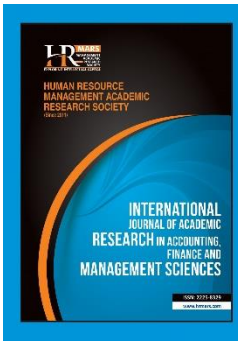
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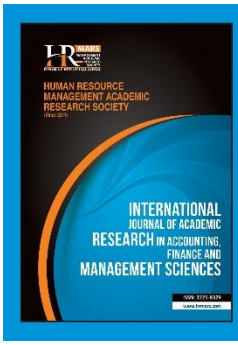
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Digital Transformation and Sustainable Performance: The Role of Management Control System

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Abstract
In light of the emerging paradigm of digital transformation, this study aims to provide multiple contributions to the sustainable development literature. This study motivate to provide the implications for scholars and policymakers to amplify emerging trends in digital transformation. Despite the concept of digitalization is growing tremendously, research on digital transformation within the academic literature of sustainable performance appears unclear, especially in the context of Pakistani manufacturing industry. In line with DC theory and stakeholder theory, this study provided insights into a deeper understanding of utilizing digital transformation as essential intellectual capital for sustainable development. This study examines whether management control systems play a moderating role in the nexus between digital transformation and sustainable performance. The study collected data from 286 manufacturing companies in Pakistan by using a simple random sampling technique. To analyze the causal relationship, this study uses the SPSS software, which is innovative in the context of the digital transformation. The findings of this study added value to the current debate on digital transformation and create interesting implications for manufacturing sector, especially for managers, professionals and for government bodies. Besides, this research can

shed lights to provide a holistic framework on digital transformation through MCS, which can open new avenues for the sustainable development of Pakistani manufacturing SMEs.
Keywords: Digital Transformation, Management Control System, Sustainable Performance, Pakistani Manufacturing Firms

Introduction

Over the last decade, research synthesizes the emerging trend of digitalization, highlighting the role of digitalization as a key driver in setting an agenda for sustainable development. The enterprise needs to shift to a knowledge-based economy due to the rapid global transition, in which the only way to create wealth is through the development of knowledge through intangible assets, commonly known as artificial knowledge (Di Vaio et al., 2023). Digitalization has been identical and distinguished between data, information and knowledge. One of the key foundations of digitalization is providing valuable assets to the organization (Erickson & Rothberg, 2014). Digitalization appears as a valuable asset to identify, measure and manage to protect the organizational knowledge system and contribute to competitive advantage (San et al., 2022). Consequently, digitalization is a novel and emerging development of sustainable development, offering several new interpretive lenses for sustainable development (Di Vaio et al., 2022; Erickson & Rothberg, 2014). However, the literature has paid unclear attention to digitalization and sustainable performance relationship. In this regard, digital transformation emerged as a valuable tool to address the challenges of sustainable development.

The key aspects are discussed in the above sections, and it is argued that digital transformation is essential for organizations, and it has an impact on sustainable performance. However, digital transformation alone is extensively defined with a variety of elements. Digital transformation can be combined with the MCS to achieve sustainable performance. Nevertheless, in relation to digital transformation, and sustainable performance, this study focus on digital transformation and its impact on sustainable performance through MCS. Hence, this study attempts to address the following research questions

RQ1: Does digital transformation influences sustainable performance?
RQ2: Does MCS moderate the nexus between digital transformation and sustainable performance?

The emerging trend of digital transformation appears as a valuable role in shaping business strategies, fostering various actors in society and determines digitalization efforts for sustainable performance (Wu et al., 2020). The world today is increasingly facing the tremendous challenges of sustainability, and the recent technological waves create an alarming situation for companies to enhance the scope of digitalization to preserve the natural environment, improve ecosystem integrity and promote the use of the digital platform (Latif et al., 2022). Aligned with the SDG UN-2030 agenda, establishing an action program for people, the planet, prosperity and peace must be the prime priority for the enterprise. To achieve the UN-2030 SDG agenda, it may only be possible to develop digital transformation within enterprise to address multiple types of stakeholder concerns. In this regard, digital transformation emerged as a valuable IC, creating a sustainable business model, fostering action plans for investment in technological advancement, guiding partnership action with collaboration with other companies (Di Vaio et al., 2020). In addition,

the implementation of digital transformation through management control system not only provide benefits to the business, but also promotes the substantial changes in innovations, involves all business processes through digital technologies, and facilitates a new direction for sustainable business model. Henceforth, management control system precisely aimed at strengthening sustainable business models, in terms of promoting digital transformation to work efficiently and provide responsible approach to natural resources, to "do more and better with less" (Di Vaio et al., 2021). The current study proposed that digital transformation plays a decisive role as an IC in allowing new data technologies to improve efficiency and productivity through MCS that allow overcoming current data limitations and improve sustainable performance.

Literature Review and Theoretical Development

Dynamic Capability Theory

The dynamic capability theory is a well-known theory in the field of strategic management, which aims to provide an explanation on how firms can achieve and maintain a competitive advantage in unpredictable and rapidly changing situations. According to the DC theory, firms are more likely to adapt and innovate, achieving a competitive advantage. Businesses have the ability to recognize, leverage, and reorganize their resources and capabilities in response to changing market conditions. DC theory emphasizes the importance of organizational learning, knowledge creation, and the ability to effectively manage and orchestrate various resources and capabilities (Teece et al., 1997), Dynamic capability theory provides a relevant lens for understanding and managing digital transformation within organizations. Digital transformation involves the strategic integration of digital technologies to fundamentally alter business processes, models, and customer experiences. In this context, dynamic capabilities play a critical role in enabling organizations to effectively adapt to and capitalize on digital opportunities. Teece (2018) highlights the importance of developing digital dynamic capabilities that include sensing digital trends and opportunities, seizing them through agile decision-making and resource allocation, and reconfiguring existing processes and capabilities to harness the potential of digital technologies. Similarly, Zhu et al (2006) argue that dynamic capabilities are crucial for organizations to successfully navigate the challenges and leverage the opportunities presented by digital transformation. By aligning dynamic capabilities with digital transformation initiatives, organizations can enhance their competitiveness, foster innovation, and effectively navigate the digital landscape.

Stakeholder Theory

Stakeholder theory is a well-recognized concept in management and organizational studies. The theory emphasizes the importance of the relationships and interests of various stakeholders in organizational decision-making processes. According to the theory, organizations should consider the concerns of other individuals or groups who have an interest in or are affected by the organization's decisions, in addition to maximizing shareholder value (Freeman, 1984). Stakeholder theory provides valuable insights into the design and implementation of management control systems (MCS) by emphasizing the consideration of various stakeholders' interests and needs. In the context of MCS, stakeholders include employees, managers, shareholders, customers, suppliers, and the wider society impacted by the organization's activities. According to Roberts (1992), stakeholder theory suggests that MCS should not only focus on financial performance but also consider the broader goals and expectations of stakeholders. This perspective recognizes that

MCS should enable effective decision-making and accountability while taking into account the diverse concerns of stakeholders. It involves aligning MCS with the organization's values, mission, and long-term sustainability.

Digital Transformation

Digital transformation refers to the strategic integration and utilization of digital technologies to fundamentally reshape business processes, models, and customer experiences. It involves adopting innovative technologies such as artificial intelligence, big data analytics, cloud computing, and the Internet of Things (IoT) to drive organizational efficiency, agility, and innovation. Digital transformation enables organizations to enhance operational effectiveness, optimize decision-making processes, improve customer engagement, and create new revenue streams. It requires organizations to adapt their strategies, cultures, and structures to leverage the potential of digital technologies and stay competitive in the rapidly evolving digital landscape. Scholars and practitioners have extensively explored the concept of digital transformation, including its drivers, challenges, and implications for organizations across industries (Westerman et al., 2014; Berman & Marshall, 2020). The successful implementation of digital transformation initiatives has become a critical imperative for organizations seeking to thrive in the digital age.

Sustainable Performance

Sustainable performance refers to the ability of an organization to achieve long-term success while simultaneously addressing environmental, social, and governance (ESG) concerns. It encompasses the integration of sustainability principles and practices into core business operations, strategy, and decision-making processes (San et al., 2022). Organizations that prioritize sustainable performance aim to minimize negative environmental impacts, promote social responsibility, and uphold good governance practices. This involves initiatives such as reducing carbon emissions, implementing responsible supply chain practices, fostering diversity and inclusion, and ensuring transparent and ethical business practices. Scholars and researchers have extensively explored the concept of sustainable performance, highlighting its importance in creating value for stakeholders and contributing to a more sustainable future (Elkington, 1997; Schaltegger & Wagner, 2011). The pursuit of sustainable performance is increasingly recognized as a critical aspect of corporate responsibility and is closely linked to long-term profitability, reputation, and resilience in a rapidly changing business landscape.

Management Control System

A management control system (MCS) is a framework of processes, tools, and practices employed by organizations to guide and monitor their activities, ensuring alignment with strategic objectives and facilitating effective decision-making. MCS encompasses various elements, such as performance measurement, budgeting, variance analysis, and internal controls, which aid in planning, coordination, and control of organizational activities. It provides managers with relevant information, feedback mechanisms, and mechanisms for accountability, enabling them to evaluate performance, make informed decisions, and take corrective actions as necessary. Researchers have explored different aspects of management control systems, including their design, implementation, and impact on organizational performance (Simons, 1995; Merchant & Van der Stede, 2017). The design and effectiveness of an MCS are influenced by organizational characteristics, contextual factors, and the specific goals and needs of the organization. By implementing an appropriate management control

system, organizations can enhance their operational efficiency, align activities with strategic objectives, and improve overall performance.

Hypothesis Development

Digital Transformation and Sustainable Performance

The relationship between digital transformation and sustainable performance is characterized by a mutually reinforcing dynamic. Digital transformation can serve as a catalyst for sustainable performance, while sustainable performance can be enhanced through effective digital transformation initiatives. Digital transformation enables organizations to leverage advanced technologies and data-driven approaches to improve their environmental, social, and governance (ESG) performance. For instance, organizations can leverage digital solutions for energy management, waste reduction, and supply chain optimization, leading to reduced environmental impacts (Gupta & George, 2016). Additionally, digital technologies enable improved transparency and accountability, facilitating responsible and ethical business practices (Khan et al., 2021; Tze et al., 2022). On the other hand, sustainable performance can provide a strategic foundation for digital transformation initiatives. Organizations that prioritize sustainability in their operations and decision-making are more likely to align their digital transformation efforts with ESG goals. The integration of sustainable practices can guide technology adoption and innovation, ensuring that digital transformation contributes to long-term societal and environmental well-being (Bhardwaj et al., 2018). Several studies have explored the relationship between digital transformation and sustainable performance. For instance, Shamsuddin et al (2021) found a positive relationship between digital transformation and environmental performance in manufacturing firms. Similarly, Almirall et al (2016) highlighted the role of digital platforms in enabling sustainable innovation.

Hypothesis (H1): Digital transformation positively influence sustainable performance
H1a: Digital transformation positively influence environmental performance
H1b: Digital transformation positively influence social performance
H1c: Digital transformation positively influence financial performance

Moderating role of MCS

Management control systems (MCS) can play a moderating role in the relationship between digital transformation and sustainable performance. Digital transformation initiatives can have a significant impact on sustainable performance by enabling organizations to adopt environmentally friendly practices, enhance social responsibility, and promote long-term sustainability. However, the effectiveness of digital transformation in achieving sustainable performance outcomes may be influenced by the design and implementation of MCS. MCS provides the structure, processes, and controls that organizations use to align their activities with strategic objectives and monitor performance (Chenhall, 2003). It helps organizations set targets, allocate resources, and track progress toward sustainable performance goals. In the context of digital transformation, MCS can act as a facilitator or a barrier in leveraging the potential benefits of digital technologies for sustainable performance.

An effective MCS can enhance the impact of digital transformation on sustainable performance by integrating sustainability metrics and targets into performance measurement systems (Schaltegger & Burritt, 2017). It enables organizations to monitor and control their environmental and social impacts, promote accountability, and make data-driven decisions

to drive sustainable outcomes (Jabbour et al., 2019). By providing feedback mechanisms and aligning incentives, MCS can motivate employees and stakeholders to actively contribute to sustainable practices associated with digital transformation initiatives (Cuganesan et al., 2019). Conversely, an inadequate or misaligned MCS may hinder the potential benefits of digital transformation for sustainable performance. If MCS does not include relevant sustainability measures or fails to provide accurate and timely information, organizations may struggle to assess and manage the environmental and social impacts of digital initiatives (Govindarajan & Gupta, 2001). Inadequate control systems can lead to inefficiencies, lack of accountability, and missed opportunities for sustainable performance improvement. In summary, management control systems have a moderating role in the relationship between digital transformation and sustainable performance. By integrating sustainability measures, aligning incentives, and providing accurate information, MCS can enhance the impact of digital transformation on sustainable outcomes. Organizations should design and implement MCS that align with their sustainability goals and support the effective management of digital transformation initiatives to drive sustainable performance.

Hypothesis (H2): MCS moderate between digital transformation and sustainable performance
H2a: MCS moderate between digital transformation and environmental performance
H2b: MCS moderate between digital transformation and social performance
H2c: MCS moderate between digital transformation and financial performance

Research Framework

The main objective of the study is to examine the effects of digital transformation on sustainable performance. Sustainable performance includes environmental performance, social performance and financial performance. Additionally, the current study employed MCS as moderator between digital transformation and sustainable performance nexus. Figure 1 illustrates the research framework.

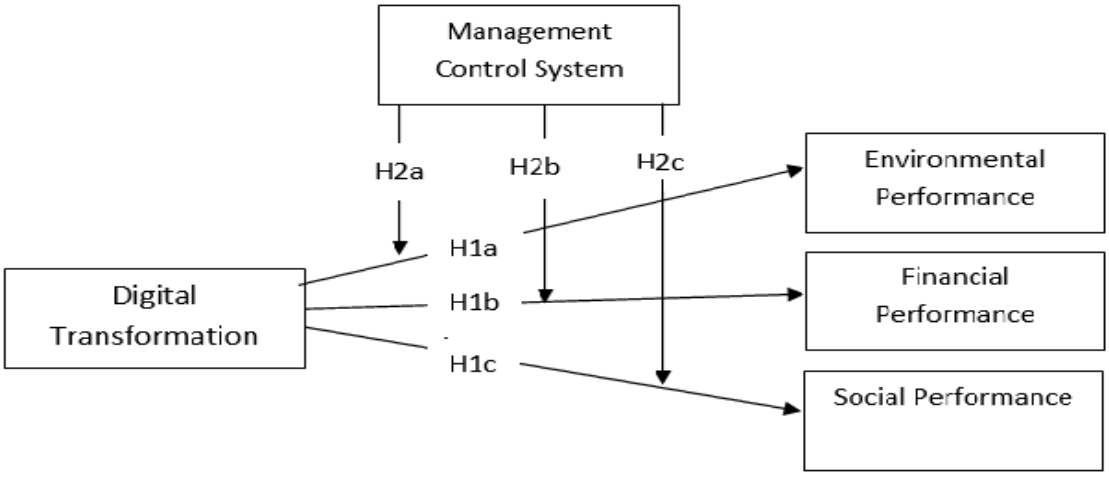

Figure 1: Research Framework

Method and Sampling

The current study presents a comprehensive analysis of the manufacturing sector in Pakistan. The selection of manufacturing sector aiming to examine digital transformation

operations and identify key challenges in achieving sustainable performance. The study uses a survey approach through questionnaire methods. To provide a holistic understanding of digital transformation operations in Pakistan's manufacturing sector, simple random sampling technique is employed. The primary data is collected through surveys to the higher level managers. The research findings contribute to enhancing the understanding of the digital transformation and MCS operations in the manufacturing sector of Pakistan. As mentioned in Table 1, the frequency distribution of respondents' profiles. From the analysis, it was determined that the majority of the questionnaires were completed by male respondents (n=185, 64.7%), while the remaining questionnaires were completed by female respondents (n=101, 35.3%). Regarding the positions of the respondents within the sample companies, it was found that the highest proportion consisted of postgraduate degree holders (n=137, 47.9%). This was followed by respondents with a Ph.D. qualification (n=62, 21.7%), and undergraduate degree holders (n=87, 30.4%) within the companies. Additionally, the results indicate that the respondents have significant work experience within the sample companies. Specifically, a considerable portion of respondents reported working for less than 1 year (n=67, 23.4%), while the majority had a working duration ranging from 1 to 5 years (n=115, 40.2%), and a significant number of respondents reported working for more than 5years (n=104, 36.4%). The age factor was also analyzed to understand the frequency distribution of employees' profiles. The findings reveal that the majority of the sample employees fall within the age range of 30-39 years (n=91, 31.8%), which is considered beneficial for the long-term stability of companies. This is followed by employees aged 40-49 (n=78, 27.3%) or 20-29 (n=63, 22%). A smaller proportion of employees fall within the age range of 50-59 (n=54, 18.9%). Although the sample companies are from various industry sectors, the majority of respondents reported working in the finance department (n=91, 31.8%). Other sectors were also represented (n=74, 25.9%), including departments related to environmental protection. The production department was the next largest group (n=64, 22.4%), followed by the accounting department (n=57, 19.9%).

Table 1

Description of N=286	Frequency	%
Gender		
Male	185	64.7
Female	101	35.3
Age		
20-29	63	22
30-39	91	31.8
40-49	78	27.3
50-59	54	18.9
Education Level		
Undergraduate	87	30.4
Postgraduate	196	68.5
Ph.D.	3	1.04
Service Tenure		
Less than 1 year	67	23.4
1-5 year	115	40.2
More than 5 year	104	36.4
Engaged Department		
Accounting Department	57	19.9
Finance Department	91	31.8
Environmental Protection Department	74	25.9
Production Department	64	22.4

Measurement of Scale

This research adopts the scales from previous research, which provides greater insights into the validity and reliability of the research findings. Six-item of digital transformation were measured by Ifenthaler and Egloffstein (2020), Seven-item of MCS by Henri (2006), Six-items of environmental performance were adopted from Zailani et al (2019); Sassen et al (2016); Cheng et al (2014), five-items of social performance were adopted from Zailani et al (2019), Sassen et al (2016); Cheng et al (2014) and five item of social performance were measured from pevious studies by (Zailani et al., 2019; Sassen et al., 2016; Cheng et al., 2014).

Results and Findings

The analysis was categorized into two parts, the first part is dealing with measurement model analysis while the second part is dealing with the structural equation model.

Measurement Model Assessment

Reliability is a measure of the error-free nature of constructs and ensures consistency in the results. It captures the concepts of stability and internal consistency. Internal consistency refers to the ability of scale items to correlate with other items within the same scale that measure the same concept or construct. In this study, Cronbach's Alpha (CA) is used as the lower bound for internal consistency reliability, while Composite Reliability (CR) serves as the upper bound for true reliability (Hair et al., 2011). As shown in Table 2, the CA values for all constructs range from 0.747 to 0.914, surpassing the recommended threshold of 0.7 suggested by (Hair et al., 2013). Additionally, the CR values for the constructs range

from 0.863 to 0.931, indicating adequate convergence or internal consistency (Hair et al., 2016).

Subsequently, the Average Variance Extracted (AVE) of the variables was assessed for the first-order constructs. The AVE represents the average amount of variance that a latent variable explains in its associated indicators. A value of 0.5 or higher indicates that the latent variable explains more than half of the variance in its indicators on average, which is considered sufficient (Hair et al., 2013; Henseler et al., 2009). In the current study, the AVE scores for each construct were found to be above the minimum threshold of 0.5, as suggested by Hair et al. (2013). The AVE values ranged from 0.560 to 0.704. Based on these results, it can be concluded that convergent validity has been achieved, indicating that the constructs adequately measure the underlying concepts.

Table 2

Construct	Items	Factor loading	Cronbach's alpha (α)	Composite reliability	Average Variance extracted
Digital Transformation	DT1	0.761	0.891	0.917	0.650
	DT2	0.822			
	DT3	0.871			
	DT4	0.864			
	DT5	0.797			
	DT6	0.710			
Management Control System	MCS1	0.819	0.914	0.931	0.660
	MCS2	0.853			
	MCS3	0.836			
	MCS4	0.756			
	MCS5	0.796			
	MCS6	0.802			
	MCS7	0.821			
Environmental performance	EP1	0.764	0.747	0.883	0.557
	EP2	0.736			
	EP3	0.774			
	EP4	0.767			
	EP5	0.728			
	EP6	0.706			
Financial performance	FP1	0.724	0.797	0.863	0.560
	FP2	0.794			
	FP3	0.811			
	FP4	0.770			
	FP5	0.629			
Social Performance	SP1	0.845	0.861	0.922	0.704
	SP2	0.738			
	SP3	0.795			
	SP4	0.903			
	SP5	0.912			

Fornell and Larcker Criterion for Discriminant Validity

Discriminant validity is often applied to examine in the context of confirmatory factor analysis (CFA) or structural equation modeling (SEM). Such analyses provides researchers about the clear assess about the distinctiveness of constructs by examining the factor loadings and factor structure. Each construct should have high factor loadings on its designated factors and low or negligible cross-loadings on other factors. Strong factor loadings on their respective factors and weak cross-loadings indicate discriminant validity. The Fornell-Larcker criterion is a commonly used criterion for assessing discriminant validity. It compares the square root of AVE for each construct with the correlation coefficients between constructs. If the square root of AVE for a construct is greater than the correlation coefficient with other constructs, it suggests discriminant validity. The HTMT ratio is a recently developed criterion for evaluating discriminant validity in SEM. It compares the average correlation between indicators of different constructs (heterotrait) with the average correlation between indicators of the same construct (monotrait). A value less than 0.85 is typically considered as evidence of discriminant validity.

Table 3

Constructs	Mean	SD	1	2	3	4	5
Digital Transformation	3.908	0.388	**0.806**				
Management Control System	4.180	0.439	0.202*	**0.812**			
Environmental performance	3.447	0.880	0.320**	0.209*	**0.746**		
Financial performance	4.183	0.393	0.350**	0.318**	0.329**	**0.748**	
Social Performance	4.254	0.485	0.436**	0.278**	0.411**	0.462**	**0.839**

Structural Model Assessment

Hierarchical Regression Analysis

Hierarchical regression analysis is applied to examine the causal relationship between constructs. This statistical method used to examine the relationship between dependent variable (sustainable performance) and a set of independent variables (digital transformation) while controlling for the influence of moderating variable (management control system). It is an extension of multiple regression analysis, where variables are entered into the analysis in a hierarchical order based on theoretical or conceptual considerations. This method allows researchers to explore the incremental contribution of each variable and assess their unique impact on the dependent variable. In current study, based on the results of hierarchical regression analysis digital transformation is confirmed the relationship with sustainable performance ($\beta = 0.285$, $p < 0.001$). However, the moderating role of MCS found significant between digital transformation and sustainable relationship ($\beta = 0.299$. $p < 0.001$, Model 5)

Table 4

	Social performance			Environmental performance			Financial performance		
Variables	Model 1	Model2	Model3	Model 4	Model5	Model6	Model 7	Model8	Model9
Gender	0.045	0.055	0.059	-0.061	-0.109	-0.108	0.056	0.004	0.004
Age	-0.063	-0.079	-0.079	-0.103	-0.009	-0.121	-0.042	-0.049	-0.050
Education Level	0.009	0.029	0.015	-0.009	-0.039	-0.047	-0.059	-0.086	-0.087
Service Tenure	0.137**	0.105	0.118	-0.074	-0.031	-0.019	0.028	0.069	0.072
Engaged Department	0.149**	0.113	0.121	-0.077	-0.036	-0.023	0.031	0.073	0.077
Digital Transformation (DT)		0.285***	0.280***		0.299***	0.312***		0.391***	0.396***
Management control system (MCS)		0.412***	0.419***		0.105***	0.113***		0.140**	0.143**
DT X MCS			0.089**			0.139*			0.040*
R2	0.023	0.209	0.223	0.024	0.232	0.251	0.035	0.257	0.259
ΔR2	0.013	0.014	0.186	0.024	0.209	0.019	0.007	0.250	0.002
***F* value**	0.919	11.88***	1.351	0.936	13.77***	1.864	0.286	17.06***	0.159

Discussion

Underpinned by the DC and Stakeholder theory, the current research has addressed two important research questions: RQ1: Does digital transformation influences sustainable performance? RQ2: Does MCS moderate the nexus between digital transformation and sustainable performance? First research question covers H1a, H1b, and H1c which demonstrated the positive impact of digital transformation on sustainable performance. This result is consistent with the past literature (Gupta & George, 2016). The results of H1 explained that digital technologies offer opportunities for sustainable performance such as energy optimization, resource efficiency, and environmental monitoring. The implementation of smart grids and Internet of Things (IoT) devices can enhance sustainable performance such as energy management and reduce carbon emissions (Chang, Wang, & Hsu, 2019). Based on DC theory, advanced analytics and data-driven decision-making appears as dynamic capability which can support predictive maintenance, optimize supply chain operations, and reduce waste and resource consumption (Zhao et al., 2019). Additionally, digital platforms can enable remote work and virtual collaboration in manufacturing sector of Pakistan, which reducing the need for physical travel and associated environmental impacts.

Second research question covers H2a, H2b and H2c, which demonstrated the moderating role of MCS between digital transformation and sustainable performance. The results are in line with the past literature (Cuganesan et al., 2019). The results of H2 explained that MCS is crucial in understanding how organizations can effectively manage and improve their digital operations for achieving sustainability. Based on stakeholder theory, MCS can play as a significant stakeholder in guiding and influencing sustainable performance by providing mechanisms for monitoring, measuring, and controlling environmental impacts. An effective MCS incorporates digital operations and feedback systems to track and evaluate an organization's sustainable performance (Klassen & Whybark, 2019). The results described MCS enables manufacturing firms in Pakistan to establish sustainable development goals, implement digital platform, digital product and services and monitor their progress toward

achieving sustainability objectives (Schaltegger & Zvezdov, 2016). Through the use of MCS, manufacturing firms can better performance measurement, budgeting, and variance analysis, and identify areas for improvement, promotes accountability, and supports decision-making processes aimed at reducing environmental impacts (Govindarajan & Gupta, 2001).

Managerial and Policy Implications

The current study contain several implications for managers and policymaker alike. Managers must provide clear direction, communicate the vision, and engage employees in the process. They should foster a culture of innovation and continuous learning. Digital transformation often requires rethinking organizational structures and job roles. Managers need to promote cross-functional collaboration, empower agile teams, and create a culture of autonomy and accountability. In addition, managers must develop data literacy skills and promote data-driven decision making. They need to invest in analytics capabilities, foster a data-driven culture, and ensure data quality and governance. Organizations must comply with data privacy regulations to protect customer data. Security and exchange commission of Pakistan (SECP) should impose strict requirements on data handling, consent, and breach notifications. Managers should ensure compliance to avoid penalties and maintain customer trust.

Conclusion

The current study analyzed how digital transformation serves as a dynamic capability for sustainable development through MCS. By means of partial least square, especially structural equation modelling, we recognized a links between digital transformation and sustainable performance through MCS in Pakistani manufacturing industry. To examine the theoretical underpinnings, we employed dynamic capability and stakeholder theory. To the best of author's knowledge, the current study is the prime investigation to address the digital transformation and sustainable performance links in the context of developing country. We found that digital transformation positively influences sustainable performance, whereby this relationship is strengthened by MCS. Therefore, digital transformation provides a strong mechanism for manufacturing companies in Pakistan, which has appeared as a significant tool of sustainable development. The findings revealed how digital transformation strengthens the sustainability operations of manufacturing firms. The results described that digitalization is widely recognized as one of the most important stakeholders in ensuring sustainable performance. Based on the results of our study, MCS identified a critical role to strengthen digital operations in terms of digital products and services to achieve sustainability.

The current study is manifold in several limitations and future research. First, the current study only examined manufacturing companies for data collection. However, future research may shed light on various industry sectors (e.g., tourism, education, services). Second, the current study explored MCS as a moderator by examining the perspective of the employee level. Although MCS is often used at the employee level, this metric does not distinguish how MCS operations are performing at the organizational level. Future research should focus on these traits among other perspectives (e.g., organizational perspective) that may define a different set of findings. Third, gender diversity can be an important factor in determining how digital transformation relates to sustainable performance. However, to analyze the role of gender diversity in the digital operations of companies, future research should take into account gender as a moderator between the links.

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