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MODERATING ROLE OF ORGANIZATIONAL STRUCTURE ON THE RELATIONSHIP BETWEEN LEADERSHIP STYLES AND DIGITAL CULTURE ADOPTION

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ABSTRACT

This study explores the complex interplay dynamics between leadership styles, organizational structure, and digital culture adoption within Katsina State Ministries, Departments and Agencies (MDAs), with particular emphasis on how these elements influence digital transformation efforts. Data were collected from 630 employees across four randomly selected MDAs—Katsina State Library Board, State House of Assembly, Ministry of Agriculture and Livestock Development, and Katsina State Television Authority. Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed for data analysis. The findings reveal a significant positive relationship between transformational leadership style and digital culture adoption, as well as a significant but negative relationship between transactional leadership style and digital culture adoption. However, the analysis did not reveal any significant moderating effects of organizational structure on these relationships. While the study provides valuable insights, limitations such as the use of cross-sectional data and the limited generalizability of the findings should be noted. The results underscore the critical role of leadership—particularly transformational leadership—in driving digital culture adoption. Based on these findings, the study recommends that organizations invest in leadership development programs that promote transformational leadership behaviors and foster a culture of digital innovation. Additionally, future research should consider longitudinal or experimental designs, employ multi-source data collection methods, and explore other organizational contexts to enhance the robustness and applicability of the findings. Further investigations into the mechanisms and long-term impacts of leadership and structural

reforms are also encouraged to provide actionable guidance for organizations navigating digital transformation in today's evolving landscape.

Keywords: Leadership style, digital culture adoption, organizational structure.

INTRODUCTION

The rapid advancement of digital technologies has fundamentally transformed how organizations operate, communicate, and innovate. This digital revolution has led to the emergence of new organizational cultures defined by digital literacy, collaboration, and agility (Balog, 2020; Isensee et al., 2020; Kapotas, 2022; Steiber & Alvarez, 2023). However, as noted by Ly (2023), the successful adoption of digital culture within organizations is not solely dependent on the availability of technology. Rather, it results from a complex interplay of factors—including leadership styles and organizational structure.

Understanding how organizational structure influences the relationship between leadership styles and digital culture adoption is crucial for organizations seeking to thrive in the digital age. Organizational structure determines how activities are coordinated, controlled, and communicated, while leadership styles shape the attitudes, behaviors, and decision-making processes of leaders (Abernethy et al., 2010; Charteris-Black, 2006; Davidaviciene & Al Majzoub, 2022; Oubrich et al., 2021). Together, these factors can either facilitate or hinder the integration of digital practices and behaviors within an organization.

This research is significant in uncovering key insights into the mechanisms driving digital transformation. By examining how different leadership styles interact with various organizational structures to influence the adoption of digital culture, organizations can gain valuable guidance to inform their strategic initiatives. For example, organizations with hierarchical structures may face challenges in adopting digital culture due to rigid decision-making processes and bureaucratic obstacles (Barjaktarović, 2023; Cetina Presuel & Martinez Sierra, 2024; Imran et al., 2022; Serpa et al., 2022). In contrast, organizations with flat or matrix structures may be better positioned to embrace digital culture, as they offer greater flexibility, collaboration, and innovation (Barjaktarović, 2023; Firican, 2023; Volberda et al., 2021).

Furthermore, understanding the moderating role of organizational structure can help organizations tailor their leadership development programs and structural reforms to nurture a culture conducive to digital innovation and change. Aligning leadership styles with organizational structures that support digital transformation, can enhance an organization's competitiveness, adaptability, and long-term success (Imran et al., 2021). Without this alignment, organizations risk encountering barriers such as resistance to change, communication breakdowns, and inefficiencies, all of which hinder their ability to fully leverage digital technologies and seize emerging opportunities.

The central problem is twofold. First, a lack of comprehensive understanding regarding the interplay between organizational structure, leadership styles, and digital culture adoption limits organizations' ability to effectively leverage digital technologies to drive innovation and competitiveness. Second, the lack of clarity about the moderating role of organizational structure hampers the development of targeted strategies to facilitate digital culture adoption across diverse organizational contexts.

Therefore, there is an urgent need for empirical investigation into the moderating role of organizational structure on the relationship between leadership styles and digital culture adoption. Addressing this gap will provide organizations with valuable insights to inform strategic decision-making, leadership development, and organizational design—ultimately fostering sustainable digital transformation and long-term success. This study is thus guided by the following objectives:

i. To examine the relationship between leadership styles (transformational and transactional) and digital culture adoption within selected organizations.
ii. To investigate the influence of organizational structure on digital culture adoption.
iii. To assess the moderating role of organizational structure on the relationship between leadership styles and digital culture adoption.

LITERATURE REVIEW

Leadership styles, digital culture adoption, and organizational structure are three critical components shaping contemporary organizational dynamics. The literature emphasizes that aligning leadership styles with digital culture and organizational structure is essential to foster innovation, improve efficiency, and maintain competitiveness.

Leadership Styles

Leadership styles represent diverse approaches to guiding organizations. Although there is no universally accepted definition of leadership (Maqbool et al., 2023; Schermuly et al., 2022), it is generally understood as a complex, multifaceted process involving the guidance, influence, and motivation of individuals or groups toward achieving common goals (Benmira & Agboola, 2021; Perera et al., 2021). The effectiveness of leadership is context-dependent and influenced by situational factors, people involved, and organizational objectives (Goleman, 2017; Northouse, 2021; Rodić & Marić, 2021). Huang et al. (2021) highlight the significance of different leadership styles—transformational, transactional, participative, and ethical—in influencing organizational performance. Studies have consistently shown that leadership styles play a crucial role in shaping employee performance and broader organizational outcomes (Jiatong et al., 2022; Onesti, 2023). This review adopts a dual leadership framework, focusing on Transformational and Transactional Leadership as key lenses for understanding leadership's role in organizational change and performance.

Digital Culture Adoption

The integration of digital culture into organizations is influenced by various factors, including leadership behavior, organizational structure, and employee attitudes. Digital culture adoption involves integrating digital technologies, practices and mindsets into core organizational processes, enabling new ways of working, engaging with customers, and achieving strategic objectives (Bozkus, 2023). This shift entails embracing innovation, agility and data-driven decision-making (Bozkus, 2023; Omol, 2023; Simon et al., 2023). Recent research underscores that digital transformation goes beyond the deployment of technology—it requires procedural and cultural shifts to fully leverage the benefits of new technologies. Effective adoption requires a culture that encourages innovation, responsiveness and flexibility, enabling organizations to stay competitive in an evolving digital landscape (Bozkus, 2023; Omol, 2023).

Weill and Woerner (2018) identify four pillars of digital culture: customer centricity, agility, openness, and collaboration. Leaders play a vital role in fostering these values by promoting digital behaviors, cross-functional collaboration (across units and departments), and a climate of experimentation. In this study, digital culture adoption is conceptualized through six interrelated aspects: digital transformation, organizational agility, digital literacy, innovation culture, data-driven decision-making, and a collaborative work environment.

Organizational Structure

Organizational structure defines how tasks are divided, grouped, and coordinated (Castañer & Oliveira, 2020), with various structural types supporting different strategic and operational goals. Functional structures group employees by expertise, emphasizing specialization but may hinder interdepartmental communication (Santalova et al., 2021), while divisional structures enable responsiveness to products or regions, though they may complicate coordination (Gutterman, 2023). Matrix structures blend both models (functional and divisional elements), promoting flexibility but introducing complexity (Jerab & Mabrouk, 2023a; Kiruba Nagini et al., 2020). Other alternatives such as flat, hierarchical, networked, and team-based structures present varying trade-offs in control, decision-making, and collaboration.

Organizational structures significantly affect the adoption of digital culture. Functional structures can support digital innovation through specialization (Mirković et al., 2019), while hierarchical models can provide clarity in digital strategy implementation (Joseph & Gaba, 2020; Sapiro, 2024). Divisional and flat structures, meanwhile, promote agility, autonomy and collaborative decision-making (Jerab & Mabrouk, 2023b; Pacheco-Cubillos et al., 2024). However, each type also presents challenges that may hinder digital integration. For instance, functional structures can create silos and limit cross-functional collaboration (Eory, 2021; Raivio, 2022), hierarchical structures can stifle creativity and slow decision-making (Jiang et al., 2022), divisional structures can lead to fragmentation and inefficiencies (Hrelja et al., 2020), and flat structures can lack managerial oversight and coordination, resulting in decentralized efforts and duplication of work (Lee & Green, 2022).

This study seeks to explore the relationship between leadership styles, organizational structure, and the adoption of digital culture within MDAs (Ministries, Departments, and Agencies) in Katsina State. The relationship between leadership styles and digital culture adoption is not linear but rather dynamic and reciprocal. For instance, Valero-Pastor et al. (2021) examined digital-only news outlets and investigated the influence of transformational leadership on innovation. By focusing on organizations such as Quartz and El Confidential, the study found that these digital news outlets use transformational leadership to drive innovation, even though elements of traditional leadership approaches occasionally persist. This research highlights a crucial gap by illuminating how leadership influences innovative performance in the digital journalism landscape.

Alabdali et al. (2024) investigate the relationship between green digital transformational leadership, green digital mindset, and green digital transformation while also considering the moderating role of organizational green digital culture. Using structural equation modeling on data collected from 240 LinkedIn respondents, the study confirms positive relationships among these variables, underscoring the crucial role of green digital transformational leadership in fostering ecological awareness among followers. Moreover, the study highlights the significant moderating effect of organizational green digital culture on the relationship between leadership and mindset, highlighting the importance of a supportive organizational culture in facilitating green digital transformation. Similarly, Philip (2021), explores digital transformation through the lens of transformational leadership by classifying digital

transformation as either planned or forced, and analyzing the behavioral changes associated with each. The study employs dimensions of transformational leadership behaviors to highlight these changes, with particular attention to the moderating effect of gender norms in forced digital transformation scenarios. By integrating leadership theory into the discussion on digital transformation, the research offers insights into the behavioral aspects that effectively contribute to successful implementation of new digital technologies, and identifies potential directions for future empirical studies to further elucidate these relationships.

Malek and Almarri (2023), propose a conceptual framework that explores the role of transformational and adaptive leadership styles in facilitating the adoption of new technologies and innovations within organizations. Drawing on the Unified Theory of Acceptance and Use of Technology (UTAUT) as a theoretical basis, the study synthesizes existing literature to provide a comprehensive perspective on how leadership influences technology adoption. Although it does not present empirical findings, the study highlights the importance of effective leadership in promoting organizational learning, innovation and receptiveness to technological change. Similarly, Hooi and Chan (2023) examine the mediating role of innovative culture (IC) in the relationship between transformational leadership (TL) and organizational digitalization, with a focus on the moderating effect of rewards and recognition. Based on data from 256 management-level executives in Malaysia, the study finds that transformational leadership enhances digitalization efforts by fostering an innovative culture. Moreover, it finds that rewards and recognition moderate this relationship, suggesting the importance of organizational support in shaping employee attitude toward digital transformation initiatives.

Siswadhi and Rony (2024) conduct a systematic literature review on the role of transactional leadership in organizational adaptation to digitalization. By analyzing ten articles from Scopus- indexed journals, the study identifies a significant contribution of transactional leadership—particularly through mechanisms such as supervision and rewards—to organizational adaptation efforts. Through its synthesis of existing research, the review offers valuable insights into how transactional leadership supports organizational responses to digital transformation, laying the groundwork for future empirical studies. In a related development, Indrayanto et al. (2024), investigate the impact of digital transformation on villages in Indonesia, focusing on the role of transformational leadership in managing this transition. Utilizing qualitative interpretive research methods, the study finds that transformational leadership effectively facilitates digital transitions in villages, enabling residents to embrace new technologies while preserving traditional cultural values. Nonetheless, the study also identifies challenges such as individualism and negative consequences of technology use, highlighting the need for proactive leadership to mitigate these issues.

Nguyen et al. (2024) investigates the impact of various leadership styles on employee creativity through the lens of online knowledge sharing, with particular attention to the moderating role of organizational innovation. Based on data from 361 employees in Vietnam, the study reveals that transformational, transactional, and creative leadership styles significantly influence online knowledge sharing, which in turn mediates their impact on employee creativity (Nguyen et al., 2024). Additionally, the findings indicate that organizational innovation moderates the relationship between leadership and online knowledge sharing, highlighting the intricate relationship between leadership approaches, innovation capacity, and employee creativity in the context of digital transformation.

The synthesis of existing literature—drawing from studies such as Valero-Pastor et al. (2021) and Philip (2021)—elucidates the relationship between leadership styles and organizational dynamics within digital transformation contexts. Alabdali et al. (2024) further contribute by exploring Green Digital

Transformational Leadership, emphasizing its role in promoting ecological awareness and advancing digital transformation. Malek and Almarri (2023) propose a conceptual framework outlining leadership's influence on technology adoption, while Hooi and Chan (2023) delve into how transformational leadership fosters workplace digitalization through innovative culture. Similarly, Siswadhi and Rony (2024) explore the role of transactional leadership in enabling organizational adaptation to digitalization. Despite these valuable contributions, a notable gap persists: the moderating role of organizational structure in the relationship between leadership styles and digital culture adoption—particularly within the unique context of ministries and MDAs in Katsina State—remains underexplored. None of the reviewed studies specifically address this dimension, presenting an opportunity for further research to develop context-specific strategies that enhance digital transformation within governmental organizations.

The interplay between leadership styles, digital culture adoption, and organizational structure is complex and reciprocal, with effective leadership styles (notably transformational and transactional leadership) fostering digital culture adoption through innovation, agility, and collaboration. On the other hand, adopting a digital culture needs organizational structures that are flexible, decentralized, and cross-functional. Flat, matrix, and team-based structures work best, while hierarchical and functional structures might make it harder to accept. By understanding the benefits and challenges of their organizational structure, leaders can mitigate barriers and create an environment conducive to digital culture adoption, driving organizational performance and competitiveness. This study explores these intricate relationships, recognizing their interdependence in driving success, leading to the formulation of the following hypotheses:

H1: There is a significant positive relationship between transformational leadership style and digital culture adoption.

H2: There is a significant positive relationship between transactional leadership style and digital culture adoption.

H3: Organizational structure moderates the relationship between transformational leadership style and digital culture adoption.

H4: Organizational structure moderates the relationship between transactional leadership style and digital culture adoption.

Theoretical Framework

This study is grounded in Contingency Theory (Fiedler, 1964), which asserts that leadership effectiveness depends on situational variables—particularly organizational structure. Supporting literature (Northouse, 2021; Yukl, 2006) affirms that structure plays a crucial role in determining leadership outcomes. In addition, the study draws on the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, 2003) which explains how user intentions and behavior toward technology are influenced by factors such as performance expectancy, effort expectancy, social influence and facilitating conditions. adopt and use technology within organizations. Recent research emphasizes the significant role of leadership in facilitating innovation adoption across various organizational contexts (Dearing & Cox, 2018; Greenhalgh & Papoutsi, 2018). By integrating these theories, the study aims to investigate how leadership styles and organizational structure interact to influence digital culture adoption.

Conceptual Framework

Building on prior empirical findings and the identified theoretical gaps, this study proposes a conceptual framework in which leadership styles influence digital culture adoption, with organizational structure serving as a moderating variable. The model comprises four key components, as illustrated in Figure 1: (1) transactional leadership style, (2) transformational leadership style, (3) organizational structure (flat), and (4) digital culture adoption.

Figure 1

Conceptual Framework
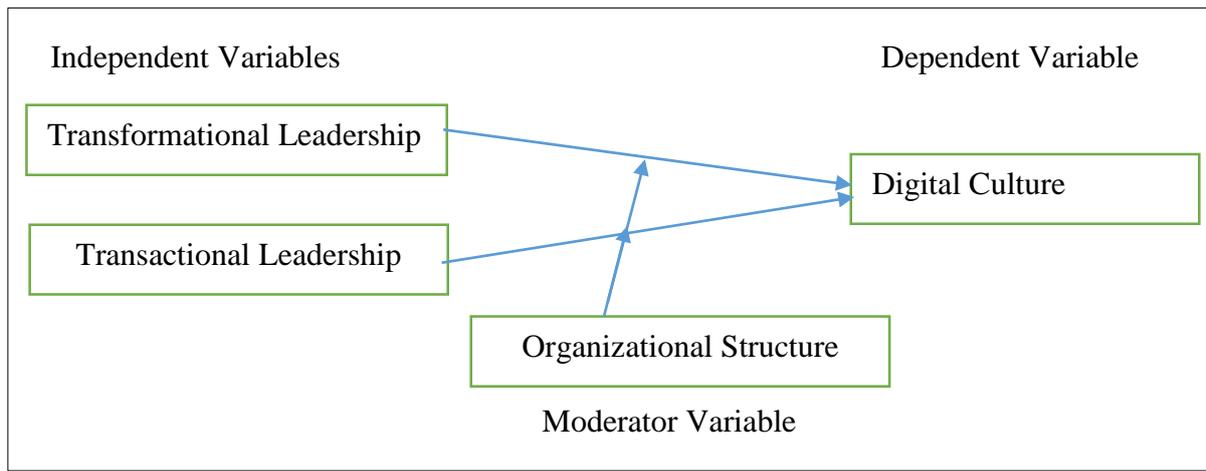
RESEARCH METHODOLOGY

This study employs a quantitative research design, utilizing a survey-based approach, to investigate the impact of organizational structure on leadership styles and digital culture adoption within Ministries, Departments, and Agencies (MDAs) in Katsina State. The target population comprises employees from four randomly selected MDAs: Katsina State Library Board, Katsina State House of Assembly, Ministry of Agriculture and Livestock Development, and Katsina State Television Authority. A stratified sampling technique was employed to ensure proportional representation across diverse personnel categories, roles, and functional areas within the MDAs. This technique also guided the selection of MDAs as the study's unit of analysis, based on their significant workforce size, critical role in policy implementation and public service delivery, and diversity of functions.

A total of 266 participants were selected, guided by Krejcie and Morgan's (1970) sample size determination table, with an additional 10% added to enhance reliability and representativeness (Althubaiti, 2023; Krejcie & Morgan, 1970). Data analysis utilized Smart PLS to assess both the direct and moderating effects of organizational structure on the relationship between leadership styles and digital culture adoption. The measured variables include transactional leadership, transformational leadership, and digital culture adoption. Responses were captured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), indicating the extent of respondents' agreement with each item. This quantitative approach aims to provide empirical insights into how organizational structure influences leadership effectiveness, and the adoption of digital culture within Katsina State MDAs.

Data Analysis

The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) to test the study's hypotheses. PLS-SEM is a components-based structural equation modeling technique that shares similarities with ordinary least squares regression, but offers several distinct advantages, particularly for exploratory research and complex models (Hair et al., 2017). PLS-SEM consists of two primary components: the measurement model, which assesses the relationships between latent variables and their observed indicators, and the structural model, which evaluates the relationships among the latent variables themselves (Hair et al., 2017). PLS-SEM was chosen for several reasons. First, it effectively handles complex models without imposing strict sample size requirements. Second, it employs a non-parametric approach to predictor specification. Third, it accommodates both reflective and formative measurement models, enhancing flexibility in model construction (Hair et al., 2017). Additionally, this method is well-suited for social science research, where data often deviate from normality assumptions. Its robustness in dealing with non-normally distributed data (Cain et al., 2017; Hair et al., 2017; Knief & Forstmeier, 2021) makes it an appropriate analytical tool for the current study.

Measurement Model Assessment

PLS-SEM follows a two-stage procedure for evaluating the measurement model, focusing on the reliability and validity of the constructs (Hair et al., 2021; Sarstedt et al., 2014). The first stage entails evaluating the reliability of indicators, which ensures internal consistency within each construct. The second stage examines construct validity. This rigorous approach is crucial for establishing the robustness of the measurement model and ensuring that the constructs are measured accurately and consistently. A well-validated measurement model is essential for drawing meaningful interpretation of the structural relationships in PLS-SEM analysis.

Validity and Reliability

Table 1

Loading Internal Consistency and AVE

Item	Loading	Cronbach's Alpha	Composite Reliability (rho_a)	Average Variance Extracted (AVE)
DCA2	0.938	0.928	0.932	0.784
DCA3	0.905			
DCA4	0.663			
DCA5	0.947			
DCA6	0.943			
OS1	0.810	0.858	0.884	0.626
OS3	0.818			
OS4	0.780			
OS5	0.737			
OS6	0.810			

Item	Loading	Cronbach's Alpha	Composite Reliability (rho_a)	Average Variance Extracted (AVE)
TFL1	0.947	0.926	0.952	0.820
TFL2	0.962			
TFL4	0.795			
TFL5	0.910			
TSL1	0.858	0.897	0.930	0.697
TSL2	0.834			
TSL3	0.770			
TSL4	0.872			
TSL6	0.838			

Notes. Loading from Smart PLs Version 4 showing Cronbach's Alpha Composite Reliability and AVE.

The study's constructs demonstrate strong reliability and validity, ensuring accurate and consistent measurement outcomes. Digital Culture Adoption (DCA) shows high factor loadings, a Cronbach's alpha of 0.928, composite reliability of 0.932, and an average variance extracted (AVE) of 0.784, indicating robust internal consistency and convergent validity. Organizational Structure (OS) also meets acceptable reliability and validity thresholds, with a Cronbach's alpha of 0.858, composite reliability of 0.884, and an AVE of 0.626 (Henseler et al., 2015) Transformational Leadership Style (TFL) demonstrates high reliability and construct validity, supported by a Cronbach's alpha of 0.926, composite reliability of 0.952, and an AVE of 0.820, confirming the construct's robustness (Sarstedt et al., 2021). Similarly, Transactional Leadership Style (TSL) shows robust measurement properties, with a Cronbach's alpha of 0.897, composite reliability of 0.930, and an AVE of 0.697, further validating its reliability and convergent validity (Hair et al., 2019). Collectively, these metrics confirm that the measurement model is both reliable and valid for assessing the constructs under investigation.

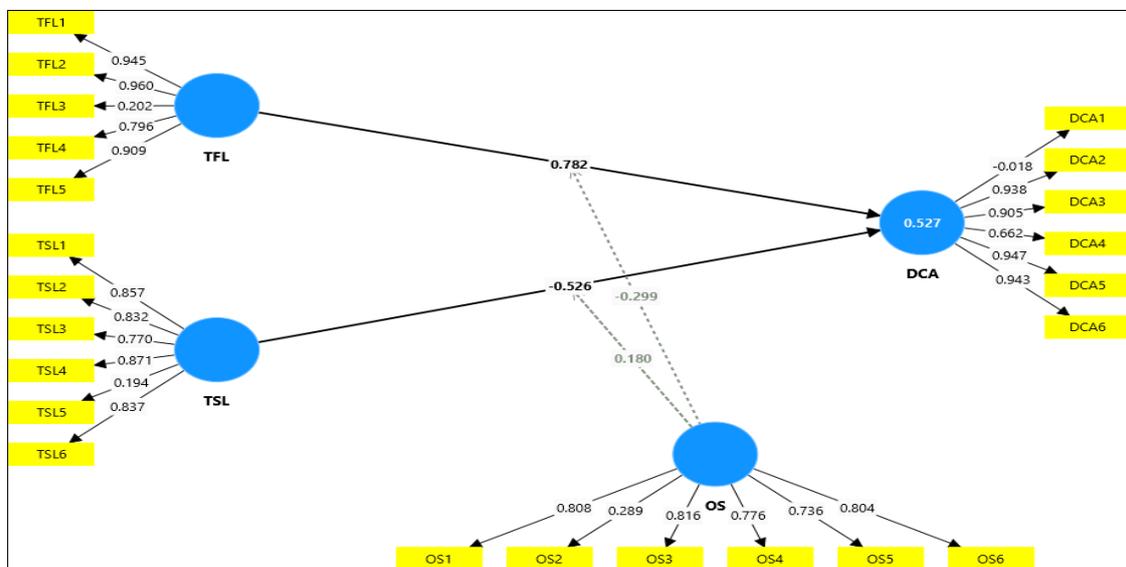**Figure 2**

Initial Measurement Model
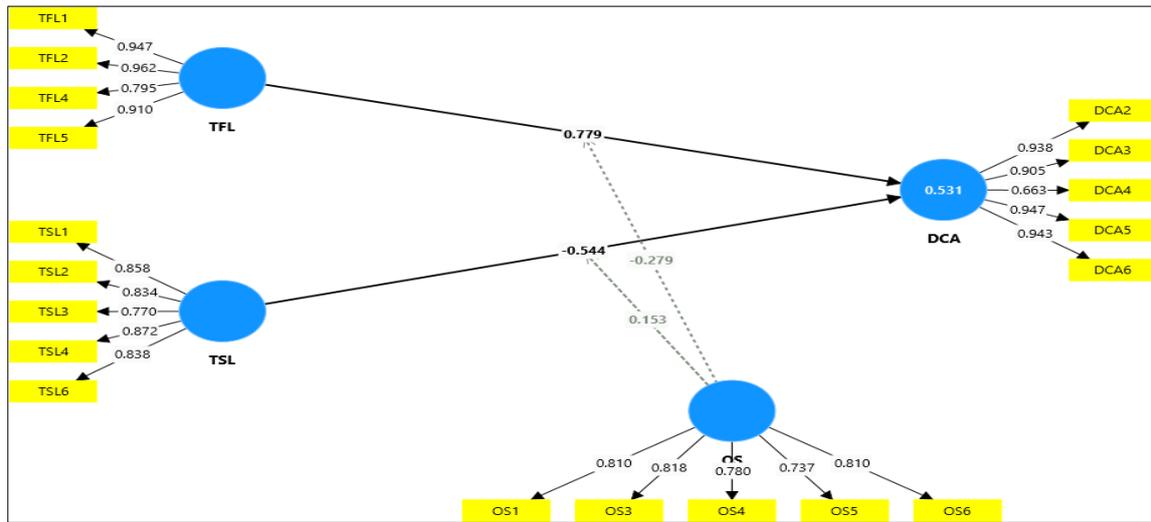
Figure 3

Revised Measurement Model

Figure 2 and Figure 3 show the measurement model before and after deletion, respectively.

Discriminant Validity

Table 2

Heterotrait-monotrait Ratio (HTMT) – Matrix

	DCA	OS	TFL	TSL
DCA				
OS	0.538			
TFL	0.658	0.986		
TSL	0.538	1.101	1.003	
OS x TSL	0.596	0.547	0.574	0.551
OS x TFL	0.627	0.539	0.593	0.546

Notes. The HTMT Matrix results from Smart PLs version 4.

Table 3

Heterotrait-monotrait Ratio (HTMT)

	DCA
OS <-> DCA	0.538
TFL <-> DCA	0.658
TFL <-> OS	0.986
TSL <-> DCA	0.538

Notes. The HTMT Ratio.

Table 4

Fornell-Larcker Criterion

	DCA	OS	TFL	TSL
DCA	0.886			
OS	0.544	0.791		
TFL	0.649	0.893	0.906	
TSL	0.551	0.958	0.931	0.835

Notes. The Fornell-Larcker criterion showing discriminant validity.

Discriminant validity is established among the study's constructs based on the results of the Heterotrait-Monotrait (HTMT) ratio and Fornell-Larcker criterion. All HTMT values fall below the threshold of 0.90, confirming that each construct is empirically distinct from the others (Henseler et al., 2015). Additionally, the Fornell-Larcker (1981) criterion is met, as the square root of the AVE for each construct exceeds its correlations with other constructs. Specifically, the AVE square roots for DCA (0.886), OS (0.544), TFL (0.649), and TSL (0.551) are all greater than their corresponding correlations supporting discriminant validity. These findings confirm that the constructs are both theoretically and empirically distinct, thereby supporting the validity of subsequent analyses and interpretations (Sarstedt et al., 2021).

Structural Model

As previously noted, the PLS algorithm was utilized to obtain the R^2 values, while a bootstrapping procedure was employed to determine the statistical significance of the path coefficients between exogenous and endogenous constructs. Additionally, the effect sizes (f^2) of the endogenous constructs were evaluated to determine the practical significance of these relationships. The PLS algorithm was chosen for its effectiveness in analyzing complex models with multiple constructs and indicators, providing robust estimates of path coefficients and R^2 values (Hair et al., 2017; Hair et al., 2021). The bootstrapping technique was used to assess the significance of relationships without requiring strict assumptions about data distribution, providing reliable confidence intervals for path coefficients (Henseler, 2017; Sarstedt et al., 2021). Furthermore, investigating effect sizes (f^2) is crucial as it enhances the interpretation of results by revealing the magnitude of influence that independent constructs exert on dependent variables, thereby complementing the statistical significance derived from bootstrapping (Chin, 1998).

Table 5

Collinearity Assessment (VIF)

	OS	DCA	TFL	TSL
Digital Culture Adoption				
Organisational Structure		1.205		
Transformational Leadership Style		1.418		
Transactional Leadership Style		1.307		

Notes. The Collinearity diagnostic test showing the variance inflationary factor using bootstrapping.

The collinearity assessment results, presented in Table 5, indicate that multicollinearity among the exogenous constructs—OS, TFL, TSL—with respect to the endogenous construct, DCA, is not a significant concern. All variance inflation factor (VIF) values are below the threshold of 5, signifying acceptable levels of multicollinearity (Hair et al., 2021). This suggests that each exogenous construct contributes uniquely to explaining the variance in DCA, indicating distinct and independent influences on digital culture adoption within the organizational context.

Table 6

Coefficient of Determination R2

Endogenous Latent Variables	R – Squared Value
Digital Culture Adoption	0.533

Notes. The constructs' coefficient of determination.

Similarly, the coefficient of determination (R²) value for the endogenous construct, DCA, as shown in Table 6, is 0.533. This indicates that approximately 53.3% of the variance in digital culture adoption is explained by the exogenous constructs included in the model (Hair et al., 2021). This represents a moderate level of explanatory power, highlighting the significant role of organizational structure and leadership styles in influencing digital culture adoption within the organization. At the same time, it acknowledges the influence of other factors not included in the current model.

Table 7

Path Coefficients

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
OS -> DCA	0.190	0.194	0.190	1.001	0.317
TFL -> DCA	0.786	0.767	0.157	5.003	0.000
TSL -> DCA	-0.550	-0.533	0.247	2.227	0.026
OS x TSL -> DCA	0.149	0.174	0.181	0.823	0.411
OS x TFL -> DCA	-0.274	-0.307	0.181	1.516	0.130

Notes. The model's coefficients, standard deviation, p – values and T – statistics.

Table 8

Confidence Intervals

	Original sample (O)	Sample mean (M)	2.5%	97.5%
OS -> DCA	0.190	0.194	-0.155	0.601
TFL -> DCA	0.786	0.767	0.437	1.065
TSL -> DCA	-0.550	-0.533	-0.998	-0.022
OS x TSL -> DCA	0.149	0.174	-0.128	0.586
OS x TFL -> DCA	-0.274	-0.307	-0.726	-0.011

Notes. The confidence intervals.

The path coefficients presented in Table 7 illustrate the strength and direction of the relationships between the exogenous constructs (OS, TFL & TSL) and the endogenous construct, DCA. Notably, TFL shows a strong positive relationship with DCA (0.786), supported by a high T-statistic (5.003) and a statistically significant p-value (0.000), indicating a robust influence of transformational leadership on digital culture adoption. Conversely, TSL reveals a significant negative relationship with DCA (-0.550), with a moderate T-statistic (2.227) and a significant p-value (0.026), suggesting that higher levels of transactional leadership style are associated with lower levels of digital culture adoption within the organization.

The confidence intervals presented in Table 8 offer further insights into the precision and reliability of the estimated path coefficients. Specifically, the confidence interval for the relationship between TFL and DCA does not include zero, indicating a statistically significant positive relationship at the 5% significance level. Similarly, the confidence interval for relationship between TSL and DCA also excludes zero, confirming a statistically significant negative relationship. These findings are consistent with the corresponding path coefficients and underscore the robustness of the estimated relationships between the exogenous constructs and DCA (Hair et al., 2021; Hussain, 2023).

The results from Table 7 provide insights into the relationships between leadership styles—transformational and transactional—and digital culture adoption (DCA), as well as the potential moderating effect of organizational structure (OS) on these relationships, in alignment with the stated hypotheses.

Regarding the relationship between TFL and DCA (TFL -> DCA), the path coefficient is 0.786, supported by a high T statistic (5.003) and a low p-value (0.000), indicating a strong and statistically significant positive association. This finding supports Hypothesis 1 (H1), confirming that transformational leadership positively influences digital culture adoption. Conversely, the relationship between transactional leadership (TSL) and DCA is characterized by a negative path coefficient of -0.550, accompanied by a moderate T statistic (2.227) and a statistically significant p-value (0.026). Although the association is negative, its significance suggests that transactional leadership style also has a meaningful—albeit inverse—impact on digital culture adoption.

Conversely, the interaction term OS x TFL -> DCA yields a path coefficient of -0.274, which is not statistically significant (p-value = 0.130). This indicates a lack of evidence to support the hypothesis that organizational structure moderates the relationship between transformational leadership style and digital culture adoption. Similarly, the moderating effect of organizational structure on the relationship between transactional leadership style and DCA (OS x TSL -> DCA) is also non-significant, with a path coefficient of 0.149 and a p-value of 0.411. These findings suggest that organizational structure does not exert a significant moderating influence on the relationship between either leadership style and digital culture adoption.

In summary, the results support Hypothesis 1 (H1), confirming a significant positive relationship between transformational leadership style and DCA. They also reveal a negative relationship between TSL and DCA. However, there is no empirical evidence to support the hypotheses regarding the moderating effects of organizational structure on these relationships.

Figure 4

Path Model
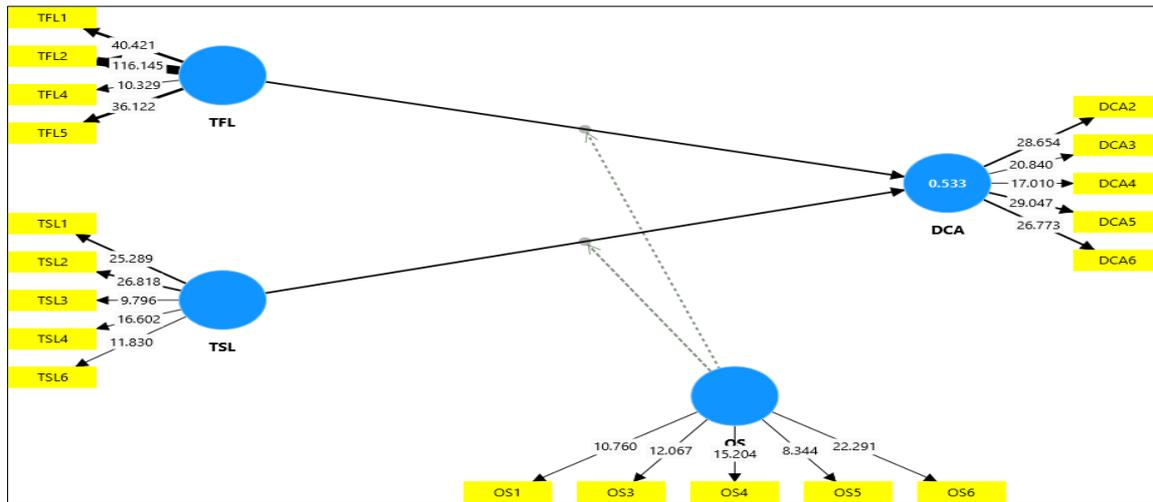
CONCLUSION AND RECOMMENDATIONS

This study's findings on leadership styles and digital culture adoption in Katsina State Ministries and MDAs provide valuable insights into the role of organizational leadership in driving digital transformation. The results establish a significant positive relationship between transformational leadership style (TFL) and digital culture adoption (DCA), suggesting that leaders who inspire, articulate a clear vision, and empower their teams are more effective in fostering a culture that embraces digital technologies and innovation. Conversely, while transactional leadership style (TS) is significantly associated with DCA, the negative direction of the relationship implies that leadership behaviors focused on task completion and control may hinder digital transformation initiatives.

The study also reveals that organizational structure does not significantly moderate the relationships between either leadership styles and digital culture adoption. This suggests that within the context of Katsina State Ministries and MDAs, organizational structure may not play a pivotal role in influencing how leadership behaviors affect digital transformation. Therefore based on these findings, several recommendations are proposed for policymakers and leaders within these institutions: i) Invest in leadership development: Implement programs that promote transformational leadership competencies such as visionary thinking, employee empowerment, and innovative problem-solving; ii) Promote a culture of digital innovation: foster an organizational environment that supports experimentation, innovation and the proactive use of digital tools and resources iii) Enhance digital competency: provide continuous training and capacity-building initiative to improve digital literacy and skills among employees at all levels; iv) Encourage organizational flexibility: consider revising existing structures to enhance adaptability and responsiveness to support emerging digital trends and technological changes.

These strategic actions can collectively enhance the effectiveness of digital culture adoption and position Katsina State Ministries and MDAs to navigate the complexities of digital transformation more successfully.

LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

While this study provides valuable insights into the relationships between leadership styles, organizational structure, and digital culture adoption within Katsina State Ministries and MDAs, several limitations should be acknowledged. First, the study utilized a cross-sectional design, which limits the ability to draw causal inferences between variables. Future research could employ longitudinal or experimental designs to better capture the temporal relationships and causal pathways among leadership styles, organizational structure, and digital culture adoption over time. Second, the reliance on self-reported data from employees may introduce common method bias and social desirability effects, potentially influencing the accuracy of responses. To mitigate this, future research could employ multi-source data collection methods—such as combining surveys with interviews or objective performance metrics—to enhance the validity and reliability of findings. Third, the study focused solely on Katsina State Ministries and MDAs, limiting the generalizability of its findings to other organizational contexts. Future research could extend this investigation to diverse sectors and geographic regions to assess the broader applicability and robustness of the observed relationships.

Despite these limitations, this study contributes meaningfully to the growing body of literature on digital transformation by exploring the interplay between leadership styles, organizational structure, and digital culture adoption. Future research could delve further into the underlying mechanisms of these relationships by examining mediating variables such as organizational climate, employee digital readiness, and technological infrastructure. Additionally, longitudinal studies could assess the long-term impact of leadership development and structural reforms on digital transformation outcomes. Comparative studies across diverse industries or organizational sizes would also enrich understanding of which leadership styles and organizational structures most effectively support digital culture adoption. By addressing these limitations and exploring these suggested avenues of inquiry, future research can offer more valuable insights for shaping organizational strategies and policies aimed at enhancing digital innovation and resilience in the increasingly digitalized world.

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