skill development contributes to organizational sustainability performance through organizational digitalization. These complementary theoretical perspectives offer a robust framework for understanding how firms, particularly small and medium-sized enterprises (SMEs), leverage internal resources and capabilities to achieve sustainable performance in increasingly digital and dynamic environments (Barney, 1991; Teece, 2007). RBV emphasizes that sustainable competitive advantage arises from the possession and effective utilization of resources that are valuable, rare, inimitable, and non-substitutable, thereby highlighting the strategic importance of firm-specific internal assets (Wernerfelt, 1984; Barney, 1991).

Within this framework, human capital has been widely recognized as a critical organizational resource, especially in knowledge-intensive and technology-driven contexts (Wright et al., 2001). In the digital era, employees' technological skills represent a key intangible resource that enables organizations to adopt, operate, and leverage digital technologies effectively (Bharadwaj, 2000; Wade & Hulland, 2004). Technology skill development refers to the continuous process through which employees acquire, update, and apply digital knowledge, technical expertise, and problem-solving capabilities necessary to support digital initiatives and innovation activities (OECD, 2020). Empirical evidence suggests that firms with strong technology-related human capital are better positioned to implement digital solutions, enhance operational efficiency, and improve overall organizational performance (Ravichandran, 2018; Mikalef et al., 2019). From an RBV perspective, technology skill development enhances the value and rarity of human capital by embedding firm-specific knowledge that is difficult for competitors to imitate, thereby contributing to improved organizational outcomes, including sustainability-related performance (Hart & Dowell, 2011).

Despite its explanatory power, RBV has been criticized for its relatively static nature, as it focuses primarily on resource possession rather than on how resources are renewed, reconfigured, and redeployed over time (Priem & Butler, 2001; Schilke et al., 2018). This limitation is particularly salient in environments characterized by rapid technological change, evolving sustainability regulations, and shifting stakeholder expectations, where firms must continuously adapt to remain competitive (Teece et al., 1997). These challenges are especially pronounced for SMEs, which often face constraints related to financial resources, technological infrastructure, and managerial capabilities, increasing their reliance on internal capabilities to respond to environmental changes effectively (Kraus et al., 2021).

Dynamic Capability Theory extends RBV by emphasizing a firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments (Teece et al., 1997; Teece, 2007). Dynamic capabilities enable organizations to sense emerging opportunities and threats, seize opportunities through strategic decision-making, and transform existing resources and processes to sustain competitive advantage (Teece, 2018). Within this perspective, technology skill development reflects a firm's sensing and learning capability, as it enhances employees' capacity to recognize technological opportunities, absorb new knowledge, and respond effectively to digital disruptions

(Mikalef et al., 2020). Organizational digitalization, in turn, represents a seizing and transforming capability, as it involves embedding digital technologies into organizational processes, structures, and decision-making systems (Sebastian et al., 2017; Verhoef et al., 2021).

Through organizational digitalization, firms can redesign workflows, enhance data-driven decision-making, improve coordination, and increase operational flexibility, all of which are essential for achieving organizational sustainability performance (Vial, 2019). Digitalized processes enable organizations to optimize resource utilization, reduce environmental impact, improve transparency, and support economic and social objectives, thereby aligning operational performance with sustainability goals (Schniederjans et al., 2020; George et al., 2021). Accordingly, organizational sustainability performance can be viewed as an outcome of effectively deployed dynamic capabilities that integrate digital transformation efforts with sustainability-oriented strategies (Bresciani et al., 2021).

By integrating RBV and Dynamic Capability Theory, this study provides a comprehensive explanation of how technology skill development translates into organizational sustainability performance through organizational digitalization. While RBV explains why employees' technological skills constitute a strategic organizational resource, DCT clarifies how these resources are mobilized, transformed, and institutionalized to generate sustainable performance outcomes in dynamic environments (Barney, 1991; Teece, 2007). Specifically, technology skill development equips firms with the necessary human capital resources, whereas organizational digitalization functions as a dynamic capability that converts these resources into organization-wide routines, processes, and structures. This integrated theoretical perspective is particularly relevant for textile SMEs in developing economies, where firms must strategically leverage internal capabilities to simultaneously address digital transformation challenges and increasing sustainability pressures (Kraus et al., 2021; Khan et al., 2021).

Literature Review and Hypotheses Development

Technology skill development refers to the continuous enhancement of employees' abilities to acquire, apply, and update knowledge related to digital tools, systems, and technologies required for effective organizational functioning in a digital environment (Bharadwaj, 2000; OECD, 2020). In the contemporary digital era, organizations increasingly rely on skilled employees to adopt and integrate technologies such as automation, data analytics, cloud computing, and enterprise resource planning systems in order to improve efficiency and competitiveness (Vial, 2019; Verhoef et al., 2021). Prior research consistently emphasizes that employee technology skills play a pivotal role in the success of digital initiatives, as they enable organizations to effectively implement digital systems, redesign workflows, and enhance data-driven decision-making capabilities (Mikalef et al., 2019; Kane et al., 2015).

Technology skill development facilitates organizational digitalization by reducing resistance to technological change, minimizing implementation errors, and ensuring the effective utilization of digital infrastructure (Sebastian et al., 2017; Warner & Wäger, 2019). Skilled employees act as internal change agents who support digital transformation by promoting knowledge sharing, process innovation, and continuous improvement across organizational functions (Côrte-Real et al., 2020). Empirical studies have shown that learning-oriented digital skills significantly enhance firms' digital readiness and maturity, particularly in small and medium-sized enterprises (SMEs) where financial and technological resources are often limited (Kraus et al., 2021; Mikalef et al., 2020). In resource-constrained contexts such as SMEs, technology skill development becomes a critical enabler of organizational digitalization, allowing firms to leverage digital technologies more effectively despite structural limitations (OECD, 2019). Based on this discussion, the following hypothesis is proposed:

H1: Technology skill development positively influences organizational digitalization among textile SMEs of Punjab.

Organizational sustainability performance refers to a firm's ability to achieve long-term economic success while simultaneously fulfilling environmental and social responsibilities (Elkington, 1997; Bansal & DesJardine, 2014). Technology skill development contributes to sustainability performance by enabling organizations to optimize resource utilization, reduce waste, enhance productivity, and comply with increasingly stringent environmental and social regulations (Hart & Dowell, 2011; George et al., 2021). Employees with strong technological skills can effectively leverage digital tools to monitor energy consumption, minimize material waste, improve supply chain transparency, and support environmentally friendly production practices (Schniederjans et al., 2020; Abbas et al., 2023).

Furthermore, technology skill development enhances organizational innovation capabilities, allowing firms to develop sustainable products, processes, and business models that align with stakeholder expectations and regulatory requirements (Bresciani et al., 2021; Mikalef et al., 2019). Prior empirical research establishes a positive relationship between employee skills and organizational performance outcomes, including operational efficiency, environmental performance, and social responsibility (Ravichandran, 2018; Santos et al., 2022). In SMEs operating in environmentally sensitive industries such as textiles, technological competence is particularly crucial for sustaining performance while addressing sustainability challenges related to pollution, labor standards, and resource consumption (Khan et al., 2021; Naseem et al., 2022). Accordingly, the following hypothesis is proposed:

H2: Technology skill development positively influences organizational sustainability performance among textile SMEs of Punjab.

Organizational digitalization refers to the extent to which organizations integrate digital technologies into their operational processes, business models, and strategic activities (Vial, 2019; Verhoef et al., 2021). Digitalized organizations are better equipped to enhance transparency, improve operational efficiency, and reduce environmental impact through automation and data-driven decision-making (Schniederjans et al., 2020; George et al., 2021). Digital technologies enable firms to track sustainability-related metrics, optimize production processes, and implement eco-efficient technologies, thereby supporting environmental and economic sustainability objectives (Bresciani et al., 2021).

For example, digital monitoring systems can significantly reduce energy consumption and material waste, while digital supply chain platforms enhance traceability, accountability, and social compliance across value chains (Tallon et al., 2019; Li et al., 2023). Empirical evidence suggests that organizational digitalization positively affects sustainability performance by enabling firms to balance economic, environmental, and social goals more effectively (Bharadwaj et al., 2013; Abbas et al., 2023). In developing economies, digitalization plays a particularly important role in helping SMEs meet international sustainability standards and remain competitive in global markets characterized by increasing sustainability requirements (Kraus et al., 2021; Khan et al., 2021). Therefore, the following hypothesis is proposed:

H3: Organizational digitalization positively influences organizational sustainability performance among textile SMEs of Punjab.

Although technology skill development provides a foundational capability for digital competence, its impact on sustainability performance may not always be direct (Kane et al., 2015; Warner & Wäger, 2019). Organizational digitalization serves as a critical mediating mechanism that translates individual-level technology skills into organization-wide sustainability outcomes. From a dynamic capability perspective, technology skill development enhances an organization's sensing and learning capabilities, whereas organizational digitalization reflects the firm's ability to seize opportunities and reconfigure resources and processes (Teece, 2007; Mikalef et al., 2020).

Through organizational digitalization, firms can institutionalize technological skills by embedding them into standardized routines, digital systems, and decision-making structures, thereby enabling systematic improvements in efficiency, environmental management, and social responsibility (Sebastian et al., 2017;

Verhoef et al., 2021). Prior research indicates that digital transformation mediates the relationship between learning capabilities and performance outcomes, suggesting that skills must be operationalized through digitalized processes to generate sustainable value (Côrte-Real et al., 2020; Bresciani et al., 2021). Accordingly, organizational digitalization allows firms to exploit technology skills effectively, ensuring that these skills contribute to long-term sustainability rather than isolated operational improvements. Based on this reasoning, the following mediation hypothesis is proposed:

H4: Organizational digitalization mediates the relationship between technology skill development and organizational sustainability performance among textile SMEs of Punjab.

Research Framework

Based on the theoretical foundation and hypotheses, the proposed research framework is illustrated below:

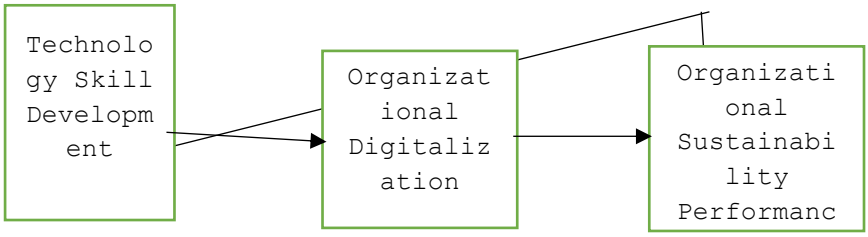

Figure 1. Conceptual Research Framework

Research Methodology

Research Design

This study employed a quantitative, cross-sectional research design to examine the relationships among technology skill development (TSD), organizational digitalization (OD), and organizational sustainability performance (OSP) in textile SMEs of Punjab, Pakistan. Quantitative research is appropriate for hypothesis testing, theory validation, and statistical generalization of results (Creswell & Creswell, 2018; Sekaran & Bougie, 2016). A cross-sectional approach enables data collection at a single point in time, which is suitable for evaluating organizational practices, managerial perceptions, and skill-related initiatives in SMEs.To analyze the proposed relationships, Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed using SmartPLS software. PLS-SEM is particularly suited for complex models, mediating relationships, prediction-oriented objectives, and non-normal data distributions, and is widely used in technology management and organizational research (Hair et al., 2019; Hair et al., 2022). This method allows simultaneous assessment of both the measurement model (validity and reliability) and the structural model (hypotheses testing).

Population and Sampling

The population of the study included small and medium-sized enterprises (SMEs) operating in the textile sector of Punjab, Pakistan, chosen due to the sector's significant role in exports, employment generation, and economic growth, as well as increasing pressures for digital adoption and sustainability compliance (Khan et al., 2021). Data were collected from textile SMEs located in Faisalabad and Lahore, which are major industrial hubs with a high concentration of textile manufacturing firms. Respondents included owners, senior managers, production managers, and IT/operations managers, who are directly involved in technology skill development, digitalization strategies, and sustainability practices.A purposive sampling technique was employed to ensure that respondents possessed relevant knowledge and experience regarding the study constructs (Etikan et al., 2016). According to PLS-SEM guidelines, the

minimum sample size should be at least 10 times the maximum number of structural paths directed at any construct (Hair et al., 2019). Since the most complex construct in the model receives two paths, the minimum required sample size was 20. To ensure robustness, 210 questionnaires were distributed, and 198 valid responses were retained after screening for completeness and consistency.

Data Collection Procedure

Data were collected using a self-administered structured questionnaire, a standard method in organizational research for gathering perceptions and practices efficiently (DeVellis, 2017). The questionnaire underwent content validation by academic experts and industry professionals to ensure clarity, relevance, and appropriateness for the textile SME context. A pilot study with 20 respondents was conducted to test the questionnaire's reliability and readability, and minor adjustments were made based on feedback. The finalized questionnaire was distributed both physically and electronically. Participants were informed of confidentiality and anonymity, reducing potential biases, and participation was voluntary with no collection of personal identifiers.

Measurement Instruments

All constructs were measured using validated scales adapted to the textile SME context. A five-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree) was employed, which is standard in organizational research (Hair et al., 2019).Technology Skill Development (TSD) was measured with four items adapted from digital learning and skill development literature (Bharadwaj, 2000; OECD, 2020), capturing employees' ability to acquire, update, and apply technological knowledge in organizational activities. Sample items included:Employees receive continuous training to enhance their digital and technological skills.Employees are capable of using new digital tools and technologies effectively. Organizational Digitalization (OD) was measured using five items adapted from Ukko et al. (2019), reflecting the extent to which digital technologies are integrated into organizational processes, operations, and decision-making. Sample items included. Our organization has digitalized key business processes. Digital technologies are widely used in decision-making and operations. Organizational Sustainability Performance (OSP) was measured using seventeen items adapted from Mousa and Othman (2020), covering economic, environmental, and social performance dimensions. Sample items included:Our organization reduces energy and resource consumption. Our organization ensures employee health, safety, and well-being. Our organization achieves long-term economic growth.

Data Analysis Technique

Data analysis was conducted using SmartPLS 4, following the two-step PLS-SEM approach:

Measurement Model Assessment

Reliability: Cronbach's Alpha (CA) and Composite Reliability (CR) were used to assess internal consistency. Convergent Validity:Evaluated through Average Variance Extracted (AVE).Discriminant Validity:Assessed using the Fornell-Larcker criterion and HTMT ratio.

Structural Model Assessment

Path coefficients (β values) were analyzed. Bootstrapping with 5,000 subsamples determined t-values and p-values.Coefficient of determination (R^2) and effect sizes (f^2) were calculated. Mediation analysis was conducted to test the indirect effect of OD between TSD and OSP.PLS-SEM was chosen due to its robustness in handling complex models, mediation effects, and non-normal data, making it suitable for examining technology skill and digitalization effects on sustainability performance (Hair et al., 2019; Hair et al., 2022).

Table 1: Measurement Items and Sources

Construct	Code	Measurement Items	Source
Technology Skill Development	TSD1	Employees are trained to use new digital technologies	Adapted
	TSD2	Employees can quickly learn new technological tools	Adapted
	TSD3	The firm invests in developing employees' technology skills	Adapted
	TSD4	Employees apply technology skills to improve work processes	Adapted
Organizational Digitalization	OD1	Business processes are digitally integrated	Ukko et al. (2019)
	OD2	Digital systems support daily operations	Ukko et al. (2019)
	OD3	Digital technologies enhance decision-making	Ukko et al. (2019)
	OD4	Data analytics is used in business planning	Ukko et al. (2019)
	OD5	Digital tools improve organizational efficiency	Ukko et al. (2019)
Organizational Sustainability Performance	OSP1–OSP17	Economic, environmental, and social sustainability indicators	Mousa & Othman (2020)

Data Analysis Technique

Data analysis was conducted using Smart-PLS 4 following a two-step approach: Measurement Model Assessment.Internal consistency reliability (Cronbach's Alpha, Composite Reliability) Convergent validity (Average Variance Extracted – AVE).Discriminant validity (Fornell-Larcker Criterion and HTMT).Structural Model Assessment.Path coefficients (β values) t-values and p-values using bootstrapping (5,000 subsamples).Coefficient of determination (R^2) Effect size (f^2) Mediation analysis using indirect effects PLS-SEM was selected due to its robustness in handling non-normal data, prediction-oriented objectives, and complex mediation models.

Data Analysis and Results

This section presents the results obtained from Partial Least Squares Structural Equation Modeling (PLS-SEM) using Smart-PLS. Following the recommended two-step approach, the analysis includes measurement model assessment and structural model assessment, along with mediation analysis.

Data Analysis and Results

Measurement Model Assessment

The measurement model was evaluated to determine the reliability and validity of the study constructs. Internal consistency reliability was assessed using Cronbach's Alpha (CA) and Composite Reliability (CR), while convergent validity was evaluated using Average Variance Extracted (AVE) (Hair et al., 2019; Henseler et al., 2015). The recommended thresholds for acceptable reliability are CA ≥ 0.70, CR ≥ 0.70, and AVE ≥ 0.50 (Hair et al., 2019).

Table 2: Reliability and Convergent Validity

Construct	Cronbach's Alpha	Composite Reliability (CR)	AVE
Technology Skill Development (TSD)	0.842	0.881	0.651
Organizational Digitalization (OD)	0.914	0.931	0.729
Organizational Sustainability Performance (OSP)	0.938	0.942	0.536

Discriminant Validity

Discriminant validity was assessed using the Fornell–Larcker criterion, which requires that the square root of AVE for each construct is greater than its correlations with other constructs (Fornell & Larcker, 1981).

Table 3: Fornell–Larcker Criterion

Construct	TSD	OD	OSP
Technology Skill Development (TSD)	0.807		
Organizational Digitalization (OD)	0.612	0.854	
Organizational Sustainability Performance (OSP)	0.547	0.624	0.732

Discriminant Validity

Discriminant validity was assessed using the Fornell–Larcker criterion, which requires that the square root of AVE for each construct is greater than its correlations with other constructs (Fornell & Larcker, 1981).

Table 4: Fornell–Larcker Criterion

Construct	TSD	OD	OSP
Technology Skill Development (TSD)	0.807		
Organizational Digitalization (OD)	0.612	0.854	
Organizational Sustainability Performance (OSP)	0.547	0.624	0.732

Structural Model Assessment

The structural model was assessed to test the hypothesized relationships using path coefficients (β), t-values, and p-values, obtained through a bootstrapping procedure with 5,000 subsamples (Hair et al., 2019).

Table 5: Direct Effects (Hypothesis Testing)

Hypothesis	Path	β	t-value	p-value	Result
H1	TSD → OD	0.648	12.214	0.000	Supported
H2	TSD → OSP	0.291	4.376	0.000	Supported
H3	OD → OSP	0.402	6.118	0.000	Supported

Coefficient of Determination (R^2)

The R^2 values indicate the explanatory power of the independent variables on the endogenous constructs (Hair et al., 2019).

Table 5: R^2 Values

Endogenous Construct	R^2
Organizational Digitalization (OD)	0.420
Organizational Sustainability Performance (OSP)	0.517

TSD explains 42.0% of the variance in OD.TSD and OD together explain 51.7% of the variance in OSP. These values demonstrate moderate to substantial explanatory power, consistent with prior studies in organizational digitalization and sustainability research (Mikalef et al., 2019; Sebastian et al., 2017).

Effect Size (f^2)

Effect sizes were computed to evaluate the relative impact of each predictor (Cohen, 1988).

Table 6: Effect Size (f^2)

Relationship	f^2	Effect Size
TSD → OD	0.724	Large
TSD → OSP	0.143	Medium
OD → OSP	0.271	Medium

TSD has a large effect on OD, while its direct effect on OSP and the effect of OD on OSP are medium, indicating meaningful contributions of digital skills and digitalization to sustainability outcomes.

Mediation Analysis

The mediating role of OD between TSD and OSP was examined using indirect effects via bootstrapping.

Table 7: Mediation Results

Hypothesis	Indirect Path	β	t-value	p-value	Result
H4	TSD → OD → OSP	0.261	5.873	0.000	Supported

Organizational digitalization partially mediates the relationship between technology skill development and sustainability performance, confirming that digitalization acts as a key mechanism translating individual-level skills into organization-wide sustainability outcomes (Teece, 2018; Vial, 2019).

Discussion

The primary objective of this study was to examine the relationship between technology skill development (TSD) and organizational sustainability performance (OSP), with a particular focus on the mediating role of organizational digitalization (OD) in textile SMEs of Punjab, Pakistan. The results provide strong empirical support for the proposed conceptual framework and offer critical insights into how technological capabilities influence sustainability outcomes, particularly in the context of a developing economy (Vial, 2019).The findings indicate that technology skill development significantly influences organizational digitalization, supporting Hypothesis H1. This suggests that employees' technological competencies are pivotal in enabling organizations to adopt and integrate digital technologies into their operational processes. In line with Dynamic Capability Theory, the development of technology skills enhances an organization's ability to sense, adapt, and respond to technological changes, thereby facilitating digitalization initiatives (Teece, 2018; Vial, 2019). In textile SMEs, where financial and technological resources are often limited, skilled employees function as key drivers of digital transformation.Furthermore, the study identifies a direct and significant relationship between TSD and OSP, supporting Hypothesis H2. This finding implies that technology-related skills contribute directly to economic efficiency, environmental responsibility, and social well-being. Employees equipped with advanced technological skills are better positioned to implement eco-efficient practices, optimize resource utilization, and enhance workplace safety, collectively fostering sustainable organizational outcomes (Mousa & Othman, 2020; Ukko et al., 2019).

The analysis also confirms that organizational digitalization positively influences OSP, supporting Hypothesis H3. Organizations that have integrated digital technologies into their processes are more capable of monitoring sustainability indicators, optimizing production, and improving transparency across the supply chain. In the textile sector, digital systems enable compliance with international sustainability standards, reduce environmental impacts, and strengthen long-term economic performance (Sebastian et al., 2017; Mikalef et al., 2019).Finally, mediation analysis demonstrates that organizational digitalization partially mediates the relationship between TSD and OSP, supporting Hypothesis H4. This result indicates that while technology skill

development has a direct impact on sustainability performance, a substantial portion of its effect occurs through digitalization. These findings highlight that technology skills need to be effectively embedded into organizational processes and digital systems to achieve sustained performance improvements (Henseler et al., 2015; Teece, 2018).

Theoretical Implications

This study provides several important theoretical contributions to the literature on technology skill development, digitalization, and organizational sustainability performance: Integration of Resource-Based View (RBV) and Dynamic Capability Theory: By combining the Resource-Based View (RBV) and Dynamic Capability Theory, this study demonstrates how technology skill development functions as a strategic organizational resource that enables both digitalization and sustainability performance. Specifically, RBV suggests that firm-specific capabilities, such as employees' technological skills, create competitive advantages that are valuable, rare, and difficult to imitate (Barney, 1991). Dynamic Capability Theory further explains how these skills allow organizations to sense, seize, and transform technological opportunities in response to changing environments, thereby facilitating digital transformation and sustainability initiatives (Teece, 2018). This integration highlights the mechanism through which individual-level competencies are transformed into organization-level outcomes. Empirical Evidence on Digitalization as a Mediator: The study addresses a critical gap in the literature by empirically validating organizational digitalization as a mediating mechanism between technology skill development and sustainability performance. While prior research has investigated digital transformation or learning capabilities independently, this study demonstrates their interconnected roles in achieving sustainability outcomes. Specifically, skilled employees provide the foundation for digital adoption, while organizational digitalization operationalizes these skills across processes, enhancing economic, environmental, and social performance (Mikalef et al., 2019; Vial, 2019).

Contextual Contribution

This research contributes contextually by providing empirical evidence from textile SMEs in a developing economy, a setting that has been underrepresented in previous studies. SMEs in developing countries often face resource constraints and unique operational challenges, which can influence the effectiveness of technology skill development and digitalization initiatives. By focusing on this context, the study extends the generalizability of digitalization–sustainability frameworks beyond large firms and developed economies, highlighting the relevance of technological and digital capabilities for achieving sustainable outcomes in emerging markets (Mousa & Othman, 2020).

Managerial Implications

The findings of this study provide actionable guidance for managers, policymakers, and industry stakeholders, particularly within the textile SME sector. By highlighting the critical roles of technology skill development (TSD) and organizational digitalization (OD) in achieving sustainability performance (OSP), the study offers the following implications. Managers should strategically invest in employee training programs, workshops, and digital learning platforms to enhance technological competencies. Skilled employees serve as the backbone for successful digital adoption, enabling firms to effectively implement and utilize digital tools in production, supply chain management, and decision-making processes. Organizations that continuously develop their workforce's technological skills are better positioned to respond to evolving market and technological demands (Teece, 2018; Mousa & Othman, 2020). Adopt Systematic. Firms should pursue an integrated and strategic approach to digitalization rather than ad hoc implementation of technologies. Embedding digital systems into core business processes, data analytics, and decision-making workflows can substantially enhance operational efficiency, transparency, and sustainability outcomes (Ukko et al., 2019; Mikalef et al., 2019). For textile SMEs, digitalization enables real-time monitoring of production processes, reduces resource waste, ensures compliance

with international sustainability standards, and improves overall economic, environmental, and social performance. Policymakers, government bodies, and industry associations can play a critical role by providing financial incentives, infrastructure support, and skill development programs. SMEs often face resource constraints that hinder digital transformation and sustainability initiatives. By offering subsidies for technology adoption, training grants, or access to digital infrastructure, external stakeholders can accelerate SMEs' capabilities to implement sustainable practices and compete in global markets (Sebastian et al., 2017; Vial, 2019). Align Skills with Strategic Objectives. Sustainability performance is not solely achieved through technology adoption. Managers must ensure that employee skills, digital systems, and organizational strategies are aligned with sustainability goals. Effective integration of technological skills into organizational processes ensures that digitalization translates into measurable environmental, social, and economic outcomes. Strategic alignment allows firms to leverage human capital and technology synergistically, enhancing both efficiency and long-term competitiveness (Teece, 2018; Mousa & Othman, 2020).

Limitations and Future Research Directions

Despite its contributions, this study has several limitations. First, the cross-sectional design limits causal inference; future research could adopt longitudinal studies to examine the evolution of technology skill development (TSD), organizational digitalization (OD), and organizational sustainability performance (OSP) over time (Hair et al., 2019; Teece, 2018). Second, the focus on textile SMEs in Punjab, Pakistan may limit generalizability; replicating the model in other industries or regions could enhance external validity (Mikalef et al., 2019; Mousa & Othman, 2020). Third, reliance on self-reported data may introduce common method bias; future studies should consider objective performance metrics or multi-source data (Podsakoff et al., 2003). Finally, additional mediators or moderators, such as organizational culture, leadership, or technological infrastructure, could be examined to better understand the mechanisms linking TSD, OD, and OSP (Vial, 2019; Sebastian et al., 2017).

Conclusion

This study provides robust empirical evidence that technology skill development (TSD) positively influences organizational sustainability performance (OSP), with organizational digitalization (OD) serving as a significant mediating mechanism. Analysis of data from textile SMEs in Punjab, Pakistan, indicates that employees' technological competencies facilitate digital transformation initiatives, which subsequently enhance economic efficiency, environmental stewardship, and social responsibility (Mousa & Othman, 2020; Ukko et al., 2019).By integrating Dynamic Capability Theory and the Resource-Based View (RBV), the study advances theoretical understanding of how internal organizational capabilities can drive sustainable outcomes in the digital era (Teece, 2018; Barney, 1991). The findings demonstrate that technology skills are not merely operational assets but strategic resources that, when embedded within organizational processes, enable firms to adopt innovative digital solutions and achieve long-term sustainability objectives (Vial, 2019; Mikalef et al., 2019).From a managerial perspective, the study underscores that sustainable performance depends on the strategic alignment of skill development, digitalization initiatives, and organizational goals, rather than on technology adoption alone (Sebastian et al., 2017). Policymakers and industry stakeholders are encouraged to support SMEs with digital infrastructure, training programs, and incentives to strengthen technology skills and facilitate digital integration.

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