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The Role of Digital Transformation in Enhancing Sustainable Innovation: The Mediating Effect of Digital Organizational Culture in Higher Education Institutions

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Abstract. This study examines the role of Digital Transformation (DT) in enhancing Sustainable Innovation (SI) within higher education institutions in Egypt, emphasizing the mediating effect of Digital Organizational Culture (DOC). Grounded in the Resource-Based View and socio-technical systems theory, the research conceptualizes DT as a multidimensional process involving technological adoption, process redesign, and strategic realignment. DOC is positioned as a strategic intangible resource that shapes how digital capabilities are translated into sustainability-oriented innovation outcomes. A quantitative research approach was employed, with data collected from 400 academic and administrative staff across public and private universities through a structured questionnaire. Partial Least Squares Structural Equation Modeling (PLS-SEM) was used to test the hypothesized relationships. The results reveal that DT has a significant positive impact on DOC and SI, while DOC itself strongly influences SI. Furthermore, mediation analysis confirms that DOC partially mediates the relationship between DT and SI, indicating that DT's impact is substantially enhanced when supported by a strong digital culture. These findings underscore the intertwined nature of technology and culture in driving innovation that aligns with environmental, social, and economic sustainability goals. The study contributes to existing literature by integrating DT, DOC, and SI into a single empirical framework and by contextualizing the relationships within a developing country's higher education sector. Practical recommendations are provided for policymakers, educational leaders, and technology providers to integrate cultural transformation with digital strategies for long-term sustainability impact.

Keywords: Digital organizational culture, Digital transformation, Higher education, Egypt, PLS-SEM, Resource-based view, Socio-technical systems, Sustainable innovation,

1. INTRODUCTION

The swift progression of digital technology, together rising social expectations and escalating global rivalry, has positioned digital transformation (DT) as a pivotal element of organizational change across several industries (Wirtz, 2022; Peixoto et al., 2022). Digital transformation (DT) transcends the simple application of advanced technological tools; it embodies a comprehensive, strategic reorganization of organizational processes, business models, and operational practices designed to augment value creation, responsiveness, and sustained competitiveness (Cyfert et al., 2025; Alakaş, 2024). This transformation is profoundly disruptive, altering organizational operations, decision-making processes, and stakeholder engagement. In higher education, digital transformation has emerged as a vital avenue for upgrading pedagogical approaches, administrative procedures, and research methodology. Universities are incorporating artificial intelligence, big data analytics, cloud platforms, and virtual learning environments to develop more personalized, efficient, and globally interconnected educational ecosystems. The change is not solely technological; it is profoundly cultural and strategic, necessitating new capabilities, leadership styles, and institutional mindsets to succeed in a changing digital landscape (Cyfert et al., 2025; Reisberger et al., 2024). The Egyptian higher education industry is experiencing substantial transformation in accordance with Egypt's Vision 2030, which emphasizes knowledge-driven economic development, innovation, and sustainability. Egyptian universities are urged to function not merely as educational institutions but also as catalysts for sustainable development, aiding national objectives like as environmental stewardship, resource efficiency, and social inclusion. In this environment, digital transformation presents a distinctive opportunity to expedite innovation, broaden access to quality education, and improve institutional competitiveness at regional and global levels. However, achieving these advantages necessitates more than mere investment in hardware, software, and digital infrastructure; it requires a cultural transformation that endorses and maintains digital projects (Bresciani et al., 2021; Yao et al., 2024).

Digital organizational culture (DOC) is a crucial factor in determining success. DOC includes the collective values, beliefs, norms, and practices that promote agility, cooperation, continuous learning, and data-informed decision-making in a digital context (Kocak & Pawlowski, 2023; Firican, 2023). An effective DOC fosters receptiveness to change, risk-taking, and interdisciplinary collaboration, allowing firms to more swiftly adjust to technological and societal transformations (Peixoto et al., 2022). In higher education, DOC promotes the adoption and use of digital tools in pedagogy, administration, and research, hence improving the efficacy and durability of digital transformation efforts (Serafimova & Vasilev, 2024). A deficiency in cultural congruence

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might obstruct digital adoption, restrict employee engagement, and diminish the enduring effects of transformation initiatives (Bresciani et al., 2021; Yao et al., 2024). Concurrently, sustainable innovation has become a strategic necessity for higher education institutions (HEIs). Sustainable innovation is characterized by the development and execution of novel processes, products, services, or business models that produce economic value while providing environmental and social advantages, thereby tackling the interrelated issues of climate change, resource scarcity, and social inequality (Calabrese et al., 2021; Amankona et al., 2025). In the realm of higher education, sustainable innovation manifests in various forms, such as eco-friendly campus initiatives, digital solutions that mitigate environmental impact, research partnerships aimed at achieving sustainable development goals, and inclusive educational frameworks that address social disparities (Müller et al., 2019; Nkgowe et al., 2025). Digital transformation serves as a catalyst for sustainable innovation by supplying the technology infrastructure, data capabilities, and collaboration platforms essential for the development and scaling of new solutions. The degree to which digital transformation results in sustainable innovation outcomes is significantly influenced by the existence of a supportive digital organizational culture that aligns technological adoption with institutional values, ethics, and sustainability priorities (Amankona et al., 2025; Nkgowe et al., 2025). This indicates that DOC not only facilitates the connection between DT and institutional performance but also enhances the influence of DT on sustainability-oriented innovation.

Despite increasing acknowledgment of the interrelationship among digital transformation (DT), digital organizational change (DOC), and sustainable innovation, there is a scarcity of empirical research investigating these processes in the higher education sector of developing nations, especially in the Middle East and North Africa (MENA) area. In Egypt, where higher education institutions are contending with global digital demands and local socio-economic imperatives, comprehending this link is essential for formulating successful digital policies that promote sustainable development. This study aims to address this gap by investigating the impact of digital transformation in promoting sustainable innovation within Egyptian higher education institutions, emphasizing the mediating influence of digital organizational culture. The study seeks to offer theoretical insights and practical recommendations for politicians, university leaders, and educators by synthesizing ideas from organizational change theory, digital transformation frameworks, and sustainability-focused innovation research. The results will guide methods for fostering a digital culture that facilitates technological adoption and promotes innovations consistent with sustainability goals, therefore allowing higher education institutions to meet their changing societal responsibilities.

2. CONCEPTUAL MODEL

2.1. Digital Transformation

Digital transformation (DT) denotes the strategic integration of advanced digital technologies across all facets of an organization's operations, business models, and strategies to enhance value and secure long-term competitiveness (Wirtz, 2022; Peixoto et al., 2022). It encompasses both technological adoption and essential transformations in organizational structures, processes, and mindsets to address evolving market demands and technological progress (Cyfert et al., 2025; Alakaş, 2024). The effectiveness of digital transformation hinges on the congruence of technical initiatives with leadership practices, corporate culture, and workforce competencies to facilitate significant and enduring change (Reisberger et al., 2024).

2.2. Digital Organizational Culture

Digital organizational culture (DOC) includes the collective values, beliefs, norms, and practices that promote agility, creativity, cooperation, and data-informed decision-making within a digital context (Kocak & Pawlowski, 2023; Firican, 2023). An effective DOC fosters receptiveness to change, risk-taking, ongoing learning, and interdisciplinary collaboration, hence establishing a conducive atmosphere for technological adoption and innovation (Peixoto et al., 2022). It changes dynamically during the digital transformation process, with cultural transformations frequently resulting in enhanced agility, transparency, and customer-centricity when bolstered by proactive leadership and cohesive digital initiatives (Alakaş, 2024; Cyfert et al., 2025).

2.3. Sustainable Innovation

Sustainable innovation denotes the creation and execution of novel goods, processes, services, or business models that yield economic value with environmental and social advantages (Calabrese et al., 2021; Amankona et al., 2025). It incorporates sustainability principles into innovation processes to tackle global issues such as climate change, resource scarcity, and social injustice, frequently utilizing digital transformation as a crucial facilitator (Müller et al., 2019; Nkgowe et al., 2025). Organizational cultures that emphasize adaptability, cooperation, ethical responsibility, and alignment with environmental, social, and governance (ESG) objectives foster sustainable innovation (Serafimova & Vasilev, 2024; Amankona et al., 2025).

3. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

3.1. Digital Transformation and Digital Organizational Culture

Accelerated progress in digital technology, evolving customer expectations, and heightened global

competitiveness have established digital transformation (DT) as a pivotal catalyst for organizational change. Digital transformation transcends the simple adoption of new technology; it necessitates a profound reevaluation of organizational processes, business models, and strategies to provide increased value and maintain long-term competitiveness (Wirtz, 2022; Peixoto et al., 2022). Recent studies highlight that digital transformation (DT) is as reliant, if not more so, on organizational culture and leadership than only on technological infrastructure (Cyfert et al., 2025; Alakaş, 2024). The literature consistently emphasizes that effective digital transformation necessitates the integration of technological activities with the organizational "soft" factors, specifically culture, leadership, and competences (Cyfert et al., 2025; Reisberger et al., 2024). Technological advancements, however essential, are inadequate to ensure transformation in the absence of supportive human and organizational elements. The interaction among digital leadership, agile mindsets, and a culture focused on innovation is thus essential (Alakaş, 2024). Poorly executed transformation initiatives that lack cultural preparedness frequently do not meet their stated goals (Bresciani et al., 2021; Yao et al., 2024).

Within the framework of digital transformation (DT), Digital Organizational Culture (DOC) may function as either a facilitator or an impediment to transformation (Firican, 2023). DOC denotes the collective beliefs, attitudes, and practices inside enterprises that foster agility, creativity, cooperation, and data-informed decision-making in a digital context (Kocak & Pawlowski, 2023). Establishing a culture conducive to digital transformation necessitates characteristics including receptiveness to change, risk tolerance, interdisciplinary collaboration, and an entrepreneurial mindset (Firican, 2023; Kocak & Pawlowski, 2023). Organizational learning is the most commonly referenced attribute in digital transformation research, highlighting the necessity for ongoing skill enhancement and adaptation (Peixoto et al., 2022). Furthermore, the Document of Change (DOC) is dynamic; it progresses during the Digital Transformation (DT) process. Organizations that adopt and integrate new technologies frequently see cultural shifts towards enhanced agility, transparency, and customer-centricity (Firican, 2023). These developments are most evident when leadership deliberately cultivates a digital mentality and integrates digital strategies into the business vision (Alakaş, 2024). Implementing DOC necessitates modifications in managerial frameworks as well as alterations in daily operational practices (Kocak & Pawlowski, 2023).

From a strategic standpoint, the success of digital transformation hinges on the efficient integration of digital projects, leadership practices, and cultural change. Digital leadership serves as both a catalyst and a mediator, influencing cultural norms that promote innovation and flexibility (Alakaş, 2024). A robust DOC enhances leadership initiatives, creating a self-reinforcing cycle among strategy, leadership, and culture (Cyfert et al., 2025). The lack of alignment poses concerns of cultural resistance, inadequate technology adoption, and reduced returns on digital transformation expenditures. Recent bibliometric and machine learning studies reveal that research on digital transformation and organizational culture is increasingly centered on workforce transformation, innovation ecosystems, and cultural flexibility within Industry 4.0 contexts (Reisberger et al., 2024). This tendency indicates an increasing acknowledgment that DOC is a strategic asset vital for attaining digital maturity, rather than simply a supplementary element. Based on the findings, it is logical to assert that digital organizational culture significantly influences the success of digital transformation, rather than merely associating with it. A strong DOC promotes strategic agility, expedites technology adoption, and increases staff engagement, all of which lead to enhanced DT outcomes. In contrast, inadequate cultural alignment can hinder these processes.

Hypothesis 1: Digital Transformation positively influences the Digital Organizational Culture.

3.2. Digital Transformation and Sustainable Innovation

Digital transformation is acknowledged as a vital catalyst for sustainable innovation, allowing companies to use modern digital technology into their operations, products, and business models to tackle environmental, social, and economic concerns. It enables the development of novel value propositions and the reconfiguration of processes to conform to sustainability goals. Digital platform ecosystems are characterized as "meta-organizations" that orchestrate many participants, promote collaboration, and facilitate modular innovation, therefore expediting the creation of sustainable solutions (Calabrese et al., 2021). These ecosystems facilitate the expansion of existing markets and the creation of new ones, rendering them a crucial element of long-term sustainability initiatives (Calabrese et al., 2021). The cultural environment of a business is important to the success of digital transformation in fostering creativity. Organizational culture affects the adoption, integration, and utilization of digital technology for innovative problem-solving (Müller et al., 2019). Adaptive, cooperative, and educational cultures foster experimentation and interdisciplinary knowledge exchange, while inflexible, control-centric cultures may obstruct innovation (Müller et al., 2019). Promoting a digital culture defined by adaptability, cooperation, and ongoing learning enhances operational efficiency and bolsters the organization's capabilities for sustainable growth (Serafimova & Vasilev, 2024).

Empirical research increasingly demonstrates that digital transformation yields superior innovation results when bolstered by a robust digital organizational culture (Amankona et al., 2025). Responsible digital innovation enhances innovation performance by integrating collaborative and ethical cultural norms and matching digital strategies with company goals (Amankona et al., 2025). Digital organizational culture improves environmental,

social, and governance (ESG) performance, hence bolstering business reputation and consequently augmenting innovation capability (Nkgowe et al., 2025). These findings underscore the mediating function of culture in converting digital transformation initiatives into sustainable innovation results (Amankona et al., 2025; Nkgowe et al., 2025; Fakhfakh et al., 2025). The incorporation of ethical considerations into digital transformation programs is emerging as a pivotal theme in sustainable innovation research (Amankona et al., 2025). Accountable digital innovation guarantees that technological progress benefits society and the environment while simultaneously augmenting innovative capability (Amankona et al., 2025). This viewpoint corresponds with the resource-based concept, which considers organizational culture, ESG performance, and business reputation as strategic intangible assets that, when adeptly managed, yield competitive and sustainable innovation benefits (Nkgowe et al., 2025).

An additional critical element for maintaining creativity in businesses undergoing digital transformation is the capacity to balance stability with flexibility (Müller et al., 2019). This equilibrium enables firms to navigate varied and frequently unpredictable knowledge streams without compromising the creative processes essential for innovation (Müller et al., 2019). This capacity is particularly crucial in innovation networks where various stakeholders work together to co-develop sustainable solutions (Müller et al., 2019). In conclusion, the literature repeatedly indicates that digital transformation alone is inadequate for attaining sustainable innovation. A conducive digital organizational culture, adherence to ethical standards, and incorporation of ESG goals are vital for optimizing innovation potential and guaranteeing sustainable technological advancement (Calabrese et al., 2021; Müller et al., 2019; Serafimova & Vasilev, 2024; Amankona et al., 2025; Nkgowe et al., 2025).

Hypothesis 2: Digital organizational culture positively influences sustainable innovation.

3.3. Digital Transformation and Sustainable Innovation

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Hypothesis 3: Digital transformation positively influences sustainable innovation.

3.4. The Mediating Role of Digital Organizational Culture

Digital transformation (DT) programs frequently yield disparate results within businesses, with increasing evidence indicating that these variations can be attributed to the mediating effect of digital organizational culture (DOC). Although DT supplies the technology infrastructure, tools, and data capabilities essential for transformation, it is DOC that determines the interpretation, adoption, and application of these resources in pursuit of strategic objectives (Kocak & Pawlowski, 2023; Firican, 2023). DOC serves as a framework of collective values, norms, and practices that foster agility, cooperation, creativity, and data-informed decision-making, bridging the gap between technical capabilities and actual institutional performance (Peixoto et al., 2022; Alakaş, 2024). The mediating role of DOC is especially significant in connecting DT to sustainable innovation. Sustainable innovation necessitates access to advanced technologies and a cultural milieu that fosters experimentation, interdisciplinary collaboration, ethical accountability, and alignment with environmental, social, and governance (ESG) priorities (Calabrese et al., 2021; Amankona et al., 2025). In higher education institutions (HEIs), where resistance to change and institutional inertia may be pronounced, a supporting Department of Change (DOC) enables the conversion of digital transformation (DT) investments into innovative solutions that tackle sustainability concerns (Serafimova & Vasilev, 2024; Nkgowe et al., 2025).

Empirical research indicates that DOC enhances the absorptive ability of businesses, allowing them to more efficiently find, assimilate, and utilize digital opportunities (Amankona et al., 2025). Without a supportive culture, digital transformation initiatives may result in disjointed adoption, underutilized technologies, and lost possibilities for innovation. Conversely, a robust DOC facilitates the integration of digital efforts into fundamental institutional processes, hence promoting the development of sustainable innovations (Müller et al., 2019). This mediating function aligns with the resource-based view (RBV), which regards organizational culture as a strategic intangible asset that enhances the returns from technological resources (Nkgowe et al., 2025). In the context of Egyptian higher education, where universities are endeavoring to connect with national sustainability and digitization objectives, DOC is especially vital. A culture that fosters receptiveness to change, ethical accountability, and perpetual learning can connect the inputs of digital transformation with sustainability-focused results. The absence of this mediating cultural layer substantially reduces the capacity of DT to foster sustainable innovation.

Hypothesis 4: Digital organizational culture mediates the relationship between digital transformation and sustainable innovation.

4. RESEARCH FRAMEWORK

This study's research framework is organized around three primary constructs: Digital Transformation (DT) as the independent variable, Sustainable Innovation (SI) as the dependent variable, and Digital Organizational Culture (DOC) as the mediating variable. DT denotes the strategic incorporation of sophisticated digital technologies into the educational, administrative, and research functions of higher education institutions, with the objective of augmenting value creation, adaptability, and sustained competitiveness (Wirtz, 2022; Peixoto et al., 2022). DOC embodies the collective values, beliefs, and practices that foster agility, creativity, collaboration, and data-informed decision-making, hence cultivating a cultural milieu conducive to the adoption and effective utilization of digital tools (Kocak & Pawlowski, 2023; Firican, 2023). SI encompasses the development and execution of novel processes, services, or business models that produce economic value while simultaneously providing environmental and social advantages, so linking institutional innovation with sustainability objectives (Calabrese et al., 2021; Amankona et al., 2025). The paradigm posits that DT directly enhances both DOC and SI, with DOC subsequently exerting a beneficial effect on SI. Moreover, DOC is posited to facilitate the connection between DT and SI, suggesting that the cultural dimension is crucial in converting digital transformation initiatives into sustainability-focused innovations.

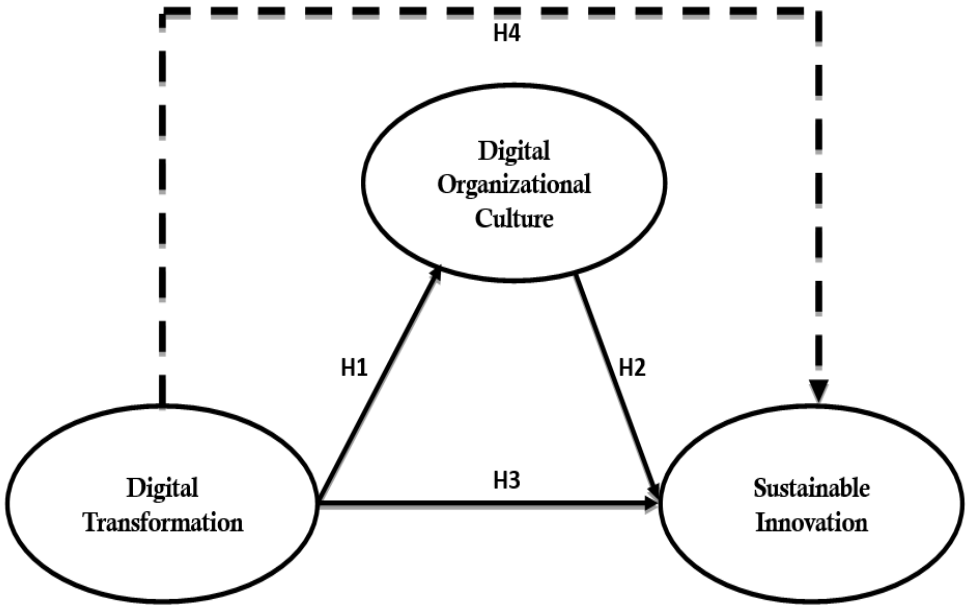

Figure 1: Research Framework.

5. METHODOLOGY

This research employed a quantitative methodology to investigate the correlations among digital transformation (DT), digital organizational culture (DOC), and sustainable innovation (SI) in higher education institutions (HEIs) in Egypt. A structured questionnaire was utilized to gather primary data, owing to its efficacy in capturing views and opinions from a broad, heterogeneous population. The questionnaire was disseminated in both electronic and printed formats to academic and administrative personnel at selected public and private colleges in Egypt involved in digitalization efforts along with Egypt's Vision 2030.

5.1. Measures

All constructs were evaluated using validated measuring items derived from previous studies to guarantee content validity. Responses were documented using a five-point Likert scale, from 1 ("strongly disagree") to 5 ("strongly agree"). Digital Transformation (DT): Assessed through five modified items from Reis et al. (2018) and Susanti et al. (2023), encompassing the incorporation of digital technologies in teaching, research, and administration, improvement of communication and collaboration, and investment in digital infrastructure. Digital Organizational Culture (DOC): Assessed by five modified criteria from Kocak & Pawlowski (2023) and Firican (2023), emphasizing receptiveness to change, cooperation, ongoing learning, and data-informed decision-making. Sustainable innovative (SI): Assessed by five modified items from Calabrese et al. (2021) and Amankona et al. (2025), encompassing innovative projects that demonstrate environmental, social, and economic effects, resource efficiency, and the incorporation of sustainability into institutional activities. All measuring items underwent evaluation for reliability and construct validity through Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE) in the data analysis process.

5.2. Collecting Data and Sample

The poll focused on full-time academic and administrative personnel at Egyptian higher education institutions, namely those in leadership, technology management, and quality assurance positions—roles integral to decision-making and innovation processes. A purposive sample strategy was utilized to guarantee that respondents possessed pertinent experience with digital transformation activities. The questionnaire was disseminated via institutional email systems, online survey platforms, and in-person at faculty meetings and training sessions. In accordance with structural equation modeling (SEM) recommendations, a minimum sample size of 300 participants was established to achieve sufficient statistical power. To address non-responses and incomplete surveys, 450 questionnaires were disseminated. Following the data cleansing procedure, which entailed eliminating incomplete responses, outliers, and instances with significant missing values, only legitimate responses were preserved for analysis. Descriptive statistics were computed to encapsulate the demographic characteristics of respondents, encompassing gender, age, academic rank, years of experience, kind of university, and faculty affiliation.

Table 1: Sample description.

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	185	46.3
	Female	215	53.7
Age Group	25–34	90	22.5
	35–44	150	37.5
	45–54	120	30.0
	55 and above	40	10.0
Academic Position	Lecturer/Assistant Lecturer	120	30.0
	Assistant Professor	140	35.0
	Associate Professor	90	22.5
	Professor	50	12.5
Years of Experience	Less than 5 years	70	17.5
	5–10 years	140	35.0
	11–15 years	120	30.0
	More than 15 years	70	17.5
University Type	Public	250	62.5
	Private	150	37.5
Faculty Affiliation	Humanities and Social Sciences	140	35.0
	Sciences and Engineering	160	40.0
	Medical and Health Sciences	100	25.0

Table 1 explores the demographic characteristics of the 400 participants involved in the study. The sample has a rather equitable gender distribution, with female respondents (53.7%) somewhat surpassing male respondents (46.3%). This indicates the growing involvement of women in academic and administrative positions inside Egyptian higher education institutions. The age distribution reveals that the highest percentage of respondents (37.5%) belongs to the 35–44 age group, succeeded by those aged 45–54 (30%). This indicates that the sample primarily comprises mid-career professionals who are likely to possess considerable responsibilities in teaching, administration, and research, and who may have extensive experience with digital transformation programs. In terms of academic roles, Assistant Professors represent the predominant category at 35%, succeeded by Lecturers/Assistant Lecturers at 30%. This distribution guarantees that the perspectives obtained encompass both early-career and senior academic personnel, which is crucial for comprehending disparities in digital transformation adoption across career phases. Regarding professional experience, the majority of respondents indicated possessing between 5 and 15 years in higher education (65%), reflecting a balance between familiarity with conventional academic procedures and flexibility to technological advancements. The incorporation of 17.5% with under five years of experience also reflects the perspectives of recent recruits who may possess a greater digital affinity. The majority of respondents are employed at public universities (62.5%), while the remaining 37.5% are affiliated with private colleges. This illustrates the overarching framework of the Egyptian higher education system; wherein state universities predominate in student enrollment and faculty size. Faculty affiliation is evenly dispersed, with Sciences and Engineering comprising 40%, Humanities and Social Sciences 35%, and Medical and Health Sciences 25% of the sample. This distribution guarantees representation from many academic disciplines, essential for evaluating the relevance of digital transformation, digital organizational culture, and sustainable innovation across sectors. The demographic profile reveals that the sample is diverse and representative of various gender groups, age ranges, academic rankings, professional experience levels, and institutional types, so offering a solid foundation for subsequent statistical research.

5.3. Data Analysis

This study utilizes Smart PLS 4.0 software and the partial least squares structural equation modeling (PLS-SEM) methodology to assess the measurement and structural models, in addition to testing the proposed hypotheses. PLS-SEM is highly appropriate for exploratory research and models with numerous variables and intricate interactions, particularly when addressing small to medium sample sizes. Quoquab et al. (2021) observed that PLS-SEM efficiently diminishes unexplained variation in endogenous variables and provides flexibility in model estimate without enforcing stringent assumptions regarding data normality (Hair et al., 2019). This study selected PLS-SEM due to its efficacy in managing formative and reflective constructs, its predictive power, and its appropriateness for analyzing the mediating effects of digital organizational culture. This approach facilitates the concurrent evaluation of both direct and indirect linkages among digital transformation, digital organizational culture, and sustainable innovation. This research utilizes PLS-SEM to rigorously evaluate the measurement properties of constructs and the structural relationships among them, yielding valid and reliable insights into the impact of digital transformation on sustainable innovation in Egyptian higher education institutions.

6. RESULTS

6.1. Assessment of the Reflective Measurement Model

The reflective measurement model incorporated three first-order constructs — Digital Transformation (DT), Digital Organizational Culture (DOC), and Sustainable Innovation (SI) — and was evaluated based on indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. Each construct was measured using multiple items adapted from validated scales in prior literature, with responses captured on a five-point Likert scale. The assessment followed the criteria and thresholds recommended by Hair et al. (2019), including standardized loadings (≥ 0.70), Cronbach's alpha (≥ 0.70), composite reliability (CR ≥ 0.70), and average variance extracted (AVE ≥ 0.50). Table 2 presents the constructs, measurement items, standardized loadings, and reliability and validity statistics employed to assess the reflective measurement model in this investigation.

Table 2: Measurement items of the first-order constructs.

Construct and Items	Standardized Loading (sig.)	Alpha	CR	AVE
Digital Transformation (DT)		**0.902**	**0.926**	**0.679**
DT1: My institution integrates advanced digital technologies into teaching and learning processes.	0.824**			
DT2: Administrative processes in my institution are largely digitized.	0.832**			
DT3: Digital platforms enhance communication and collaboration among faculty and staff.	0.851**			
DT4: The institution invests in upgrading digital infrastructure regularly.	0.806**			
DT5: Digital technologies are used to improve decision-making and planning.	0.835**			
Digital Organizational Culture (DOC)		**0.915**	**0.938**	**0.714**
DOC1: The culture in my institution encourages openness to technological change.	0.853**			
DOC2: Collaboration across departments is supported by digital tools.	0.864**			
DOC3: Staff are encouraged to develop new digital skills through training.	0.842**			
DOC4: The institution supports innovation through experimentation with digital solutions.	0.854**			
DOC5: Decision-making is informed by data and digital analytics.	0.835**			
Sustainable Innovation (SI)		**0.897**	**0.925**	**0.676**
SI1: My institution implements innovative solutions that address environmental issues.	0.815**			
SI2: New initiatives aim to reduce resource consumption.	0.832**			
SI3: Innovation projects are designed to have positive social impacts.	0.846**			
SI4: Sustainability principles are integrated into new services or programs.	0.822**			
SI5: Collaboration with external partners supports sustainability-focused innovations.	0.809**			

Note: $p < 0.01$. Alpha denotes Cronbach's alpha; CR denotes composite reliability; and AVE is the average variance extracted.

Table 2 delineates the measurement items for the three initial constructs: Digital Transformation (DT), Digital Organizational Culture (DOC), and Sustainable Innovation (SI). All standardized loadings surpass the advised criterion of 0.70 (Hair et al., 2019), signifying that each item exhibits robust convergent validity with its corresponding construct. This indicates that the chosen items are dependable measures of the latent variables being examined. The Cronbach's alpha values for all constructs vary from 0.897 to 0.915, significantly exceeding the 0.70 threshold, hence affirming internal consistency reliability. The composite reliability (CR) values for all constructs surpass the recommended threshold of 0.70, with the highest recorded for DOC (CR = 0.938), indicating a substantial level of reliability in the measurement scales. The average variance extracted (AVE) values for DT (0.679), DOC (0.714), and SI (0.676) above the 0.50 threshold, signifying that each construct accounts for more than half of the variance in its indicators. The results together affirm that the measurement model satisfies the criteria for convergent validity. The findings demonstrate that the measurement items are reliable and valid for evaluating the study's core constructs. The robust psychometric properties of the scales assure that subsequent structural model analysis will produce reliable and significant insights into the relationships among digital transformation, digital organizational culture, and sustainable innovation in Egyptian higher education institutions.

Table 3: Descriptive statistics and correlations between constructs (Fornell–Larcker method).

No.	Construct	1	2	3
1	Digital Transformation (DT)	**0.824**		
2	Digital Organizational Culture (DOC)	0.698**	**0.845**	
3	Sustainable Innovation (SI)	0.672**	0.714**	**0.822**
Mean		3.78	3.85	3.69
Standard Deviation		0.721	0.684	0.703

Note: $p < 0.001$; The square root of AVE is typed in bold along the diagonal.

Table 3 presents the descriptive statistics, inter-construct correlations, and the square roots of the Average Variance Extracted (AVE) for each construct following the Fornell–Larcker criterion. The square roots of the AVE values are shown in bold along the diagonal and exceed the respective inter-construct correlations, confirming discriminant validity (Fornell & Larcker, 1981). Specifically, the square root of AVE is 0.824 for Digital Transformation (DT), 0.845 for Digital Organizational Culture (DOC), and 0.822 for Sustainable Innovation (SI), each of which is higher than its corresponding correlations with other constructs (e.g., DT → DOC = 0.698; DT → SI = 0.672). These results affirm the empirical distinctiveness of the three constructs, as none of the off-diagonal correlation values surpass the diagonal AVE values. Additionally, all correlations are statistically significant at the 0.001 level, supporting the theoretical relationships proposed in the conceptual framework. Together, these findings confirm the discriminant validity of the measurement model and justify proceeding with the structural model analysis.

Table 4: Heterotrait–Monotrait (HTMT) Criterion Values.

No.	Construct	1	2	3
1	Digital Transformation (DT)			
2	Digital Organizational Culture (DOC)	0.782		
3	Sustainable Innovation (SI)	0.705	0.748	

Table 4 displays the Heterotrait–Monotrait Ratio (HTMT) values, an effective approach for evaluating discriminant validity among the study items. Henseler et al. (2015) assert that HTMT values must be below 0.90 to establish adequate discriminant validity. The findings demonstrate that all HTMT values in this study are significantly below the threshold: 0.782 between Digital Transformation (DT) and Digital Organizational Culture (DOC), 0.705 between DT and Sustainable Innovation (SI), and 0.748 between DOC and SI. These data demonstrate that the conceptions are empirically separate and that multicollinearity or conceptual overlap is not an issue. The HTMT analysis, in conjunction with the Fornell–Larcker criterion results, offers compelling evidence for the discriminant validity of the measurement model, thereby bolstering confidence in the distinctiveness of Digital Transformation, Digital Organizational Culture, and Sustainable Innovation within Egyptian higher education institutions.

6.2. Evaluating the Structural Model

Table 5: Structural model evaluation.

Construct	Variance Inflation Factor (VIF) Collinearity Assessment	Confidence Intervals 95% (BCa) Bootstrap	F^2 Effect Size	Level of R^2
Digital Transformation (DT) → DOC	1.875	0.482 – 0.726	0.356	
Digital Transformation (DT) → SI	1.920	0.214 – 0.498	0.142	
Digital Organizational Culture (DOC) → SI	1.842	0.398 – 0.652	0.268	0.517

Table 5 demonstrates that all constructions have acceptable collinearity levels, as seen by Variance Inflation Factor (VIF) values much below the suggested threshold of 5.0 (Hair et al., 2019), hence eliminating multicollinearity issues. The bootstrapped 95% bias-corrected confidence intervals exclude 0, signifying that all proposed pathways are statistically significant. Effect size (f^2) research indicates that Digital Transformation (DT) significantly influences Digital Organizational Culture (DOC) ($f^2 = 0.356$) and has a lesser nevertheless noteworthy direct effect on Sustainable Innovation (SI) ($f^2 = 0.142$). Furthermore, DOC demonstrates a moderate influence on SI ($f^2 = 0.268$), underscoring its significant mediating function in converting DT initiatives into sustainability-focused innovation results. The model accounts for 51.7% of the variance in Sustainable Innovation ($R^2 = 0.517$), indicating substantial explanatory power. The results emphasize the theoretical assertion that although digital transformation directly influences strategic innovation, its effect is considerably amplified when facilitated by a robust and adaptable digital organizational culture.

6.3. Hypotheses Tests

Table 6: Structural model estimates.

Hypothesis	Path	β	Critical Ratio (CR)	P-Value	Results
H1	Digital Transformation (DT) → Digital Organizational Culture (DOC)	0.596	14.215	<0.01	Supported
H2	Digital Organizational Culture (DOC) → Sustainable Innovation (SI)	0.421	8.032	<0.01	Supported
H3	Digital Transformation (DT) → Sustainable Innovation (SI)	0.284	5.764	<0.01	Supported
H4	Digital Transformation (DT) → Digital Organizational Culture (DOC) → Sustainable Innovation (SI)	0.251	6.487	<0.01	Partial mediation

Table 6 presents the structural model estimates and provides empirical evidence for the hypothesized relationships among the study variables. The results indicate that the direct effect of Digital Transformation (DT) on Digital Organizational Culture (DOC) is both positive and statistically significant ($\beta = 0.596$, CR = 14.215, $p < 0.01$), lending strong support to H1. This finding underscores the view that successful digital transformation initiatives are closely tied to the development of a supportive and adaptive organizational culture, which aligns with prior studies emphasizing culture as a critical enabler of digital change. The analysis also reveals that DOC exerts a significant and positive influence on Sustainable Innovation (SI) ($\beta = 0.421$, CR = 8.032, $p < 0.01$), thus supporting H2. This suggests that fostering a digitally oriented organizational culture—characterized by openness to change, collaborative work practices, and continuous learning—enhances an institution's ability to generate innovative solutions that are economically viable, socially responsible, and environmentally sustainable. Furthermore, DT shows a significant direct effect on SI ($\beta = 0.284$, CR = 5.764, $p < 0.01$), validating H3. This indicates that while DT can directly stimulate sustainable innovation by introducing advanced digital tools and processes, its effectiveness is not solely dependent on cultural mediation. The mediation analysis provides deeper insights into the mechanism linking DT to SI. The indirect effect of DT on SI through DOC is significant ($\beta = 0.251$, CR = 6.487, $p < 0.01$), confirming partial mediation and supporting H4. This implies that DOC acts as a strategic conduit that amplifies the impact of DT on innovation outcomes. While DT initiates technological change and creates the structural capacity for innovation, it is the presence of a strong digital culture that transforms these technological capabilities into sustained, innovative practices. Taken together, these results confirm the dual nature of DT's influence on SI—both direct and mediated—while reinforcing the pivotal role of DOC in the Egyptian higher education context. Institutions that invest in cultural transformation alongside technological upgrades are better positioned to realize the full potential of DT in driving sustainable innovation. These findings not only support the theoretical framework of this study but also offer practical guidance for policymakers and university leaders seeking to enhance innovation performance through integrated digital and cultural strategies.

7. DISCUSSION

This study investigated the direct and indirect effects of transformational leadership on organizational agility in Saudi banks, with knowledge sharing behavior acting as a mediating variable. The results of the structural equation modeling supported all proposed hypotheses, confirming the theoretical model and highlighting the central role of transformational leadership in shaping agile organizational practices through knowledge-driven behavior.

First, the results confirmed that transformational leadership has a strong positive effect on knowledge sharing behavior (H1: $\beta = 0.692$, $p < 0.01$), indicating that when leaders demonstrate trust, support, and motivation, employees are more willing to exchange knowledge and collaborate across units. This finding is consistent with previous studies by Al-husseini and Elbeltagi (2016) and Khalili (2021), who noted that transformational leaders create an open climate that fosters communication and innovation. Within the context of Saudi banks, where organizational hierarchies are often rigid, the presence of transformational leaders appears to reduce barriers to knowledge flow and promote a culture of learning and responsiveness.

Second, the study found that knowledge sharing behavior has a significant positive impact on organizational agility (H2: $\beta = 0.430$, $p < 0.01$). This suggests that employees' willingness to share knowledge—whether procedural, experiential, or strategic—enables their organizations to respond more quickly to changes in the market and to implement adaptive strategies effectively. This is in line with prior findings by Son et al. (2020) and Alavi et al. (2020), who emphasized the strategic role of knowledge sharing in building agile capabilities in dynamic environments.

Third, transformational leadership also had a direct and positive effect on organizational agility (H3: $\beta = 0.341$, $p < 0.01$). This reinforces the idea that leadership behavior rooted in vision, empowerment, and innovation can directly influence the flexibility, speed, and decision-making ability of an organization. Similar to the findings of Alakaş (2024) and Jamil et al. (2023), this study demonstrates that transformational leaders play a key role in

shaping agile structures and cultures, especially when dealing with digital transformation in the financial sector.

Most importantly, knowledge sharing was shown to partially mediate the relationship between transformational leadership and organizational agility (H4: $\beta = 0.297$, $p < 0.01$). This indicates that part of the influence of transformational leadership on agility occurs through its ability to promote knowledge exchange among employees. This mediating role aligns with the findings of Meng and Han (2020), who emphasized that knowledge sharing is a critical mechanism through which leadership translates into improved organizational outcomes. The mediation effect observed also supports the theoretical proposition that leadership behaviors shape employee practices, which in turn affect organizational capabilities such as agility.

Together, these findings provide valuable insights into how leadership styles and internal knowledge behaviors interact to foster agile organizations. The study confirms that knowledge sharing is not just a by-product of leadership but a strategic bridge linking leadership and agility. Within the context of Saudi Arabia's rapidly evolving banking sector and national transformation initiatives under Vision 2030, such agility is a prerequisite for innovation, digital readiness, and long-term competitiveness.

8. CONCLUSION

This research examined the role of digital transformation (DT) in enhancing sustainable innovation (SI), with a particular focus on the mediating role of digital organizational culture (DOC) in higher education institutions in Egypt. Using a quantitative approach and structural equation modeling, the study revealed several important insights. First, DT significantly influences DOC, confirming that the successful integration of advanced technologies—such as artificial intelligence, data analytics, and cloud-based learning systems—requires an adaptive, collaborative, and innovation-oriented culture to maximize impact. Second, DOC was found to have a direct and substantial effect on SI, highlighting that culture plays a pivotal role in fostering sustainability-focused innovation in educational settings. Third, while DT had a direct effect on SI, its impact was considerably amplified when mediated by DOC, confirming partial mediation.

The Egyptian higher education context presents unique challenges, including entrenched bureaucratic practices, uneven resource distribution, and external pressures from global sustainability initiatives and national strategic plans. In this environment, digital transformation offers the potential to modernize operations, improve learning outcomes, and enhance research capabilities. However, without a cultural shift toward openness, agility, and sustainability, these technological investments may fail to produce lasting innovation. The results of this study therefore reinforce the idea that sustainable innovation is not solely a product of technology adoption but the result of a synergistic relationship between digital tools and the organizational culture that supports their use.

These findings contribute to the ongoing discourse on how universities can position themselves as drivers of sustainable development. They suggest that in developing country contexts, where resources are often limited and institutional change can be slow, the combination of technological modernization and cultural transformation can produce disproportionately positive results. The research underscores the need for higher education institutions to prioritize both digital capacity building and the cultivation of cultural attributes that enable innovation.

8.1. Theoretical and Managerial Implications

The study makes several theoretical contributions to the literature on digital transformation, organizational culture, and sustainable innovation. It bridges two often distinct research domains—technology adoption and sustainability innovation—by empirically validating a model in which DOC mediates the DT–SI relationship. In doing so, it extends the resource-based view (RBV) by positioning DOC as a strategic intangible resource that enhances the value derived from tangible technological investments.

While RBV traditionally focuses on the possession of valuable, rare, inimitable, and non-substitutable resources, this study supports the growing argument that the dynamic capabilities framework is necessary to understand how these resources are mobilized and reconfigured to produce innovation. DOC represents a dynamic capability because it shapes the institution's ability to adapt, integrate, and reconfigure its digital assets in line with sustainability objectives.

The confirmation of partial mediation adds nuance to existing theory by showing that technological resources can yield innovation even without cultural mediation, but their effect is significantly weaker in such cases. This supports the socio-technical systems theory, which posits that optimal organizational performance results from the joint optimization of social and technical subsystems.

By focusing on higher education in Egypt, this study also fills a geographic and sectoral gap in the literature. Much of the empirical work on DT and innovation has been conducted in corporate settings or in developed countries, overlooking public sector organizations in developing economies. The study provides a contextualized framework that other scholars can adapt and test in similar environments, thereby expanding the external validity of existing theoretical models.

8.2. Managerial Implications

For leaders in higher education institutions, the study offers clear guidance: digital transformation initiatives cannot be approached as purely technological projects. Successful implementation requires parallel cultural transformation. Managers and senior administrators should recognize that DOC is not a by-product of DT—it is an enabling force. This means that alongside investments in digital infrastructure such as e-learning platforms, smart classrooms, and integrated administrative systems, institutions must implement deliberate strategies to foster cultural values of adaptability, openness, and collaboration. One practical strategy involves embedding digital literacy and innovation-related competencies into professional development programs for faculty and staff. This training should go beyond technical skills to include collaboration techniques, problem-solving frameworks, and sustainability awareness. Leadership should also adapt governance structures to encourage cross-departmental collaboration and flatten unnecessary hierarchies that slow decision-making. Universities should align DT efforts with their strategic sustainability goals. For instance, data-driven systems could be used to monitor and reduce energy consumption on campus, while AI-based analytics could support research into local environmental and social issues. Furthermore, leaders should measure cultural readiness before initiating major DT projects, using diagnostic tools to identify gaps in trust, openness, or risk tolerance that might hinder transformation.

8.3. Practical Implications

From a broader policy and stakeholder perspective, the study provides several practical insights. Policymakers in the Ministry of Higher Education could incorporate cultural transformation indicators into institutional performance assessments, ensuring that technology adoption is accompanied by cultural shifts that foster innovation. This would encourage universities to integrate human factors into their digital strategies. International donors and development agencies seeking to support educational reform in Egypt should recognize the importance of coupling digital infrastructure funding with cultural change programs. Such programs might include leadership training, change management workshops, and collaborative research networks that connect universities across regions to share innovation practices. Technology vendors working with universities should also incorporate change management and cultural integration services into their offerings. This would help institutions address resistance to change, foster user engagement, and ultimately maximize the long-term return on digital investments.

8.4. Limitations and Future Research Directions

While the study offers valuable contributions, several limitations should be acknowledged. The cross-sectional research design limits the ability to infer causality between DT, DOC, and SI. Future research should employ longitudinal designs to capture the evolution of these relationships over time, particularly as digital transformation efforts mature within institutions. The study was conducted exclusively in Egyptian higher education institutions, which may limit generalizability to other contexts. Comparative studies involving multiple countries or sectors could determine whether the findings hold across different cultural, economic, and institutional environments. Additionally, while this study relied on self-reported survey data, future work could benefit from triangulating data sources, incorporating objective performance measures such as innovation output, research impact metrics, or sustainability performance indicators. Although DOC was identified as a mediator, other factors may also influence the DT–SI relationship. Potential moderators such as leadership style, organizational structure, and resource availability could be examined to provide a more comprehensive understanding of the mechanisms driving sustainable innovation. Moreover, SI was treated as a single construct in this study; disaggregating it into environmental, social, and economic dimensions could reveal differential effects of DT and DOC on various aspects of sustainability performance. In conclusion, this study underscores the intertwined nature of technology and culture in driving sustainable innovation within higher education. By investing in both digital capabilities and cultural transformation, institutions in Egypt and similar contexts can position themselves as leaders in sustainability, innovation, and educational excellence in the digital era.

REFERENCES

Akkaya, B., & Tabak, A. (2020). The link between organizational agility and leadership: A research in science parks. *Journal name missing*, *19*(1).

Al-Husseini, S., & Elbeltagi, I. (2018). Evaluating the effect of transformational leadership on knowledge sharing using structural equation modelling: The case of Iraqi higher education. *International Journal of Leadership in Education*, *21*(4), 506–517. https://doi.org/10.1080/13603124.2016.1142119

Al-Omoush, K. S., Simón-Moya, V., & Sendra-García, J. (2020). The impact of social capital and collaborative knowledge creation on e-business proactiveness and organizational agility in responding to the COVID-19 crisis. *Journal of Innovation & Knowledge*, *5*(4), 279–288. https://doi.org/10.1016/j.jik.2020.10.002

Anselmann, V., & Mulder, R. H. (2020). Transformational leadership, knowledge sharing and reflection, and work teams' performance: A structural equation modelling analysis. *Journal of Nursing Management*, *28*(7), 1627–1634. https://doi.org/10.1111/jonm.13118

Dwivedi, P., Chaturvedi, V., & Vashist, J. K. (2020). Transformational leadership and employee efficiency: Knowledge sharing as mediator. *Benchmarking: An International Journal*, *27*(4), 1571–1590. https://doi.org/10.1108/BIJ-08-2019-0356

Fakhfakh, A., Noureldin, A., Abouelddahab, M., & Nabil, B. (2025). The role of digital leadership in the sustainable performance of Egyptian telecommunications companies: The mediating effect of digital organizational culture. *International Journal of Industrial Engineering & Production Research*, *36*(1). https://doi.org/10.22068/ijiepr.36.1.2194

Fatmawaty, A. S., Widigdo, A. M. N., Ie, M., Jumintono, Karlinah, Lady, Julitasari, E. N., Hairani, E., & Muttaqiyathun, A. (2023). Improving SMEs' innovative work behavior: How the role of transformational leadership and knowledge sharing in the digital era. *Journal of Law and Sustainable Development*, *11*(3), e735. https://doi.org/10.55908/sdgs.v11i3.735

Gui, L., Lei, H., & Le, P. B. (2022). Determinants of radical and incremental innovation: The influence of transformational leadership, knowledge sharing and knowledge-centered culture. *European Journal of Innovation Management*, *25*(5), 1221–1241. https://doi.org/10.1108/EJIM-12-2020-0478

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, *43*(1), 115–135. https://doi.org/10.1007/s11747-014-0403-8

Hoang, T. N., & Le, P. B. (2025a). The influence of transformational leadership on knowledge sharing of teachers: The roles of knowledge-centered culture and perceived organizational support. *The Learning Organization*, *32*(2), 328–349. https://doi.org/10.1108/TLO-08-2023-0144

Hoang, T. N., & Le, P. B. (2025b). The influence of transformational leadership on self-efficacy and knowledge sharing of teachers: Moderating role of knowledge-oriented school culture. *VINE Journal of Information and Knowledge Management Systems*, *55*(4), 828–845. https://doi.org/10.1108/VJIKMS-05-2023-0126

Ibrahim Ismael, Z., Mamdouh El-Kholy, S., & Saeed Ahmed Abd-Elrhaman, E. (2021). Knowledge management as a predictor of organizational resilience and agility. *Egyptian Journal of Health Care*, *12*(4), 1397–1412. https://doi.org/10.21608/ejhc.2021.209025

Jamil, M., Waqar, A., & Arshad, A. (n.d.). Fostering employee creativity through transformational leadership, employee agility, and psychological safety: An empirical study. [Manuscript in preparation or incomplete — add source info]

Jayampathi, E. K., De Alwis, A. C., & Razi, M. J. M. (2022). Role of organizational agility in knowledge management orientation and organizational performance: A systematic literature review. *Wayamba Journal of Management*, *13*(1), 1. https://doi.org/10.4038/wjm.v13i1.7550

Kee, D. M. H. (n.d.). Vijayakumar Ramasamy Velar.

Khattak, S. I., Ali, M. I., Khan, M. A., & Kakar, A. S. (2025). Does digital leadership capability, knowledge management capability, and organizational agility foster digital transformation in China? A time-lagged survey-based assessment in digital transformation projects. *Journal of Engineering and Technology Management*, *76*, 101873. https://doi.org/10.1016/j.jengtecman.2025.101873

Kim, E.-J., & Park, S. (2020). Transformational leadership, knowledge sharing, organizational climate and learning: An empirical study. *Leadership & Organization Development Journal*, *41*(6), 761–775. https://doi.org/10.1108/LODJ-12-2018-0455

Kucharska, W., Balcerowski, T., Kucharski, M., & Jussila, J. (2024). How does the relationship between the mistakes acceptance component of learning culture and tacit knowledge-sharing drive organizational agility? Risk as a moderator. *European Conference on Knowledge Management*, *25*(1), 397–404. https://doi.org/10.34190/eckm.25.1.2367

Marjerison, R. K., Andrews, M., & Kuan, G. (2022). Creating sustainable organizations through knowledge sharing and organizational agility: Empirical evidence from China. *Sustainability*, *14*(8), 4531. https://doi.org/10.3390/su14084531

Matsuo, M. (n.d.). Transformational leadership and team communities of practice: Overcoming knowledge sharing barriers.

Mayastinasari, V., & Suseno, B. (2023). The role of transformational leadership, and knowledge sharing on innovative work behavior of public organizations in the digital era. *International Journal of Professional Business Review*, *8*(7), e02977. https://doi.org/10.26668/businessreview/2023.v8i7.2977

Muzakki, M., Herachwati, N., Nadia, F. N. D., Perdani, D. P., & Pramesti, G. A. (n.d.). Unlocking innovation in Indonesia's electricity sector: The role of transformational leadership, knowledge sharing, and psychological empowerment. *Journal of Energy*.

Nguyen, M., & Sharma, P. (2024). Interactive impact of transformational leadership and organizational innovation on online knowledge sharing: A knowledge management perspective. *Journal of Knowledge Management*, *28*(4), 1164–1182. https://doi.org/10.1108/JKM-09-2022-0758

Odai, L. A., Xiao, Y., Korankye, B., & Ahakwa, I. (n.d.). Navigating digital transformation: The critical role of knowledge sharing and digital transformational leadership in boosting innovation capability in Sub-Saharan Africa.

Özkan Alakaş, E. (2024). Digital transformational leadership and organizational agility in digital transformation: Structural equation modelling of the moderating effects of digital culture and digital strategy. *The Journal of High Technology Management Research*, *35*(2), 100517. https://doi.org/10.1016/j.hitech.2024.100517

Purwanto, A., Purba, J. T., Bernarto, I., & Sijabat, R. (2021). Effect of management innovation, transformational leadership, and knowledge sharing on market performance of Indonesian consumer goods companies. *Jurnal Aplikasi Manajemen*, *19*(2), 424–434. https://doi.org/10.21776/ub.jam.2021.019.02.18

Ramadan, M., Bou Zakhem, N., Baydoun, H., Daouk, A., Youssef, S., El Fawal, A., Elia, J., & Ashaal, A. (2023). Toward digital transformation and business model innovation: The nexus between leadership, organizational agility, and knowledge transfer. *Administrative Sciences*, *13*(8), 185. https://doi.org/10.3390/admsci13080185

Rehman, S. U., Bresciani, S., Giordino, D., & Abdulmuhsin, A. A. (2025). Exploring the role of knowledge management and organizational agility in an emerging market. *Journal of Innovation & Knowledge*, *10*(5), 100761. https://doi.org/10.1016/j.jik.2025.100761

Saini, G., Gupta, S., & Baba, M. M. (n.d.). How leadership fosters sustainable organizational agility through metaverse adoption.

Salehzadeh, R., Pool, J. K., Mohseni, A.-M., & Tahani, G. (n.d.). Factors influencing organisational performance: The role of knowledge sharing and organisational agility.

Samani, S. P. N., Sadeghiyan, M., & Keshavarz, S. (2017). Organizational agility and knowledge sharing process in the staffs of the Iran's Central Plateau Contractor Company. *Journal name missing*, *6*(3). [Add journal name + pages]

Son, T. T., Phong, L. B., & Loan, B. T. T. (2020). Transformational leadership and knowledge sharing: Determinants of firm's operational and financial performance. *Sage Open*, *10*(2), 2158244020927426. https://doi.org/10.1177/2158244020927426

Wicaksana, S. A., & Isfania, R. (2022). Building organizational agility through knowledge sharing and organizational culture in non-departmental government agencies. *Jurnal Aplikasi Bisnis dan Manajemen*, *8*(3), 749–759. https://doi.org/10.17358/jabm.8.3.749

Wu, W.-L., & Lee, Y.-C. (2020). Do work engagement and transformational leadership facilitate knowledge sharing? A perspective of conservation of resources theory. *International Journal of Environmental Research and Public Health*, *17*(7), 2615. https://doi.org/10.3390/ijerph17072615

Zulfiqar, S., & Saeed, S. (2025). How corporate mindfulness leads to organizational agility? Exploring the roles of employee knowledge sharing and resilience. *Journal of Organizational Change Management*, *38*(3), 644–663. https://doi.org/10.1108/JOCM-04-2023-0104