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Article

Factors of digital transformation of Tunisian companies

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Abstract: This study aims to elucidate the digital transformation process in Tunisian companies, identify its driving factors, and explain its key success factors. We examine a sample of 70 companies across various economic sectors using a Multinomial Logistic regression to assess the impact of digital strategy, corporate culture, and leadership on digital transformation success. The dependent variable "digital maturity" is categorized into low, medium, and high, with medium serving as the reference category. The results indicate a significant and positive effect of digital strategy on digital transformation success. Leadership influences companies at a low level of digital maturity but does not significantly impact those at a high maturity level. Corporate culture does not significantly affect digital transformation. Digital strategy is crucial for the success of digital transformation in Tunisian companies, while leadership plays a role primarily at lower maturity levels. Corporate culture, however, does not significantly contribute to digital maturity. The study provides insights for Tunisian companies and policymakers to focus on developing robust digital strategies and leadership qualities to enhance digital transformation efforts. This research expands the theoretical base on digital transformation in the Tunisian context, identifying critical success factors and barriers, and confirming the significant role of digital strategy in successful digital transformations.

Keywords: digital transformation; digital strategy; corporate culture; leadership; performance

1. Introduction

Digital transformation has emerged as a vital strategy for organizations striving to maintain competitiveness and drive sustainable growth in an increasingly technology-driven global economy. This transformation, which integrates digital technologies into all business operations, fundamentally alters how organizations function and deliver customer value (Misra and Panigrahi, 2014; Rozanova and Yushin, 2015). Digital transformation is not merely a technological upgrade; it represents a shift in business models, operational processes, and organizational culture, with profound implications for innovation, productivity, and financial performance (Caluri et al., 2019; Feher et al., 2017). For example, Yaser Almansour et al. (2023) note that digital transformation enhances innovation capabilities by facilitating more efficient workflows and decision-making processes, while Almansour and Elkrghli (2023) underscores its role in driving long-term financial sustainability for companies.

Despite the substantial benefits, the digital transformation process is complex and varies significantly across industries and regions. Barbieri et al. (2024) argue that sectoral characteristics, such as firm size and market structure, deeply influence the degree of digital adoption. Similarly, Gerasimenko et al. (2023) highlight the

geographic and industry-specific factors that affect the pace of digital transformation. These dynamics suggest that the challenges and success factors associated with digital transformation are not uniform but context-dependent, a point reiterated by Guhan and Nigama (2022) in their study of emerging markets. Additionally, Yaser Almansour et al. (2023) emphasize that although digital transformation has been a focal point of research, the specific contexts and conditions under which firms successfully implement these changes remain underexplored.

The literature reveals that digital transformation is deeply intertwined with internal organizational capabilities. For instance, Yang et al. (2024) emphasize that internal talent and a robust digital infrastructure are critical for firms to harness the benefits of digital transformation, particularly in fostering innovation. Pan et al. (2024) provide evidence that digital technologies improve total factor productivity (TFP) through enhanced task-based processes, demonstrating the efficiency gains of technological advancement. Valdez-Juárez et al. (2024), focusing on SMEs, explore the dual role of digital transformation in promoting both financial performance and innovation, emphasizing sustainability as a critical enabler for long-term success.

Moreover, digital transformation presents unique sector-specific challenges and opportunities. In the tourism and luxury industries, for example, digital adoption has led to significant operational shifts, as explored by several researchers (Alexandrova, 2024; Al-Taie and AL-Khafaji, 2024; Benavides-Espinosa et al., 2024). These studies highlight different industries' distinct digital challenges, such as consumer expectations for personalization in tourism and the integration of digital technology in the luxury market's traditionally high-touch customer service models. From a macroeconomic perspective, the systemic role of digital transformation in firm performance and sustainability is highlighted by Plečko and Bradač Hojnik (2024), who discuss the strategic use of digital technologies to foster organizational agility and adaptive business practices. Similarly, Yu et al. (2024) and Chen et al. (2024) explore how digital transformation improves internal management and innovation investment across sectors.

Despite extensive research, a gap remains in understanding digital transformation in specific regions, such as Tunisia. This study addresses that gap by focusing on the Tunisian context, where companies are at various stages of digital adoption. Tunisia, an emerging economy, is experiencing rapid digitalization yet faces challenges such as infrastructural limitations and regulatory hurdles (Barbieri et al., 2024; Guhan and Nigama, 2022). The Tunisian economy, primarily driven by SMEs, requires a tailored approach to digital transformation, as smaller firms often face resource constraints and distinct market pressures. These conditions necessitate a deeper examination of how Tunisian companies navigate digital transformation and what strategies enable successful outcomes in such a dynamic environment (Gerasimenko et al., 2023).

This study aims to contribute to the literature by examining the drivers, challenges, and success factors of digital transformation within Tunisian companies. By analyzing these dynamics, this research provides critical insights for policymakers and business leaders seeking to enhance economic growth and maintain competitiveness through digital strategies.

2. Review of the literature

Digital transformation (DT) refers to the integration of digital technologies into all areas of business, fundamentally changing how organizations operate and deliver value to customers. The scope of digital transformation extends beyond technological advancements, encompassing organizational culture, leadership, strategy, and talent management (Verhoef et al., 2021). It affects not only operational efficiencies but also innovation capabilities and market competitiveness, making it a multifaceted concept that must be examined from several angles (Vial, 2019). Given its broad implications, we have selected studies that highlight the intersection of digital transformation with innovation, productivity, and firm performance, which are critical factors for long-term competitiveness in various industries.

Yang et al. (2024) examined the influence of digital transformation on firm innovation, emphasizing the role of internal talent and digital infrastructure in driving heterogeneous treatment effects. Their analysis of Chinese A-share listed companies between 2007 and 2020 found that digital transformation boosts innovation by enhancing human capital and information processing capabilities, offering valuable policy implications for emerging markets. Similarly, Pan et al. (2024) integrated digital technology into a task-based model, demonstrating that advancements in digital technologies significantly improved total factor productivity (TFP) across Chinese-listed firms between 2008 and 2021. Their findings suggest that reducing entry prices and optimizing management capabilities are vital for enhancing TFP, particularly in regions with varying levels of technological adoption.

Several scholars have explored the role of digital transformation in specific organizational contexts. Valdez-Juárez et al. (2024) studied small and medium-sized enterprises (SMEs) in Mexico and revealed that while digital transformation fosters technological and non-technological innovation, its direct effect on financial performance is moderated by sustainability strategies. This underscores the importance of integrating sustainability with digital initiatives to drive more comprehensive performance outcomes. Al-Taie and Al-Khafaji (2024) explored how digital ecosystems in tourism SMEs enhance big data analytics capabilities, enabling firms to better identify opportunities within the sector.

In the context of sector-specific transformations, Benavides-Espinosa et al. (2024) focused on the Spanish agrifood sector, finding that digital transformation enhanced innovation and performance, further illustrating the importance of sectoral differences in DT adoption. Alexandrova (2024) examined the luxury industry, noting that digital technologies like NFTs and blockchain offer significant opportunities for creating sustainable competitive advantages, especially in high-value sectors. These studies highlight the variability in DT effects across industries, each with unique technological adoption patterns and strategic responses.

From a macroeconomic perspective, Yu et al. (2024) showed that digital transformation encourages firm innovation investment, albeit with resource allocation challenges between production and innovation functions. Chen et al. (2024) provided insights into how digital transformation facilitates internal control improvements, underscoring its role in enhancing management practices at different stages of transformation. Similarly, Plečko and Hojnik (2024) explored how digital

technologies impact sustainable business practices, reinforcing the systemic benefits of DT on sustainability goals.

The literature also addresses the evolving paradigms of industrial transformation, notably in the shift from Industry 4.0 to Industry 5.0. Abril-Jiménez et al. (2024) proposed a methodology for assessing the direct and indirect benefits of integrating human actors into digital processes, offering a comprehensive framework for evaluating the socio-technical impacts of industrial digitalization. Liu et al. (2024) extended the understanding of digital transformation in Chinese state-owned enterprises, identifying strategic positioning and institutional pressures as key factors influencing their digitalization trajectories. Finally, studies on organizational behavior and leadership, such as Mittal et al. (2024) and Abdurrahman et al. (2024), emphasized the importance of leadership, collaboration, and corporate culture in shaping successful digital transformations. These findings are particularly relevant for emerging economies like Tunisia, where digital transformation faces unique challenges related to institutional readiness and market conditions. By focusing on the Tunisian context, this study aims to bridge existing gaps in the literature, providing both theoretical insights and practical implications for businesses navigating digital transformation in emerging markets.

Hypothesis development and justification

Digital transformation represents a multi-faceted change process that fundamentally alters how organizations operate and deliver value (Vial, 2019). Among the critical elements influencing this transformation, corporate culture plays a pivotal role. Corporate culture, defined as the collective values, beliefs, and behaviors shared by members of an organization, has been consistently linked to the success of organizational change initiatives, including digital transformation (Gansterer and Hartl, 2020). Research suggests that organizations with cultures that promote openness to innovation, agility, and collaboration are more likely to embrace digital technologies effectively (Kane, 2019). Moreover, culture helps mitigate the resistance to change that often hampers digital initiatives, enabling smoother integration of new technologies and processes (Westerman and Bonnet, 2015). Therefore, corporate culture serves not only as a support system but as a catalyst for the success of digital transformation efforts. This leads to the formulation of the first hypothesis:

H1: There exists a significant relationship between corporate culture and the success of digital transformation.

Leadership involvement is another critical factor influencing the success of digital transformation. According to several studies, leadership plays a central role in providing strategic direction, fostering an innovation-driven culture, and securing the resources necessary for digital transformation (Bharadwaj and Tiwana, 2005). Leaders act as change agents, shaping the digital vision and guiding the organization through the complexities of transformation (Fitzgerald et al., 2013). Leadership is not only about setting strategic goals; it also involves active participation in digital projects, demonstrating commitment to the transformation at both the operational and symbolic levels (Beverungen et al., 2022). By fostering an environment of digital readiness and resilience, leaders help their organizations overcome internal inertia and navigate the

uncertainties associated with digital transformation (Merten et al., 2024). Consequently, we hypothesize:

H2: There is a significant relationship between the involvement of a company's leadership and the success of digital transformation.

In addition to culture and leadership, the development of a clear digital strategy is indispensable for successful transformation. A digital strategy serves as the blueprint for the adoption and integration of digital technologies across business functions (Correani et al., 2020). It ensures that the transformation efforts are not isolated or reactive but are aligned with the broader strategic objectives of the organization (Steiber and Alvarez, 2023). A well-articulated digital strategy provides clarity on the organization's digital goals, the resources required, and the mechanisms for managing risks and disruptions (Spanaki et al., 2023). Companies that embed digital strategy within their core business strategy tend to outperform those that treat digital initiatives as standalone projects (Bharadwaj et al., 2013). In this regard, digital strategy acts as a roadmap that guides organizations through the stages of digital transformation, from initial adoption to full-scale integration and optimization. Accordingly, the third hypothesis is proposed:

H3: There is a significant relationship between digital strategy and the success of a company's digital transformation.

Each of the proposed hypotheses is grounded in established theoretical and empirical work on digital transformation. The role of corporate culture, leadership, and digital strategy in shaping digital transformation outcomes has been consistently validated by previous research. Furthermore, the model aligns with frameworks such as those proposed by Kane et al. (2019) and Westerman and Bonnet (2015), which emphasize the interplay between organizational culture, leadership, and strategy in driving successful digital initiatives. While our model is conceptual, it builds on these existing frameworks to explore digital transformation within the specific context of Tunisian organizations. Given the growing body of literature on context-specific digital transformation efforts, this approach allows for a more nuanced understanding of the factors influencing digital success in emerging markets (Vial, 2019).

3. Materials and methods

Our study draws on data from a sample of 70 companies representing a broad array of economic sectors, aligned with similar research that has explored digital transformation across diverse industry contexts (Fitzgerald et al., 2014; Vial, 2019). We adopted an agnostic approach, treating digital transformation as a cross-sectoral phenomenon, consistent with studies that have emphasized the universal applicability of digital transformation strategies irrespective of sectoral specificities (Sebastian et al., 2017; Verhoef et al., 2021). The participating companies were sourced from over thirteen distinct sectors, reflecting the broad industrial landscape within which digital transformation occurs (Fitzgerald et al., 2013; Junk and Matt, 2015; Matt et al., 2015).

Data collection was centred on top management respondents, following established methodologies that recognize the importance of gathering insights from strategic decision-makers in technological adoption studies (Kane et al., 2015). The selection of top management was particularly relevant given the strategic implications

of digital transformation in the Tunisian context, where digitalization is largely driven by senior executives (Sebastian et al., 2017). Prior research has shown that input from top management is both pragmatic and effective for understanding digital transformation efforts, as these individuals typically spearhead such initiatives (Kane et al., 2015; Vial, 2019). Our respondents were carefully chosen based on their managerial roles and their level of engagement with digital matters, ensuring that our dataset is representative of informed, strategic perspectives, a crucial factor for obtaining reliable insights in this domain (Li et al., 2018; Matt et al., 2015).

In this study, Multinomial Logistic Regression (MLR) has been employed as the primary analytical framework, due to its robustness in handling multi-category dependent variables and its ability to model relationships between categorical and independent variables (Bayar et al., 2020). The objective of utilizing MLR is to differentiate varying levels of digital transformation success across organizations and to establish relationships with key variables such as digital strategy, corporate culture, and leadership (Al Halbusi et al., 2024; Soto-Acosta, 2024). Specifically, the dependent variable "Digital Maturity" is categorized into three levels: low, medium, and high digital maturity, reflecting the stages of digital progression in firms (Vial, 2019). The rationale for using MLR lies in its flexibility to address a dependent variable with more than two categories, allowing us to model how digital strategy and leadership influence different levels of digital maturity (Brynjolfsson et al., 2022). In this analysis, we have concentrated on the low and high categories, in alignment with prior research focusing on the extremes of digital maturity to maximize interpretive clarity (Fitzgerald et al., 2014). Multinomial logistic regression offers several advantages, such as accommodating non-linear relationships and generating odds ratios for categorical outcomes, which are highly relevant to the study of digital transformation (Birkinshaw et al., 2016; Majchrzak et al., 2016). However, it also requires careful interpretation of coefficients and the selection of an appropriate reference category (Sun et al., 2024).

In this study, "medium maturity" is selected as the reference category to provide a balanced comparison between digitally immature organizations and those that are digitally advanced, following established methodologies in digital transformation research (Kane et al., 2015). Furthermore, the absence of a mathematical expression in the earlier draft has been addressed here by outlining the multinomial logistic regression equation used:

$$P(Y = j \mid X) = \frac{e^{j_0^j p_1^j X_1 + \cdots + p_k^j X_k}}{1 + \sum_{l=1}^{J-1} e^{j_0^j + p_1^d X_1 + \cdots + \rho_k^d X_k}}$$

where Y is the digital maturity level, j is the category (low, medium, high), X represents the independent variables (digital strategy, corporate culture, leadership), and β is the coefficients for each category relative to the reference group (medium maturity).

4. Results and discussion

This section may be divided by subheadings. It should provide a concise and precise description of the experimental results, their interpretation, as well as the experimental conclusions that can be drawn.

4.1. Descriptive statistics

Similar to the approach adopted by Kane et al. (2015) and Kane (2019), respondents in our study were requested to assess their organization's proximity to an ideal state achieved through digital transformation. This evaluation was conducted using a Likert scale ranging from 1 to 10, where "1" denoted "Not close at all" and "10" signified "Very close". By employing this methodology, we aimed to gauge the perceived alignment of the participating organizations with the envisioned ideal state facilitated by digital technologies. **Table 1** underscores a notable predominance of two key departments within the participating organizations: "General Management" and "Information Technology", albeit with varying degrees of prominence. This imbalance holds considerable implications for the relevance and precision of the gathered responses, particularly considering the strategic nature of the phenomenon under investigation. Given their pivotal roles in shaping organizational strategies and implementing technological initiatives, the perspectives and inputs from these departments wield significant influence over the overall accuracy and comprehensiveness of the data collected (see **Figure 1**).

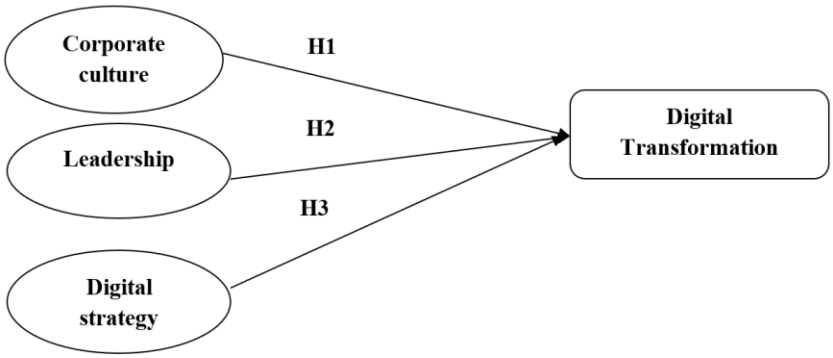

Figure 1. Conceptual framework.

Table 1. Distribution of sample by management position of respondents.

Department	Percentage (%)
General Management	55.7%
Information Technology	15.7%
Marketing	2.9%
Production/ Operations	2.9%
Research and development	1.4%
Finance	7.1%
HR	4.3%
Customer Relations	7.1%
Other	2.9%

As depicted in the table above, the sample encompasses a diverse array of economic sectors that collectively constitute the Tunisian economic landscape.

Tables 2 and **3** provide insight into the technological interest levels of the surveyed respondents. It indicates that a substantial portion, comprising 32.9% of the sample, demonstrates a moderate level of interest in technology. This suggests that a

significant segment of the surveyed managers possesses a baseline interest in technological advancements, although not to an extreme degree.

Moreover, the table highlights that 27.1% of the respondents exhibit high to very high levels of technological interest. This finding implies that a considerable proportion of the managerial cohort is not only interested in technology but also actively engaged or deeply invested in exploring and leveraging technological innovations within their respective organizations. The presence of a notable percentage of respondents with high or very high levels of technological interest is indicative of a proactive stance towards embracing digital transformation initiatives. Such individuals are likely to champion technological adoption within their organizations, driving innovation and facilitating the integration of digital solutions across various business functions.

Table 2. Distribution of sample by sector.

Sector	Percentage (%)
Banking	11.4%
Insurance	12.9%
Asset management	1.4%
Construction/Materials	2.9%
Trade/ Retailing	8.6%
Multimedia	2.9%
Research and consultancy	10.0%
Pharmaceutical	2.9%
IT/Telecom	5.7%
Industry	17.1%
Transport/ Logistics	4.3%
Tourism	4.3%
Administrative	7.1%
Others	8.6%

Table 3. Distribution of sample by technology interest of the respondents.

Technology interest level	Percentage (%)
Very low	2.9%
Low	27.1%
Medium	32.9%
High	20.0%
Very high	17.1%

4.2. Results of the multinomial logistic regression

The results from the multinomial logistic regression analysis are presented below, first focusing on the assessment of model significance and validity, followed by interpretation and discussion of the research variables.

Beginning with the goodness of fit assessment (see **Table 4**), the "Omnibus" tests reveal a Chi-square value of 79.128. This statistic allows us to infer that the model

demonstrates significance at the 5% level, indicating that at least one independent variable exerts an influence on the dependent variable, which in this case is "Digital Maturity". Furthermore, attention is drawn to the "pseudo-square" coefficient, which serves as a measure of model fit and the strength of the relationship between variables (as displayed in **Table 4**). Notably, the "Nagelkerke R^{2}" coefficient stands at 76.6%. This figure signifies a robust representativeness, suggesting that the model effectively accounts for 76.6% of the variance observed in the dependent variable, "Digital Maturity".

The results of the logistic regression are presented in **Table 4**. We interpret the impact of the independent variables on low digital maturity and high digital maturity.

Table 4. Results of the multinomial logistic regression.

Variables		coefficient	Wald	Sig.
Low digital maturity	Constant	−3.573	7.374	0.007
	CE	0.205	0.082	0.774
	LD	−1.435	2.865	0.091
	SD	−3.034	5.987	0.014
High digital maturity	Constant	−1.460	5.628	0.018
	CE	−0.337	0.201	0.654
	LD	0.802	0.674	0.412
	SD	2.631	6.218	0.013

The Wald statistic tests the hypothesis that each coefficient in the model is equal to zero, indicating no effect. A smaller *p*-value (Sig.) suggests that the predictor variable is significantly associated with the outcome variable. The goodness of fit assessment indicates that the model demonstrates significance at the 5% level, implying that at least one independent variable exerts influence on the dependent variable, "Digital Maturity". The robustness of the model is further underscored by the Nagelkerke R^{2} coefficient, which suggests that the model effectively accounts for 76.6% of the variance observed in digital maturity. These findings validate the appropriateness of the model in capturing the complexities of digital transformation dynamics within Tunisian companies.

The examination of corporate culture's influence on digital transformation, as depicted in **Table 4**, reveals non-significant coefficients with *p*-values of approximately 0.774 for low digital maturity and 0.654 for high digital maturity. Consequently, corporate culture exhibits no discernible impact on either low or high digital maturity. This implies an absence of a significant correlation between culture and a company's digital maturity, as assessed through the "digital maturity" variable designed to gauge the success of digital transformation initiatives. Consequently, culture does not emerge as a primary determinant in the transformation process's success. Despite the presence of mature companies in the dataset, digital transformation in Tunisia remains relatively nascent. This observation aligns with Schein's conceptualization of corporate culture as a pattern of shared values evolving to address external adaptation or internal integration challenges. While the present study indicates a lack of immediate influence, it posits a potential for corporate culture

to develop a substantive relationship with digital transformation success in the future. This conjecture arises from the ongoing discovery and experimentation within Tunisian companies regarding digital transformation dynamics. Therefore, Hypothesis H1 fails to garner confirmation.

Regarding leadership, examination of its associated probabilities indicates values of 0 and 0.091 for low digital maturity and 0.412 for high digital maturity, respectively. This suggests a significant impact on low digital maturity while insignificantly affecting high digital maturity. Notably, the variable's odds ratio (Exp B) stands at 0.238, indicative of a negative relationship between low and high digital maturity categories. Consequently, companies characterized by strong leadership attributes are more inclined to exhibit high digital maturity compared to those lacking such attributes, thus partially confirming Hypothesis H2.

Analysis of the digital strategy reveals probabilities of approximately 0.014 for low maturity and 0.013 for high maturity. Coefficients associated with this variable exhibit a significant positive impact on high digital maturity and a significant negative impact on low digital maturity. This underscores the critical role of digital strategy in facilitating successful digital transformation endeavors within Tunisian companies. A well-defined digital strategy, aligned with overall business objectives and informed by a clear vision for the future, emerges as pivotal for navigating the complexities inherent in digital transition and transformation processes. This positive correlation underscores the strategic importance of digital strategy formulation, serving as a guiding framework to steer the organization through the transformation journey. This finding not only concurs with existing literature but also corroborates the insights of Tunisian experts regarding the pivotal role of digital strategy in transformative initiatives. Thus, Hypothesis H3 receives validation.

5. Discussion

The results of the multinomial logistic regression analysis offer critical insights into the factors driving digital maturity within Tunisian companies, aligning with existing studies on digital transformation in emerging economies (Vial, 2019). Specifically, this section evaluates the implications of the findings, particularly focusing on the pivotal roles of corporate culture, leadership, and digital strategy in shaping digital maturity, thereby contributing to both theory and practice (Kane et al., 2015).

Contrary to expectations, corporate culture is found to have a non-significant impact on either low or high digital maturity. This aligns with studies that suggest corporate culture may be less influential in the early stages of digital transformation, especially in developing regions (Kargas et al., 2023). Given that Tunisia's digital transformation is still in its infancy, these findings suggest that corporate culture may not yet have evolved to the point where it plays a critical role in digital maturity (Telnov et al., 2022). Schein's (1977) theory, which frames culture as a pattern of shared values evolving to meet external challenges, indicates that as Tunisian companies gain more experience with digital initiatives, the influence of corporate culture on digital maturity could become more pronounced. Consequently, while Hypothesis 1 is not supported by the current analysis, future research may uncover a

stronger relationship between corporate culture and digital transformation, consistent with broader trends in digital evolution (Westerman et al., 2014).

Leadership, however, shows a significant effect on low digital maturity, underscoring its critical role in initiating digital transformation efforts. This finding corroborates research that highlights the importance of leadership in setting a vision for digital initiatives and guiding organizations through the complexities of digital adoption (Kane et al., 2019). In contexts where leadership is robust, companies are more likely to demonstrate higher levels of digital maturity, especially in the early stages (Haffke et al., 2017). However, leadership's lack of significance in driving high digital maturity suggests that other factors, such as organizational structure and resources, may become more important as firms move toward advanced stages of digital development (Sebastian et al., 2017). This nuanced finding partially confirms Hypothesis 2 and adds to the growing body of literature on the role of leadership in digital transformation (Schallmo et al., 2017).

Perhaps the most striking result of the analysis is the significant positive effect of digital strategy on high digital maturity, reinforcing the idea that strategic planning is crucial for successful digital transformation (Matt et al., 2015). This aligns with existing research that positions digital strategy as a key determinant of digital success, particularly when aligned with overall business goals and future-oriented visions (Bharadwaj et al., 2013). Tunisian companies with well-defined digital strategies are more adept at navigating the complexities of digital transition, echoing the findings from global studies on digital strategy's critical role in achieving high levels of digital maturity (Chanias et al., 2019). Hypothesis 3 is thus validated, underscoring the centrality of strategic foresight in fostering digital maturity within Tunisian companies, which also echoes conclusions drawn in broader global contexts (Fitzgerald et al., 2014). These findings make a substantive contribution to the digital transformation literature by clarifying the roles of corporate culture, leadership, and digital strategy in emerging market contexts, particularly Tunisia. The results suggest that while corporate culture may not yet be a decisive factor, leadership and digital strategy are pivotal in shaping digital maturity. Future studies could further explore how these dynamics evolve as digital transformation matures in Tunisia and other emerging markets.

6. Conclusion

In this study, we examined the influence of corporate culture, leadership, and digital strategy on digital transformation within Tunisian companies. The results indicate that corporate culture does not significantly impact digital maturity, suggesting that it may not currently play a decisive role in driving digital transformation initiatives. However, there is potential for corporate culture to develop a more substantial relationship with digital transformation success as companies continue to explore and experiment with digital transformation dynamics. On the other hand, strong leadership attributes exhibit a significant influence on low digital maturity levels, indicating their importance in guiding companies towards digital advancement. Additionally, digital strategy emerges as a critical determinant of digital

maturity, with a well-defined and aligned strategy significantly contributing to successful transformation efforts.

These findings contribute to the theoretical understanding of digital transformation dynamics, particularly within the context of Tunisian companies. By elucidating the roles of corporate culture, leadership, and digital strategy, this study enriches the existing literature on digital transformation, providing insights into the factors driving or hindering successful transformation initiatives. Moreover, the non-significant impact of corporate culture underscores the need for further theoretical exploration to better understand its evolving relationship with digital transformation in diverse organizational contexts. From a practical standpoint, the results highlight the importance of strong leadership and well-defined digital strategies in driving successful digital transformation endeavors. Tunisian companies can leverage these insights to develop tailored strategies and cultivate leadership capabilities conducive to digital maturity. Moreover, the findings underscore the need for organizations to continually reassess and refine their approaches to digital transformation, considering the evolving landscape of digital technologies and market dynamics.

Future research endeavours should focus on the specific factors that have a proven impact on digital transformation outcomes, including organizational structure, technology adoption processes, and external market forces (Warner and Wäger, 2019). For instance, understanding the alignment between corporate hierarchies and digital strategies can help organizations navigate the complexities of digital transformation more effectively (Deng et al., 2024; Singh and Sarva, 2024). Additionally, longitudinal studies tracking the progression of digital transformation within Tunisian companies have the potential to reveal the sustained influence of corporate culture, leadership, and digital strategy on digital maturity over time (Schallmo et al., 2017). These studies could provide concrete recommendations on how corporate governance and cultural adaptation drive success in digitalization efforts. Future researchers may conduct bibliometric reviews or framework-based systematic reviews to map the evolving trends and key themes in digital transformation literature, identifying the most influential works and emerging research gaps (Fakhar et al., 2023; Khan and Azam, 2023; Khan et al., 2024; Rashid et al., 2024). Such a review would provide a comprehensive analysis of how different factors, such as leadership, technology adoption, and organizational culture, have been studied over time. This approach would offer valuable insights into research trajectories and inform future studies on digital maturity and transformation strategies.

Comparative studies across industries and regions can yield critical insights into the specific contextual factors, such as market competition and regulatory environments, that shape the digital transformation process (Bharadwaj et al., 2013; Sebastian et al., 2017). Such cross-sectoral analyses are essential to formulating actionable recommendations for policymakers and business leaders looking to foster competitive digital ecosystems. Moreover, qualitative research approaches, including in-depth interviews and case studies, offer valuable insights into the nuances and underlying mechanisms that propel successful digital transformation initiatives within organizations, making it easier to identify replicable best practices (Ishrat et al., 2021; Ishrat et al., 2023; Westerman and Bonnet, 2015). Targeted, context-specific recommendations for business leaders and policymakers should emerge from this

body of work, guiding them toward optimal digital strategies tailored to their unique market conditions.

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References

Abdurrahman, A., Gustomo, A., Prasetio, E. A. (2024). Exploring barriers, drivers, and routines of dynamic capabilities in Indonesian digital banking transformation: A qualitative study based on the TOE framework. Electronic Journal of Information Systems in Developing Countries. https://doi.org/10.1002/isd2.12329

Abril-Jiménez, P., Carvajal-Flores, D., Buhid, E., & Cabrera-Umpierrez, M. F. (2024). Enhancing worker-centred digitalisation in industrial environments: A KPI evaluation methodology. Heliyon, 10, e26638. https://doi.org/10.1016/j.heliyon.2024.e26638

Al Halbusi, H., Popa, S., Alshibani, S. M., & Soto-Acosta, P. (2024). Greening the future: analyzing green entrepreneurial orientation, green knowledge management and digital transformation for sustainable innovation and circular economy. European Journal of Innovation Management. https://doi.org/10.1108/EJIM-02-2024-0169

Alexandrova, E. (2024). Digital Technology in Luxury Industry Development. In: Zokirjon ugli, K. S., Muratov, A., Ignateva, S. (editors). Fundamental and Applied Scientific Research in the Development of Agriculture in the Far East (AFE-2022), AFE 2023. Springer.

Almansour, B., Elkrghli, S. (2023). Factors Influencing Customer Satisfaction on E-Banking Services: A Study of Libyan Banks. International Journal on Technology, Innovation, and Management, 3(1), 34–42. https://doi.org/10.54489/ijtim.v3i1.211

Al-Taie, Y., AL-Khafaji, J. (2024). The effect of the digital business ecosystem on enhance big data analytics capabilities: An analytical study of the employees opinions in tourism companies in Al-Najaf Al-Ashraf. AIP Conference Proceedings, 3092(1), 040010. https://doi.org/10.1063/5.0200558

Barbieri, L. M., Sott, M. K., Monticelli, J. M. (2024). Critical Success Factors for Implementing Cloud ERP in SMEs: A Systematic Review. International Journal of Innovation and Technology Management, 21(02). https://doi.org/10.1142/S0219877024300039

Bayar, Y., Sezgin, H. F., Öztürk, Ö. F., Şaşmaz, M. Ü. (2020). Financial Literacy and Financial Risk Tolerance of Individual Investors: Multinomial Logistic Regression Approach. SAGE Open, 10(3). https://doi.org/10.1177/2158244020945717

Benavides-Espinosa, M. del M., Ribeiro-Soriano, D., Gieure, C. (2024). How can agrifood businesses improve their performance? The role of digital transformation. British Food Journal, 126, 1682–1697. https://doi.org/10.1108/BFJ-06-2022-0541

Beverungen, D., Hess, T., Köster, A., Lehrer, C. (2022). From private digital platforms to public data spaces: implications for the digital transformation. Electronic Markets, 32, 493–501. https://doi.org/10.1007/s12525-022-00553-z

Bharadwaj, A., Tiwana, A. (2005). Managerial Assessments of E-Business Investment Opportunities: A Field Study. IEEE Transactions on Engineering Management, 52(4), 449–460. https://doi.org/10.1109/TEM.2005.856573

Birkinshaw, J., Robbins, P., Ryan, J. (2016). Getting to Grips with Digital Transformation. London Business School Review, 27(1), 40–43. https://doi.org/10.1111/2057-1615.12098

Brynjolfsson, E., Liu, M., Westerman, G. (2022). Do Computers Reduce the Value of Worker Persistence? Journal Management Information Systems, 39, 41–67. https://doi.org/10.1080/07421222.2021.2023406

Caluri, L., Jianu, M., Cerioli, P., Silvestri, G. B. (2019). Open Innovation as Enabling Paradigm to Empower Digital Transformation in Oil & Gas Organizations. In: Proceedings of the Abu Dhabi International Petroleum Exhibition & Conference; 13 November 2019; Abu Dhabi, UAE.

Chanias, S., Myers, M. D., Hess, T. (2019). Digital transformation strategy making in pre-digital organizations: The case of a financial services provider. Journal of strategic information systems, 28, 17–33.

Chen, A., Zhao, D., He, C. (2024). Firm digital investments and capacity utilisation: A perspective of factor inputs. Technological

Forecasting and Social Change, 200(C).

Correani, A., De Massis, A., Frattini, F., et al. (2020). Implementing a Digital Strategy: Learning from the Experience of Three Digital Transformation Projects. California Management Review, 62(4), 37–56. https://doi.org/10.1177/0008125620934864

Deng, T., Wan, G., Ma, M. (2024). Impact of tourism companies digital transformation on employment: some evidence from China. Asia Pacific Journal of Tourism Research, 29(2), 225–238. https://doi.org/10.1080/10941665.2024.2324180

Fakhar, S., Mohd Khan, F., Tabash, M. I., et al. (2023). Financial distress in the banking industry: A bibliometric synthesis and exploration. Cogent Economics & Finance, 11(2). https://doi.org/10.1080/23322039.2023.2253076

Feher, P., Szabo, Z., Varga, K. (2017). Analysing Digital Transformation among Hungarian Organizations. In: Proceedings of Digital Transformation—From Connecting Things to Transforming Our Lives; 18–21 June 2017; Bled, Slovenia. pp. 139–150.

Fitzgerald, M., Kruschwitz, N., Bonnet, D., Welch, M. (2013). Embracing Digital Technology: A New Strategic Imperative. Available online: http://sloanreview.mit.edu/projects/embracing-digital-technology?switch_view=PDF (accessed on 2 June 2024).

Gansterer, M., Hartl, R. F. (2020). The collaborative multi-level lot-sizing problem with cost synergies. International Journal of Production Research, 58(2), 332–349. https://doi.org/10.1080/00207543.2019.1584415

Gerasimenko, V., Kurbatskii, A., Kurkova, D. (2023). Digitalization of market interactions of Russian enterprises (Russian). St Petersburg University Journal of Economic Studies, 39(4), 534–559. https://doi.org/10.21638/spbu05.2023.404

Guhan, R., Nigama, K. (2022). The Upsurge of Mobile Wallet Adoption by Generation X: Evidence from India. In: Proceedings of 2022 Interdisciplinary Research in Technology and Management (IRTM); 24–26 February 2022; Kolkata, India. pp. 1–6.

Ishrat, I., Hasan, M., Farooq, A., Khan, F. M. (2023). Modelling of consumer challenges and marketing strategies during crisis. Qualitative Market Research, 26(4), 285–319. https://doi.org/10.1108/QMR-12-2021-0149

Ishrat, I., Hasan, M., Khan, F. M., Farooq, A. (2021). The Impact of Lifestyle Orientations on Professionals: A Study of Academicians and Public Executives. IUP Journal of Organizational Behavior, 20(3), 7–25.

Junk, S., Matt, R. (2015). New approach to introduction of 3D digital technologies in design education. Procedia CIRP, 36, 35–40.

Kane, G. (2019). The Technology Fallacy. Research-Technology Management, 62(6), 44–49. https://doi.org/10.1080/08956308.2019.1661079

Kargas, A., Gialeris, E., Komisopoulos, F., et al. (2023). Digital Maturity and Digital Transformation Strategy among Greek Small and Medium Enterprises. Administrative Sciences, 13(11), 236. https://doi.org/10.3390/admsci13110236

Khan, F. M., Anas, M., Uddin, S. M. F. (2024). Anthropomorphism and consumer behaviour: A SPAR-4-SLR protocol compliant hybrid review. International Journal Consumer Studies, 48(1), 1–37. https://doi.org/10.1111/ijcs.12985

Khan, F. M., and Azam, M. K. (2023). Chatbots in hospitality and tourism: a bibliometric synthesis of evidence. Journal of the Academy of Business and Emerging Marke, 3(2), 29–40. https://doi.org/10.5281/zenodo.10183134

Liu, G., Liu, J., Gao, P., et al. (2024). Understanding mechanisms of digital transformation in state-owned enterprises in China: An institutional perspective. Technological Forecasting and Social Change, 202, 123288. https://doi.org/10.1016/j.techfore.2024.123288

Majchrzak, A., Markus, M. L., Wareham, J. (2016). Designing for digital transformation: Lessons for information systems research from the study of ICT and societal challenges. Management information systems: mis quarterly, 40(2), 267–277.

Matt, C., Hess, T., Benlian, A. (2015). Digital Transformation Strategies. Business & Information Systems Engineering, 57, 339–343. https://doi.org/10.1007/s12599-015-0401-5

Merten, S., Schmidt, S. L., Winand, M. (2024). Organisational capabilities for successful digital transformation: a global analysis of national football associations in the digital age. Journal of Strategy and Management, 17(3), 408–426. https://doi.org/10.1108/JSMA-02-2022-0039

Misra, H., Panigrahi, S. K. (2014). Transforming Rural e-Governance for Citizen Collaboration in India. In: Proceedings of the 2014 Conference on Electronic Governance and Open Society: Challenges in Eurasia; New York, USA. pp. 79–83.

Mittal, A., Kumar, V., Verma, P., Singh, A. (2024). Evaluation of organizational variables of quality 4.0 in digital transformation: the study of an Indian manufacturing company. The TQM Journal, 36(1), 178–207. https://doi.org/10.1108/TQM-07-2022-0236

Pan, J., Cifuentes-Faura, J., Zhao, X., Liu, X. (2024). Unlocking the impact of digital technology progress and entry dynamics on firm's total factor productivity in Chinese industries. Global Finance Journal, 60(C), 100957.

Plečko, S., Bradač Hojnik, B. (2024). Sustainable Business Practices and the Role of Digital Technologies: A Cross-Regional

Analysis. Systems, 12(3), 97. https://doi.org/10.3390/systems12030097

Rashid, U., Abdullah, M., Khatib, S. F. A., et al. (2024). Unravelling trends, patterns and intellectual structure of research on bankruptcy in SMEs: A bibliometric assessment and visualisation. Heliyon, 10(2), e24254. https://doi.org/10.1016/j.heliyon.2024.e24254

Rozanova, N., Yushin, A. (2015). Digital Technologies in TV and Transformation of Media Market. World Economy and International Relations, 59, 92–103. https://doi.org/10.20542/0131-2227-2015-5-92-103

Schallmo, D., Williams, C. A., Boardman, L. (2017). Digital transformation of business models-best practice, enablers, and roadmap. International Journal of Innovation Management, 21(8), 1740014. https://doi.org/10.1142/S136391961740014X

Schein, V. E. (1977). Political Strategies for Implementing Organizational Change. Group & Organization Studies, 2(1), 42–48. https://doi.org/10.1177/105960117700200106

Singh, S., Sarva, M. (2024). The Rise of Finfluencers: A Digital Transformation in Investment Advice. Australasian Accounting, Business and Finance Journal, 18(3), 269–286. https://doi.org/10.14453/aabfj.v18i3.14

Soto-Acosta, P. (2024). Navigating Uncertainty: Post-Pandemic Issues on Digital Transformation. Information Systems Management, 41(1), 20–26. https://doi.org/10.1080/10580530.2023.2274531

Spanaki, K., Zissis, D., Papadopoulos, T., Li, F. (2023). The transformation of digital strategy and value creation in omnichannel organisations: the case of the gambling industry. European Journal of Information Systems, 1–18. https://doi.org/10.1080/0960085X.2023.2282454

Steiber, A., Alvarez, D. (2023). Culture and technology in digital transformations: how large companies could renew and change into ecosystem businesses. European Journal of Innovation Management. https://doi.org/10.1108/EJIM-04-2023-0272

Sun, B., Zhang, Y., Zhu, K., et al. (2024). Is faster really better? The impact of digital transformation speed on firm financial distress: Based on the cost-benefit perspective. Journal of Business Research, 179, 114703. https://doi.org/10.1016/j.jbusres.2024.114703

Telnov, Y., Bryzgalov, A., Kozyrev, P., Koroleva, D. (2022). Choosing the type of business model to implement the digital transformation strategy of a network enterprise. Business Informatics, 16(4), 50–67. https://doi.org/10.17323/2587-814X.2022.4.50.67

Valdez-Juárez, L. E., Ramos-Escobar, E. A., Hernández-Ponce, O. E., Ruiz-Zamora, J. A. (2024). Digital transformation and innovation, dynamic capabilities to strengthen the financial performance of Mexican SMEs: a sustainable approach. Cogent Business & Management, 11(1). https://doi.org/10.1080/23311975.2024.2318635

Verhoef, P. C., Broekhuizen, T., Bart, Y., et al. (2021). Digital transformation: A multidisciplinary reflection and research agenda. Journal of Business Research, 122, 889–901. https://doi.org/10.1016/j.jbusres.2019.09.022

Vial, G. (2019). Understanding digital transformation: A review and a research agenda. The Journal of Strategic Information Systems, 28(2), 118–144. https://doi.org/10.1016/j.jsis.2019.01.003

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

Westerman, G., Bonnet, D. (2015). Revamping your business through digital transformation. MIT Sloan Management Review, 56(3), 2–5.

Yang, C., Gu, M., Albitar, K. (2024). Government in the digital age: Exploring the impact of digital transformation on governmental efficiency. Technological Forecasting and Social Change, 208, 123722. https://doi.org/10.1016/j.techfore.2024.123722

Yaser Almansour, B., Elkrghli, S., Tellez Gaytan, J. C., Mohnot, R. (2023). Interconnectedness dynamic spillover among US, Russian, and Ukrainian equity indices during the COVID-19 pandemic and the Russian–Ukrainian war. Heliyon, 9(12), e22974. https://doi.org/10.1016/j.heliyon.2023.e22974

Yu, J., Xu, Y., Zhou, J., Chen, W. (2024). Digital transformation, total factor productivity, and firm innovation investment. Journal of Innovation & Knowledge, 9(2), 100487. https://doi.org/10.1016/j.jik.2024.100487