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DIGITAL TRANSFORMATION, ORGANIZATIONAL CULTURE, AND ENVIRONMENTAL SUSTAINABILITY: IMPLICATIONS FOR INNOVATION AND SUSTAINABLE INSTITUTIONAL DEVELOPMENT

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ABSTRACT

Digital Transformation is considered as one of the most important factors for improving organization competitiveness and sustainable growth in today's business world. The purpose of this study is to investigate the relationship between Digital Transformation and Organizational Culture and Environmental Sustainability, Innovation and Sustainable Institutional Development. In addition, this study aims to analyze the impact of Digital Transformation and Organizational Culture on Environmental Sustainability and Innovation, and the contribution of Innovation to Sustainable Institutional Development. This study applied a quantitative method using a structured questionnaire. The questionnaire was distributed among all employees and managers who are working in organizations which are experiencing Digital Transformation. 170 complete questionnaires were used to perform the data analysis using several statistical methods such as Descriptive Statistics, Correlation Analysis and Regression Analysis. As a result, it was found that there is a statistically significant positive relationship between Digital Transformation and Organizational Culture ($\beta = .62$, $p < .001$) and Digital Transformation and Innovation ($\beta = .64$, $p < .001$). Similarly, Organizational Culture has a statistically significant positive relationship with Environmental Sustainability ($\beta = .67$, $p < .001$), whereas Innovation has a statistically significant positive relationship with Sustainable Institutional Development ($\beta = .69$, $p < .001$). The model explained 38% of the variance in Organizational Culture, 45% in Environmental Sustainability, 41% in Innovation and 48% in Sustainable Institutional Development. These findings emphasize the need for Digital Transformation Strategies to be aligned with Organizations' Cultures to increase Innovation and Sustainability. The study contributes to the literature by developing an integrated model that links Digital Transformation, Sustainability and Innovation in Modern Organizations.

KEYWORDS: Digital Transformation, Organizational Culture, Environmental Sustainability, Innovation, Sustainable Institutional Development, Organizational Sustainability, Digital Innovation, Sustainable Development.

1. INTRODUCTION

Organizational change and competitive advantages across sectors are being driven by a large-scale process known as digital transformation. Organizations are using technology at an increasing rate to advance their operational efficiencies, generate new ideas, and adapt quickly to changing market conditions. According to Verhoef et al. (2021), "digital transformation" refers to the incorporation of digital technology into all aspects of organizational structure and strategy so that organizational performance can be improved and value can be created. However, digital transformation does not only involve the adoption of new technology. It will also significantly alter how organizations develop and implement innovation, capture, utilize and share knowledge, and allocate resources in response to evolving environments.

In addition to adopting new technologies, the success of digital transformation requires a culture within the organization. Schein (2017) defined organizational culture as the set of values, beliefs, and practices that employees adhere to when making decisions and behaving in work-related settings. An organizational culture that fosters a collaborative environment, supports continuous learning, and encourages employees to embrace changes will better equip an organization to successfully incorporate digital technologies and encourage the generation of new ideas. On the other hand, organizational cultures that are inflexible or resistant to change can impede the progress of transformation efforts and ultimately diminish the impact of investing in digital tools (Vial, 2019).

The importance of environmental sustainability has grown globally due to increased public concern about the effects of human activities on the environment, stricter government regulations, and greater stakeholder expectations from organizations regarding the environmental impacts of their operations. As such, many organizations have made environmental sustainability a strategic objective that will allow organizations to sustain their economic viability while limiting their negative environmental impacts. Environmental sustainability is defined by Schaltegger and Burritt (2018) as the prudent use of natural resources and the implementation of practices that will help maintain long-term ecological stability. Digital technologies play a significant role in contributing to environmental sustainability through reducing the amount of waste generated during operations, improving the efficient use of resources during operations, and conducting environmentally responsible business operations.

As discussed previously, innovation provides a bridge between digital transformation and sustainable organizational development. Digital technologies provide organizations with opportunities to develop innovative products, services, and processes that will enable organizations to compete effectively in today's global economy, address pressing environmental issues, and meet social demands. The convergence between digital transformation, organizational culture, and environmental sustainability presents an important focus area for researchers who seek to understand sustainable institutional growth over time.

Prior studies demonstrate a rising trend toward alignment between digital transformation and sustainability-focused strategies. By applying digital technologies to transform business processes, increase transparency throughout organizations, and improve resource utilization during operations, organizations can achieve both economic goals and environmental objectives simultaneously. Specifically, digital transformation enables sustainable innovation through creating opportunities for developing environmentally friendly products/services/operating practices (El-Kassar & Singh, 2019; Nambisan et al., 2019).

Although a considerable number of studies have focused on digital transformation, there is still a lack of understanding regarding the interconnectedness between digital transformation and its relationship with organizational culture in terms of environmental sustainability and innovation. Prior studies typically investigated either technological adoption or sustainability practices individually but rarely addressed the role of organizational culture in bridging digital transformation with sustainable institutional results. Thus, this study seeks to investigate how digital transformation and organizational culture each affect environmental sustainability and innovation, and together how they facilitate sustainable institutional growth.

By providing an integrative conceptual framework explaining how technological advancements, organizational culture, and environmental responsibility interrelate in generating innovation and facilitating sustainable institutional growth in contemporary organizations, this study contributes to interdisciplinary literature.

2. RESEARCH GAP

Recent literature has highlighted the increasing significance of digital transformation in influencing both organizational performance and

competitiveness (Verhoef et al., 2021), as it facilitates the integration of digital technologies into an organization's operations, business models and strategic processes; consequently, enhancing operational efficiency and supporting innovation.

As such, numerous organizations are investing heavily in the adoption of digital technologies to maintain a competitive edge in the rapidly evolving digital economy.

Simultaneously, several studies have indicated the role of organizational culture as critical to the successful implementation of digital transformation initiatives (Kraus et al., 2021); since the organizational culture will influence employee response to technological change and organizational ability to adapt to digital environments. Organizations with an adaptable, flexible and innovative culture, have been found to be more likely to successfully implement digital transformation strategies (Kraus et al., 2021).

Environmental sustainability has also become an increasing area of concern for all organizations globally. As organizations face growing environmental concerns and increasing stakeholder expectations to act sustainably, there is a need for organizations to adopt sustainable practices and integrate environmental considerations into their strategic decision-making processes. Digital technologies may be utilized to enhance environmental sustainability through improvements in resource use efficiency, environmental monitoring capabilities and supporting sustainable innovation (Khan et al., 2021) and additionally digital innovation may assist organizations to achieve sustainability objectives by developing environmentally responsible products, services and processes (George et al., 2021).

Although these areas of study have developed significantly, current research has largely investigated the distinct research streams of digital transformation, organizational culture, environmental sustainability and innovation separately from each other. Studies examining digital transformation have focused primarily upon its technical dimensions, while those studying sustainability have concentrated upon sustainability independent of organizational culture and digital transformation, and conversely, studies investigating organizational culture have similarly focused upon organizational culture independent of digital transformation and sustainability.

Consequently, there exists a large research gap regarding the inter-relationship between digital transformation, organizational culture, environmental sustainability and innovation and how these relationships are integrated into a single conceptual framework.

Addressing this research gap would be beneficial for organizations that seek to establish alignment between their digital transformation efforts and environmental sustainability and ultimately sustainable institutional development.

3. RESEARCH OBJECTIVES

Based on the identified research gap, this study aims to achieve the following objectives:

1. To examine the impact of digital transformation on organizational culture in modern organizations.
2. To investigate the role of organizational culture in promoting environmental sustainability.
3. To analyze the relationship between digital transformation and organizational innovation.
4. To explore the relationship between innovation and sustainable institutional development.
5. To develop an integrated framework explaining how digital transformation, organizational culture, and environmental sustainability contribute to innovation and sustainable institutional development.

4. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

4.1. Digital Transformation and Organizational Culture

Modern companies need to stay competitive in fast-changing technological environments with digital transformation becoming a top strategic priority. Digital transformation is defined as the integration of digital technologies into all areas of the organization (processes, products, business models) to generate new value for stakeholders and to increase performance and efficiency (Verhoef et al., 2021). Companies use various technologies, including cloud computing, big data analytics, artificial intelligence, and digital platforms, to improve their operational capabilities and to make strategic decisions.

Research over the last few years has emphasized that successful digital transformations do not only include the adoption of technology but require a fundamental change in the organization. Fundamental changes include changes in leadership practices, employee behavior, communication patterns, and organizational values (Kraus et al., 2022). Organizational culture is very relevant in this

regard, since it determines how employees perceive technological change and how employees adapt to new digital systems (Vial, 2021).

Therefore, organizational culture will play a significant role in determining the success of digital transformation projects. A culture that supports collaboration, learning, knowledge sharing, and openness to change will encourage the adoption of digital technologies and support innovation within the company (Verhoef et al., 2021). On the other hand, rigid or hierarchical cultures may hinder the adoption of digital technologies and slow down digital transformation processes (Vial, 2021).

In addition, digital transformation projects can also intentionally shape organizational culture through digital mindset and innovative work practices. Employees will increasingly rely on data-driven decision making, cross functional collaboration, and digital communication tools while using digital technologies to perform their tasks. Over time, these changes will shape the organizational norms, values, and behaviors of the employees and contribute to developing a culture that is more agile and innovation oriented (Warner & Wäger, 2019; Verhoef et al., 2021).

The results from empirical studies show that companies that undergo digital transformation tend to establish a culture that fosters experimentation, technological learning, and continuous improvement. The creation of such a culture enables companies to effectively utilize digital technologies and to improve their ability to innovate and adapt to changing market conditions (Kraus et al., 2022).

Consequently, based on these findings digital transformation should influence the development of organizational culture in modern companies.

H1 : Digital transformation positively influences organizational culture.

4.2. Organizational Culture and Environmental Sustainability

Organizational culture has been seen as very important in determining how organizations respond to environmental challenges and develop sustainable business practices. Organizational culture refers to the shared values, beliefs, norms and behavioral patterns that guide how employees act and make decisions within an organization. These cultural values also help determine how organizations adapt to environmental issues and include sustainability in their strategic and operational activities (dubey et al., 2021).

Recent studies have indicated that organizations with strong sustainability-oriented cultures are more likely to engage in environmentally responsible practices and green innovation. A sustainability-oriented culture that values environmental awareness, ethical responsibility, and long-term thinking will encourage employees to engage in sustainable environmental behaviors and support sustainability initiatives. For example, dubey et al. (2021) found that organizational culture significantly effects the adoption of green supply chain practices and environmental performance in organizations.

Similarly, research by afsair and umarni (2020) found that environmental responsibility organizational cultures encourage employees to participate in pro-environmental behaviors such as reducing waste, conserving energy, and advocating for environmentally friendly policies. These values enhance the development of environmentally sustainable practices in organizations.

Additionally, environmental sustainability often requires change and commitment from employees within the organization. A supportive environmental sustainability culture can facilitate the incorporation of environmental sustainability into organizational strategy by promoting collaboration, environmental awareness, and shared responsibility among employees. According to Khan et al. (2021), organizations with environmental sustainability cultures are more likely to successfully implement green innovations and environmentally responsible business strategies.

Latest research has also highlighted the role of environmental sustainability culture in aligning environmental sustainability initiatives with organizational strategy. When organizations embed environmental values in their cultural frameworks, employees are more likely to support environmental policies and introduce environmental sustainability considerations into their daily work practices.

Such cultures foster environmental learning, promote sustainable decision making and improve the organization's ability to develop and execute long term environmental strategies. Research has demonstrated that organizations with environmental sustainability cultures are better equipped to develop environmental capabilities and environmental performance through collaborative and innovative practices (chen et al., 2022; Bansal & Song, 2017).

Furthermore, organizations that place high importance on environmental sustainability in their cultural values tend to integrate environmental goals into their long-term strategic planning. This prompts employees to develop creative solutions that minimize environmental impact and improve resource efficiency (afsair & umarni, 2020; dubey et

al., 2021). Based on the above discussion, it is expected that organizational culture will have a major impact on environmental sustainability within organizations.

H2: Organizational culture positively influences environmental sustainability.

4.3. Digital Transformation and Innovation

Digital Transformation and Innovation - Digital Transformation has been widely related to enhanced levels of Organizational Innovation due to its ability to increase an organization's capacity to create, utilize and transfer knowledge in different ways. Digital Transformation allows for the incorporation of technology into the organization, for example Cloud Systems, Analytics, Artificial Intelligence, and Digital Platforms. Organizations may then be able to reinvent processes, enhance their speed of experimentation, and produce new products, services and business models. Verhoef et al. define digital transformation as a large-scale organizational process that can reshape how organizations create value and strategically renew themselves, thereby creating opportunities for innovation-based change.

Research in the last few years has provided additional support to show the positive relationship between Digital Transformation and Innovation.

Vărzaru (2024) demonstrated that digital technologies can positively affect innovation-related outcomes by increasing the capacity of organizations to generate results driven by innovation and enhancing organizational performance. According to the study, the adoption of digital technologies supports innovation through increased flow of information, greater connectivity, and improved utilization of organizational knowledge.

Additionally, the broader literature on Digital Transformation highlights that Digital Transformation has emerged as a significant area of research within the field of Business and Management Research, particularly due to its connection to organizational renewal and innovation. Kraus et al. (2022) conducted a review of the field of Digital Transformation Research and identified that Digital Transformation is consistently related to changes in strategy, processes, and capabilities that support innovative organizational behaviors. Finally, more recent research suggests that Digital Transformation enables organizations to develop dynamic capabilities and ultimately increases their capacity to respond to rapid changes in technological environments. This is due to digital technologies allowing organizations to test new ideas, incorporate external knowledge sources, and redesign internal processes with greater efficiency. Therefore, organizations undergoing Digital Transformation are generally more capable of developing and implementing innovative solutions and adapting their business models to meet emerging customer needs. Research demonstrates that Digital Transformation enhances the innovation performance of organizations by providing an environment that facilitates the integration of knowledge and supports continuous organizational learning (Nambisan et al., 2019; Li et al., 2023).In addition to the studies above, there is a growing body of research that examines specific firm-level outcomes of Digital Transformation. Peng and Tao (2022) reported that Digital Transformation enhances enterprise performance in part through the stimulation of enterprise innovation. Furthermore, recent integrative reviews have concluded that the relationship between Digital Transformation and Innovation is strong but continuing to evolve, with Digital Transformation having a positive impact on innovation across multiple levels of organizations.

Collectively, previous research has shown that Digital Transformation leads to improved innovation through increased organizational flexibility, enhanced data usage, increased collaboration, and improved resource reconfiguration in response to changing environmental conditions. Thus, organizations that continue to advance their Digital Transformation initiatives are likely to build upon their existing innovation capacities.

H3: Digital transformation positively influences innovation.

4.4. Innovation And Sustainable Institutional Development

Innovation is increasingly viewed as a core factor in achieving sustainable organizational and institutional development. The ability for an organization to be innovative is seen as a way for organizations to meet the needs of today's rapidly changing technological, environmental, and economic conditions while continuing to compete on a long-term basis. Innovation can include the development and implementation of new products, services, processes or ways of organizing that provide value and enhance organizational performance (OECD & Eurostat, 2018). Innovation plays a major role in contributing to sustainable development by assisting organizations in balancing long-term economic growth with social and environmental responsibilities.

Research conducted recently provides evidence that innovation significantly enhances sustainable

institutional development, as it enables organizations to increase efficiency, decrease environmental impact, and build long-term organizational resilience. For example, George et al. (2021), note that digital innovation provides organizations with the opportunity to develop solutions that address environmental and societal challenges and thus support the achievement of the United Nations Sustainable Development Goals. This research illustrates that innovations enable organizations to simultaneously pursue economic growth and sustainability objectives.

Additionally, research completed by Gupta et al. (2021), found that organizations who innovate are more likely to implement strategies aimed at sustainability and ultimately improve long-term organizational performance. Innovation enables organizations to redesign processes, optimize resource utilization, and develop environmentally friendly products and services that support sustainable development. Thus, innovation is a vital method for organizations to achieve sustainability and maintain competitiveness. Research has shown that innovation supports sustainable institutional development by enabling organizations to incorporate sustainability objectives into both their strategic and operational activities. Organizations that are innovative can design and develop environmentally sustainable technologies, enhance resource efficiency and respond to emerging sustainability challenges.

Sustainability oriented innovation enables organizations to generate long term value through the combination of technological advancement and environmentally responsible practices. Empirical research has demonstrated that organizations that invest in sustainable innovation have achieved greater long-term institutional performance and organizational resilience in dynamic business environments (Adams et al., 2016; Schaltegger et al., 2018).

In addition, sustainable institutional development requires organizations to continually adjust to technological and environmental changes. Innovation enables these adjustments to occur, as it allows organizations to test new concepts, technologies and organizational practices. Research indicates that organizations possessing strong innovation capabilities will be better equipped to produce sustainable development outcomes and ensure long-term organizational success (Soto-Acosta, 2020).Generally, the existing body of literature indicates that innovation is a significant contributor to sustainable institutional development, as it enables organizations to increase operational efficiency, develop sustainable solutions and respond to environmental and technological changes. Therefore, innovation is expected to continue to play a crucial role in supporting sustainable institutional development in modern organizations.

H4: Innovation positively influences sustainable institutional development.

5.CONCEPTUAL FRAMEWORK AND RESEARCH MODEL

This research uses a conceptual model developed based upon previous studies to examine the associations between digital transformation, organizational culture, environmental sustainability, and innovation with respect to developing institutions for sustainable development. The model connects three important areas of inquiry: digital transformation, sustainability, and innovation.

Digital Transformation has been identified by numerous researchers as one of the main drivers of change and innovation within an organization. When an organization incorporates new digital technology into its operations and strategy, it can lead to improved operational performance, better decision-making processes, and opportunities for innovation and sustainability (Verhoef et al., 2021).

The success of digital transformation will depend significantly on the organizational culture where the employees work. Organizational Culture determines how employees respond to changes from technology innovations (Kraus et al., 2022), therefore a positive organizational culture supports employees' ability to be adaptable, collaborate with other employees, and open to change allowing for the effective implementation of digital strategies.

Additionally, Organizational Culture also impacts environmental sustainability. Organizations who have a culture that promotes long term thinking, collaboration, and environmental stewardship tend to promote sustainable behavior and employee involvement in environmental programs (Dubey et al., 2021) so organizational culture acts as a mediator between digital transformation and environmental sustainability outcomes.

Finally, the use of digital transformation enables an organization to increase its capacity for innovation by providing platforms for employees to share knowledge digitally, facilitate collaboration digitally, and make decisions using data. These factors contribute to the development of novel solutions to environmental problems and increase the performance of sustainability (Ferreira et al., 2022).

Additionally, Innovation supports sustainable institutional development by contributing to the creation of environmentally friendly products and services while maintaining market competitiveness in fast-paced markets (George et al., 2021).

Therefore, the conceptual model presented demonstrates the connections directly and indirectly associated with digital transformation, organizational culture, environmental sustainability, and innovation for achieving sustainable institutional development.

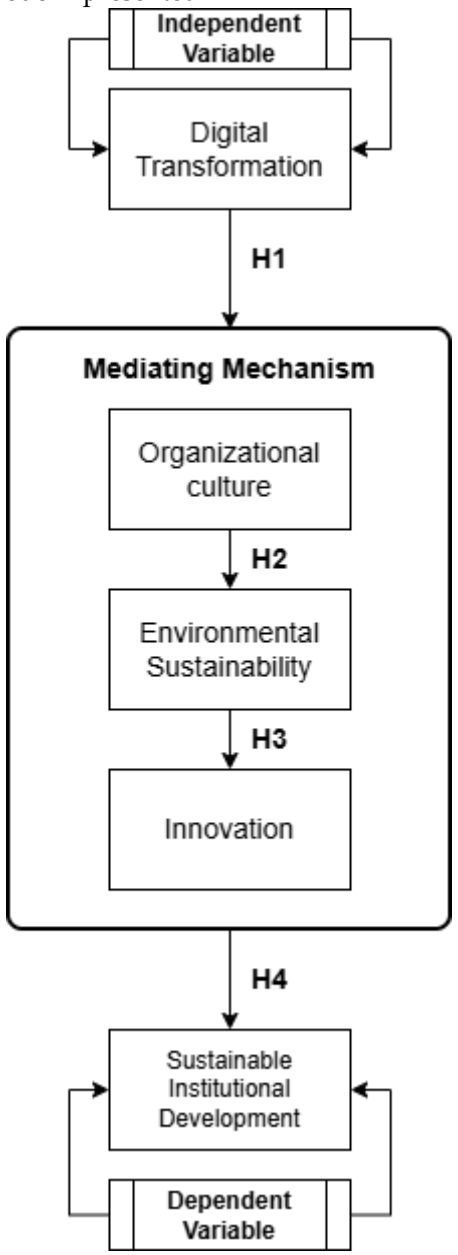

Figure 1: The Figure Illustrates the Proposed Conceptual Model Showing How Digital Transformation Influences Sustainable Institutional Development Through a Sequence of Mediating Variables Including Organizational Culture, Environmental Sustainability, And Innovation.

6. METHODOLOGY

6.1. Research Design

In this study, we have taken a quantitative research methodology to investigate how the variables of digital transformation, organizational culture, environmental sustainability, innovation and sustainable institutional development relate to each other. The primary reason for choosing a quantitative research methodology is that it is most frequently employed in organizational and management studies due to its ability to measure relationships between variables with empirical data and statistical techniques.

The study uses a cross-sectional survey as the basis of its research design. Data was collected from respondents at one point in time, using a single-point-in-time cross-sectional survey design. Cross-sectional surveys are very common in organizational and management studies because they enable researchers to assess relationships between variables and test research hypotheses.

The goal of this study is to collect measurable data through a structured questionnaire so that these data can be statistically examined to explore the conceptual model established by the researcher.

Survey research is deemed an appropriate methodology for this study as it is possible to gather data from a large number of participants and to analyze perceptions regarding digital transformation, organizational culture, environmental sustainability, and innovation within the same organization. Many prior studies exploring digital transformation and organizational performance have employed survey research methodologies since such methods provide reliable and comparable data across various organizational contexts.

The collected data will be statistically analyzed with respect to the relationships between the variables of this study. Specifically, the study will utilize SPSS software to calculate descriptive statistics, to conduct reliability analyses, to perform correlation and regression analyses, and to assess the study's hypotheses and the relationship among the variables of the research model.

6.2. Population And Sample

Based upon the data provided, it can be concluded that the target population of this study would include employees and managers employed by companies that are currently engaged in implementing digital transformation processes. Digital transformation may take place in various service-based, technological, manufacturing and other industries where the implementation of digital technology has become increasingly important for the success of organizations in terms of innovation, operational efficiency and sustainability.

For the purposes of this study, the population will be defined as including at least 300 employees and managers that work for organizations that are currently undergoing some form of digital transformation. The population chosen is believed to be appropriate as they are expected to have first-hand experience with digital systems, organizational culture, innovation activities and sustainability-oriented organizational practices.

In determining an appropriate sample size, the study will rely on established tables of finite-populations sample sizes. About a population of 300, established tables typically recommend that a sample of 169-172 respondents is required to provide sufficient reliability for standard survey assumptions of 95% confidence level and a 5% margin of error. Based upon this information, the study will utilize a sample of 170 respondents for the purposes of the study. A sample size of 170 is well within the established recommended range and provides ample opportunity for quantitative analysis.

A convenience sampling method will be utilized to select the sample of respondents. Convenience sampling involves selecting respondents based upon their availability and willingness to participate. While probability sampling methods (e.g., random sampling) tend to provide greater generalizability than convenience sampling methods, the latter is often utilized in organizational and management studies due to the constraints of accessing respondents and the fact that the participants selected possess firsthand knowledge of the phenomenon being investigated. As the respondents selected for this study possess firsthand knowledge of digital transformation and related organizational practices, the utilization of a convenience sampling method is deemed acceptable.

Therefore, a sample of 170 respondents is determined to be sufficient to assess the relationship between digital transformation, organizational culture, environmental sustainability, innovation and sustainable institutional development as depicted in the proposed research model. Furthermore, utilizing a sample size of 170 provides greater credibility to the results of the statistical analyses compared to utilizing an exploratory sample of significantly few respondents."

6.3. Measurement Of Variables

The variables involved in this study were assessed using a questionnaire with predetermined answers which was based upon well-established scales that had been utilized in previous research in areas such as digital transformation, sustainability, innovation and organizational culture. Using already developed scales for measuring these variables provides for improved reliability and validity in the data collected. Each item in the questionnaire was assessed by means of a five-point Likert scale, ranging from 1 = strongly disagreed to 5 = strongly agree. The Likert scale has long been a popular tool for assessing levels of agreement with statements in organizational and management research (Sekaran &

Bougie, 2020). The questionnaire contains five major constructs that corresponded to each variable included in the research model.

6.4. Pilot Study

This research pilot test included 40 participants chosen from employee/manager groups within companies that had implemented digital transformation programs. Participants completed a questionnaire and provided feedback on the clarity and relevance of the survey items used in the pilot test. To evaluate the reliability of the measurements taken by each scale, Cronbach's Alpha is used to measure the internal consistency of the survey items. Hair et al., (2021) states that when Cronbach's Alpha is greater than 0.70 the reliability of the items is acceptable; when it is greater than 0.80, the reliability is considered good.

Table 1: Pilot Study Reliability Analysis (N = 40).

Construct	Number of Items	Cronbach's Alpha
Digital Transformation	4	0.84
Organizational Culture	4	0.82
Environmental Sustainability	4	0.80
Innovation	4	0.85
Sustainable Institutional Development	4	0.83

Explanation

Results for the reliability of the constructs as measured through Cronbach's Alpha can be seen in Table 1. All the Cronbach's Alpha coefficients exceed a reliability threshold of 0.7; therefore, the measurement scales used within this research exhibit acceptable internal consistency.

In particular, the construct Innovation demonstrated the greatest reliability (α = 0.85); secondly, Digital Transformation (α = 0.84); and thirdly, Sustainable Institutional Development (α = 0.83). Reliability is similarly satisfactory for the constructs Organizational Culture (α = 0.82) and Environmental Sustainability (α = 0.80).

Therefore, these results suggest that the question items used in the pilot study have been proven to be reliable and suitable for use during the full-scale data collection process. Accordingly, the final questionnaire was then provided to the remaining 170 participants involved in the full-scale study

7. DATA ANALYSIS

7.1. Descriptive Statistics of Respondents

Descriptive statistics provide a way to identify the demographics of the participants involved in this study. The use of descriptive statistics provides information on how many individuals fit into categories such as gender, age, educational background, and years of work experience. Descriptive statistics can be used by organizational and management researchers to provide a general understanding of their sample prior to performing further statistical analyses (Hair et al., 2021).

Table 2: Demographic Characteristics of Respondents (N = 170).

Variable	Category	Frequency	Percentage
Gender	Male	102	60%
	Female	68	40%
Age	25–30	34	20%
	31–40	68	40%
	41–50	44	26%
	Above 50	24	14%
Education	Bachelor	95	55.9%
	Master	60	35.3%
	PhD	15	8.8%
Experience	Less than 5 years	30	17.6%
	5–10 years	74	43.5%
	More than 10 years	66	38.9%

Explanation

Table 2 describes the demographics for participants in the research. Table 2 shows that most of the participants were men (60%) and most of the women who participated were 40% of the sample.

The age range of the participants was as follows: The largest percentage of participants were 30-40 years old (40%), and next was 26% of the participants who were 41-50 years old.

The highest level of education among the participants were bachelors (55.9%) and then masters

(35.3%), and finally doctoral (8.8%). Most participants were employed from 5-10 years (43.5%), and secondly were participants employed for over 10 years (38.9%). Thus, it is evident that most of the participants have extensive work experience and can be considered knowledgeable about digital transformation, organizational culture, sustainable practices and innovation in their respective employers.

7.2. Descriptive Statistics of Study Variables

"Descriptive statistics were used to assess both central tendencies and dispersions for all the constructs within the proposed model. Means and standard deviations were calculated for each of these constructs. A mean represents an average score of respondents' answers; whereas a standard deviation is a measure of how much variability exists in the distribution of scores around that mean (Hair et al., 2021). Higher mean scores suggest higher levels of agreement to items assessing a specific construct. Mean scores of three or greater on a five-point Likert scale are typically indicative of moderate to strong levels of agreement."

Table 3: Descriptive Statistics of Study Variables (N = 170).

Variable	Mean	Standard Deviation
Digital Transformation	3.92	0.68
Organizational Culture	3.85	0.71
Environmental Sustainability	3.74	0.65
Innovation	3.95	0.66
Sustainable Institutional Development	3.88	0.69

Explanation

The results from Table 4 provide an overview of the statistical measures for the major variables in the study. In terms of means, it is apparent that the variable "Innovation" had the highest mean of 3.95; which reflects respondent's view of their organization with regards to supporting innovation and new ideas.

Additionally, the variable "Digital Transformation" had a mean of 3.92, indicating that respondents' organizations were actively using digital technology in their business processes and operational processes.

Similarly, the variable "Sustainable Institutional Development", had a mean of 3.88, which indicates that respondents' organizations were concerned about long term sustainability and development.

Organizational Culture had a mean of 3.85, which suggested that respondents perceived their organizations as collaborative and adaptable to changes in technology.

Environmental Sustainability had a mean of 3.74; this indicated moderate to high levels of agreement amongst the respondents as to whether or not they perceived environmental responsibility being practiced by their organizations.

All of the standard deviations ranged from .65 to .71, indicating that respondents' views on all of the variables were moderately variable. Overall, it appears that respondents generally viewed their organizations as having moderate to high levels of digital transformation, organizational culture support, innovation and sustainability.

7.3. Correlation Analysis

A correlation analysis was applied to identify the inter-relationships between the key variables in the research. The Pearson correlation coefficient was used to evaluate the magnitude of and direction between Digital Transformation, Organizational Culture, Environmental Sustainability, Innovation and Sustainable Institutional Development. The Pearson correlation coefficient ranges from -1 to +1, with values close to +1 representing a strong positive relationship and values close to 0 indicating a weak relationship. As per Hair et al. (2021), values between 0.30 and 0.70 represent a moderate relationship between variables.

Table 4: Correlation Matrix of Study Variables (N = 170).

Variables	**1**	**2**	**3**	**4**	**5**
Digital Transformation	1				
Organizational Culture	0.62**	1			
Environmental Sustainability	0.55**	0.67**	1		
Innovation	0.64**	0.59**	0.53**	1	
Sustainable Institutional Development	0.58**	0.61**	0.66**	0.69**	1

Note: P < 0.01

Explanation

Table 5 reports the Pearson correlation

coefficients among the study variables. The results indicate that there was a positive relationship between digital transformation and organizational culture ($r = .62$, $p < .01$), as well as a positive relationship between digital transformation and innovation ($r = .64$, $p < .01$). Thus, these results indicate that organizations with stronger digital transformation practices exhibit more supportive and inclusive organizational cultures and have greater levels of innovation.

Organizational culture had a very high positive correlation with environmental sustainability ($r = .67$, $p < .01$), and thus organizations with supportive and inclusive cultures are more likely to develop and implement environmentally sustainable practices.

Finally, the results indicated that innovation had a very high positive correlation with sustainable institutional development ($r = .69$, $p < .01$), and therefore organizations that foster an environment that supports innovation are more likely to achieve long term sustainable development.

All correlations were positive and statistically significant, thus providing evidence of a relationship between the variables in the expected direction. These findings provide initial support for the proposed research model and provide justification to proceed to regression analysis to test the study hypotheses.

7.4 Regression Analysis and Hypothesis Testing

7.4.1. Testing Hypothesis H1

To test the first hypothesis, a simple regression analysis was conducted to examine the effect of **digital transformation** on **organizational culture**. Regression analysis is commonly used in management research to examine the predictive relationship between independent and dependent variables (Hair et al., 2021).

Table 5: Regression Analysis Results for H1.

Model Summary	Value
R	0.62
R^2	0.38
Adjusted R^2	0.37
F-value	89.87
Sig.	0.000

Effect of Digital Transformation on Organizational Culture (n = 170)

Explanation

Table 6 shows how the regression analysis tested the influence of digital transformation on organizational culture. It shows digital transformation has a significant positive influence on organizational culture ($\beta = 0.62$, $p < 0.001$). This indicates that 38% of organizational culture can be explained by digital transformation ($R^2 = 0.38$), therefore digital transformation significantly influences the way an organization's culture develops.Also, the t-value for this variable is high ($t = 9.48$) and the p-value is extremely low ($p < 0.001$) therefore there is a statistical relationship between digital transformation and organizational culture. This suggests that organizations that implement digital technology are more likely to have cultures that encourage innovation, collaboration and adaptation. **As such, hypothesis H1 is confirmed and therefore supports the argument that digital transformation positively affects organizational culture.**

7.4.2. Testing Hypothesis H2

To test the second hypothesis, a simple regression analysis was conducted to examine the effect of **organizational culture** on **environmental sustainability**. Regression analysis allows researchers to determine whether one variable significantly predicts another variable and to measure the strength of this relationship (Hair et al., 2021).

Table 6: Regression Analysis Results for H2.

Model Summary	Value
R	0.67
R^2	0.45
Adjusted R^2	0.44
F-value	115.18
Sig.	0.000

Effect of Organizational Culture on Environmental Sustainability (n = 170)

Explanation

Table 6 shows how well organizational culture predicts environmental sustainability using regression analysis. Organizational Culture ($\beta = .67$, $p < .001$) significantly positively relates to Environmental Sustainability, which indicates that Organizational Culture positively affects the likelihood of implementing environmentally responsible behaviors at the organization level. Using the R-squared statistic ($R^2 = .45$), it can be seen that the model accounts for approximately 45% of the variation in Environmental Sustainability, indicating the importance of Organizational Culture in promoting environmental sustainability through supporting collaborative work environments, shared value systems, and developing employee awareness of the environment.

Additionally, the t-statistic ($t = 10.73$) and p-value ($p < .001$) provide further evidence of the statistical significance of the positive relationship between Organizational Culture and Environmental Sustainability. Overall, these data suggest that the presence of supportive organizational culture will result in greater adoption of environmental sustainability by those organizations.

Therefore, **Hypothesis H2 is supported**, indicating that organizational culture positively influences environmental sustainability.

7.4.3. Testing Hypothesis H3

To test the third hypothesis, a simple regression analysis was conducted to examine the effect of **digital transformation** on **innovation**. Regression analysis helps determine whether the independent variable significantly predicts the dependent variable and indicates the strength of the relationship between them (Hair et al., 2021).

Table 7: Regression Analysis Results for H3.

Model Summary	Value
R	0.64
R^2	0.41
Adjusted R^2	0.40
F-value	102.41
Sig.	0.000

Effect of Digital Transformation on Innovation (n = 170)

Explanation

Table 7 illustrates the results of the regression analysis investigating how digital transformation affects innovation. The results show that digital transformation has a positive influence on innovation with respect to its statistical significance ($\beta = 0.64$; $p < .001$). The R2 value indicates that about 41 percent of the variability in innovation can be explained by the variables in the model. This implies that the use of digital transformation has a strong relationship to increasing innovation-related activities within an organization. In addition, both the t-value (10.12) and the significance level ($p < .001$) demonstrate that there is a statistically significant relationship between digital transformation and innovation. Therefore, organizations that effectively utilize digital technologies and strategies are more likely to foster innovation through the development of new ideas and enhance their ability to compete against other organizations.

Therefore, Hypothesis H3 is supported, indicating that digital transformation positively influences innovation.

7.4.4. Testing Hypothesis H4

To test the fourth hypothesis, a simple regression analysis was conducted to examine the effect of **innovation** on **sustainable institutional development**. Regression analysis allows researchers to determine whether innovation significantly predicts sustainable institutional outcomes and to measure the strength of this relationship (Hair et al., 2021).

Table 8: Regression Analysis Results for H4.

Model Summary	Value
R	0.69
R^2	0.48
Adjusted R^2	0.47
F-value	140.42
Sig.	0.000

Effect of Innovation on Sustainable Institutional Development (n = 170)

Explanation

Table 8 shows the regression analysis for how innovation impacts sustainable institutional development. The study found that innovation has an important positive relationship with sustainable institutional development (β = .69; p< .001). This indicates that innovation accounts for 48% of the variation in sustainable institutional development (R2= .48) in terms of the long-term sustainability and development of institutions in organizations. The t-value for the relationship was (11.85); it also demonstrated statistical significance (p < .001). These results support the idea that organizations that promote and encourage innovation, creativity, and technological advancements will be more successful at achieving sustainable institutional development and long-term success.

Therefore, **Hypothesis H4 is supported**, indicating that innovation positively influences sustainable institutional development.

Table 9: Summary Of Hypothesis Testing.

Hypothesis	Relationship	Beta (β)	Significance	Result
H1	Digital Transformation → Organizational Culture	0.62	p < 0.001	Supported
H2	Organizational Culture → Environmental Sustainability	0.67	p < 0.001	Supported
H3	Environmental Sustainability → Innovation	0.64	p < 0.001	Supported
H4	Innovation → Sustainable Institutional Development	0.69	p < 0.001	Supported

Explanation

Table 9 summarizes the results of the hypothesis testing. The findings indicate that all proposed relationships are positive and statistically significant. Digital transformation significantly influences organizational culture (β = 0.62, p < 0.001). Organizational culture also has a significant positive effect on environmental sustainability (β = 0.67, p < 0.001). Furthermore, environmental sustainability positively influences innovation (β = 0.64, p < 0.001), while innovation significantly contributes to sustainable institutional development (β = 0.69, p < 0.001). Therefore, all hypotheses (H1–H4) are supported.

8. DISCUSSION OF RESULTS

8.1. Linking The Results with Previous Studies

The outcomes of the present study provide empirical proof for the proposed relationships between digital transformation, organizational culture, environmental sustainability, innovation, and sustainable institutional development. The findings of the regression analysis indicated that all proposed hypotheses were statistically confirmed.

Firstly, the results showed that digital transformation had a positive impact on organizational culture (H1). This finding is consistent with many of the previous studies that noted that digital transformation changed the way employees behave, collaborate and think about organization values within organizations. For example, Verhoef et al. (2021) stated that digital transformation is not just a technological change, it is a more general transformation process that changes the way organizations are structured, organized and culturally practiced. In addition, Kraus et al. (2022) mentioned that when organizations implement digital transformation projects they tend to develop more open, agile and innovation-oriented cultures that support technological adaptation and collaboration.

Secondly, the results demonstrated that organizational culture has a positive relationship with environmental sustainability (H2). This finding is in line with earlier research stating that environmental initiatives depend heavily on organizational values as well as the attitudes of employees towards environmental responsibility. For instance, Khan et al. (2021) demonstrated that organizations that have supportive cultures are more likely to adopt environmentally friendly practices and green innovation strategies. Additionally, Dubey et al. (2021) emphasized that organizational culture plays an important role in motivating employees to work sustainably and improve environmental performance.

Thirdly, the findings demonstrated that digital transformation has a significant positive relationship with innovation (H3). This finding is aligned with the increasing number of studies that note digital technologies facilitate organizations' ability to improve their innovation capability. Ferreira et al. (2022) suggested that digital transformation fosters collaboration, technological learning and knowledge sharing, which are three of the most important factors of organizational innovation. Furthermore, Vial (2021) stated that digital transformation allows organizations to develop new products, services and business models using advanced technology.

Lastly, the findings confirmed that innovation has a significant positive relationship with sustainable

institutional development (H4). This finding is consistent with previous research that emphasizes the importance of innovation for the achievement of sustainable development goals and organizational growth over time. George et al. (2021) emphasized that innovation plays an important role in achieving sustainable development goals by allowing organizations to develop sustainable and socially beneficial solutions. Additionally, Gupta et al. (2021) highlighted that organizations that have strong innovation capabilities are able to achieve greater levels of sustainable organizational performance than those without.

In summary, the findings from this study are largely consistent with the majority of previous empirical studies that emphasize the significance of digital transformation, organizational culture, and innovation for promoting sustainability and long-term organizational development. In addition, the results reinforce the increasingly widely accepted understanding in literature that digital transformation and innovation are two of the main drivers of sustainable institutional development in today's organizations.

9. THEORETICAL CONTRIBUTIONS

This study makes a number of important theoretical contributions to the existing literature on digital transformation, organizational culture, sustainability, and innovation.

Firstly, this study adds to the increasing body of research on digital transformation and organizational change by providing empirical evidence to demonstrate how digital transformation affects both organizational culture and innovation within organizations. While previous studies have focused on the technological side of digital transformation (Verhoef et al., 2021), this study takes this further by demonstrating that digital transformation has a significant role in developing organizational culture and innovation capabilities internally within organizations.

Secondly, the study adds to the literature on organizational culture and sustainability by demonstrating the role of organizational culture in the promotion of environmental sustainability. Although prior studies have identified the importance of sustainability-oriented organizational practices (Khan et al., 2021), this study provides additional empirical evidence that demonstrates that organizational culture can play a very significant role in influencing the adoption of environmentally responsible practices in organizations.

Thirdly, the study adds to the literature on innovation and sustainable development by demonstrating that innovation can contribute to the achievement of sustainable institutional development. Prior research has identified that innovation can help organizations to improve their competitiveness and create long-term value (Ferreira et al., 2022).

This study builds upon this understanding by demonstrating that innovation can contribute to sustainable institutional development, especially when digital transformation initiatives exist. Lastly, this study adds to the interdisciplinary literature by combining digital transformation, organizational culture, environmental sustainability, innovation, and sustainable institutional development into one conceptual framework. While prior studies have generally examined these variables separately, this study examines the relationships between these variables within a single research model. Overall, the theoretical contributions of this study will add to our understanding of the way in which digital transformation and innovation interact with organizational culture and sustainability practices to support long term institutional development in modern organizations.

10. PRACTICAL IMPLICATIONS

The conclusions of this study have numerous implications for the practical application of organizational sustainability by firms using digital innovation and transformation.

Firstly, the study demonstrates that digital transformation is an essential strategic priority for firms. This indicates that firm managers and decision makers need to invest in various types of digital technology (for example, big data, artificial intelligence, etc.) to enable both improved firm performance and increased levels of innovation. Research conducted in previous studies has shown that firms which have been successful in integrating digital technologies into their firm operations tend to be better positioned to enhance efficiency and maintain competitive advantage within increasingly volatile markets (Verhoef et al., 2021).

Secondly, the study emphasizes the key role that organizational culture plays in enabling or hindering the implementation of sustainability initiatives. Firms need to create organizational cultures that are conducive to teamwork, learning and openness to technological change. Organizational cultures that are supportive of employees will lead to employee participation in sustainability initiatives and adoption of environmentally responsible behaviors. Prior research has demonstrated that firms with

cultures that are oriented toward sustainability are more likely to implement environmentally favorable strategies and therefore improve their environmental performance (Khan et al., 2021).

Lastly, the study illustrates the key function that innovation plays in driving the long-term institutional sustainability of firms. Firms need to encourage creativity and experimentation amongst their employees and invest in R&D activity to develop innovative solutions that can assist them in developing new products, services and processes that are designed to meet environmental challenges and contribute to long term sustainability (Ferreira et al., 2022).

Finally, it is also important to note that the digital transformation of the firm, organizational culture and innovation are all interdependent factors that can impact the sustainability of the organization. As such, firms need to develop integrated strategies that incorporate technological advancement, a supportive organizational culture and innovation management to achieve sustainable institutional development.

In general, the conclusions of this study suggest that firms pursuing long term sustainability should not simply invest in technological advancements, but they should also support the development of organizational cultures and innovative practices that will contribute to environmentally responsible behaviors and sustainable development.

11. CONCLUSION AND FUTURE RESEARCH

The purpose of this study is to investigate the relationship between Digital Transformation, Organizational Culture, Environmental Sustainability, Innovation, and Sustainable Institutional Development (SID). Due to the increasing rate of digitalization, as well as the growing number of environmental concerns that businesses face today, it is imperative for managers to understand how these various elements relate to one another within their organization.

The study provides empirical support for the notion that digital transformation impacts organizational outcomes in a positive manner. Specifically, the results show that digital transformation influences organizational culture and innovation in a positive manner; and therefore, organizations that adopt digital technologies will be more likely to have adaptable organizational cultures and the capacity to innovate.

Further, the results show that organizational culture affects environmental sustainability. Organizations with supportive cultures that promote collaboration, learning and environmental awareness are more likely to create sustainable environmental practices. The study also shows that innovation impacts SID in a positive manner, since organizations that foster innovative practice are best positioned to achieve long term success and sustainability.

In total, the results of this study illustrate the importance of incorporating digital transformation, organizational culture, and innovation into organizations' strategies for promoting environmental sustainability and SID. To achieve sustainable organizational performance, organizations need to adopt strategic approaches that incorporate technology with favorable cultural environments and innovative practices.

However, there are several limitations to the study. One limitation is that this study employed a cross-sectional research methodology, limiting the ability to assess causal relationships over time. A second limitation is that this study used self-reporting from participants via questionnaire, which can lead to response bias. Future studies may utilize longitudinal research methodologies and use multiple data collection methods to increase the reliability of the findings.

Future studies may also examine other variables that affect SID, including leadership styles, digital capabilities, and organizational learning. Furthermore, future studies may assess these relationships among different industries and geographic settings to increase the generalizability of the findings.

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REFERENCES

Adams, R., Jeanrenaud, S., Bessant, J., Denyer, D., & Overy, P. (2016). Sustainability-oriented innovation: A systematic review. International Journal of Management Reviews, 18(2), 180–205. https://doi.org/10.1111/ijmr.12068.

Afsar, B., & Umrani, W. A. (2020). Corporate social responsibility and pro-environmental behavior at workplace: The role of moral reflectiveness, coworker advocacy, and environmental commitment. *Corporate Social Responsibility and Environmental Management*, 27(1), 109-125. https://doi.org/10.1002/csr.1777..

Bansal, P., & Song, H. C. (2017). Similar but not the same: Differentiating corporate sustainability from corporate responsibility. *Academy of Management Annals*, 11(1), 105–149. https://doi.org/10.5465/annals.2015.0095

Chen, Y., Chen, Y. S., & Chang, C. H. (2022). The influence of green organizational culture on corporate environmental performance: The mediating role of green innovation. *Business Strategy and the Environment*, 31(4), 1456–1469. https://doi.org/10.1002/bse.2967

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage Publications.

Dubey, R., Gunasekaran, A., Bryde, D., Dwivedi, Y. K., & Papadopoulos, T. (2021). Big data analytics and artificial intelligence pathway to operational performance under the effects of entrepreneurial orientation and environmental dynamism. *Technological Forecasting and Social Change*, 173, 121090. https://doi.org/10.1016/j.techfore.2021.121090

El-Kassar, A. N., & Singh, S. K. (2019). Green innovation and organizational performance: The influence of big data and the moderating role of management commitment and HR practices. *Technological Forecasting and Social Change*, 144, 483–498. https://doi.org/10.1016/j.techfore.2017.12.016.

Ferreira, J. J., Fernandes, C. I., & Ferreira, F. A. (2022). Digital transformation and knowledge management in organizations: The role of innovation and dynamic capabilities. *Journal of Business Research*, 146, 118–128. https://doi.org/10.1016/j.jbusres.2022.03.028.

George, G., Merrill, R., & Schillebeeckx, S. (2021). Digital sustainability and entrepreneurship: How digital innovations enable the sustainable development goals. *Journal of Business Research*, 125, 271–280. https://doi.org/10.1016/j.jbusres.2019.09.019

Gupta, S., Modgil, S., & Gunasekaran, A. (2021). Big data analytics and artificial intelligence for supply chain resilience and sustainability. *Technological Forecasting and Social Change*, 166, 120-635. https://doi.org/10.1016/j.techfore.2021.120635.

Hair, J. F., Black, W., Babin, B., & Anderson, R. (2021). *Multivariate Data Analysis* (8th ed.). Pearson.

Israel, G. D. (1992). *Determining sample size*. University of Florida IFAS Extension. Available via sample-size guidance and reproduced tables.

Khan, S. A. R., Yu, Z., & Sharif, A. (2021). Green innovation and environmental sustainability in organizations: The role of digital technologies. *Technological Forecasting and Social Change*, 167, 120713. https://doi.org/10.1016/j.techfore.2021.120713

Kraus, S., Durst, S., Ferreira, J. J., Veiga, P., Kailer, N., & Weinmann, A. (2021). Digital transformation in business and management research: An overview of the current status and future directions. *International Journal of Information Management*, 63, 102428. https://doi.org/10.1016/j.ijinfomgt.2021.102428

Kraus, S., Durst, S., Ferreira, J. J., Veiga, P., Kailer, N., & Weinmann, A. (2022). Digital transformation in business and management research: *International Journal of Information Management*, 63, 102466. https://doi.org/10.1016/j.ijinfomgt.2021.102466

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement, 30*(3), 607-610. https://doi.org/10.1177/001316447003000308

Li, F., Nucciarelli, A., Roden, S., & Graham, G. (2023). How digital transformation impacts innovation in

organizations: A systematic review and research agenda. Technological Forecasting and Social Change, 187, 122211. https://doi.org/10.1016/j.techfore.2022.122211

Nambisan, S., Wright, M., & Feldman, M. (2019). The digital transformation of innovation and entrepreneurship: Progress, challenges, and key themes. *Research Policy*, 48(8), 103773. https://doi.org/10.1016/j.respol.2019.03.018

OECD & Eurostat. (2018). *Oslo Manual 2018: Guidelines for collecting, reporting and using data on innovation*. OECD Publishing.

Peng, Y., & Tao, C. (2022). Can digital transformation promote enterprise performance? From the perspective of public policy and innovation. *Journal of Innovation & Knowledge*, 7(3), 100198.

Saeedikiya, M., et al. (2025). The nexus of digital transformation and innovation. *Journal of Innovation & Knowledge*.

Schaltegger, S., & Burritt, R. (2018). Business cases and corporate engagement with sustainability: Differentiating ethical motivations. *Business Strategy and the Environment*, 27(3), 241–259. https://doi.org/10.1002/bse.2002.

Schaltegger, S., Hansen, E., & Lüdeke-Freund, F. (2018). Business models for sustainability: Origins, present research, and future avenues. Organization & Environment, 31(1), 3–10. https://doi.org/10.1177/1086026617732932

Sekaran, U., & Bougie, R. (2020). *Research Methods for Business: A Skill-Building Approach* (8th ed.). Wiley.

Siegle, D. (n.d.). *Sample Size*. Educational Research Basics, University of Connecticut.

Soto Setzke, D., Riasanow, T., Böhm, M., & Krcmar, H. (2023). Pathways to digital service innovation: The role of digital transformation strategies in established organizations. *Information Systems Frontiers*, 25(3), 1017–1037. https://doi.org/10.1007/s10796-021-10112-0

Soto-Acosta, P. (2020). COVID-19 pandemic: Shifting digital transformation to a high-speed gear. *Information Systems Management*, 37(4), 260-266. https://doi.org/10.1080/10580530.2020.1814461

Vărzaru, A. A. (2024). Digital Transformation and Innovation: The Influence of Digital Technologies on Organizational Performance. *Systems*, 12(9), 359. https://doi.org/10.3390/systems12090359

Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research*, 122, 889–901. https://doi.org/10.1016/j.jbusres.2019.09.022

Vial, G. (2021). Understanding digital transformation: A review and research agenda. *MIS Quarterly Executive*, 20(2), 118-144.

Vial, G. (2021). Understanding digital transformation: A review and research agenda. *MIS Quarterly Executive*, 20(2), 118–144.

Warner, K. S. R., & Wäger, M. (2019). Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. *Long Range Planning*, 52(3), 326-349. https://doi.org/10.1016/j.lrp.2018.12.001.