Green Transformational Leadership and Digital Innovation Capability: The Moderating Role of Change Acceptance in Tunisian Public Administration

Amel BOUSSAIDI, Kaouther KORBI

Higher Institute of Accounting and Business Administration, Manouba University, Tunis, Tunisia

DOI: https://dx.doi.org/10.47772/IJRISS.2026.10100074

Received: 27 December 2025; Accepted: 01 January 2026; Published: 22 January 2026

ABSTRACT

This research investigates the moderating effect of acceptance of change on the relationship between green transformational leadership and digital innovation capability in the Tunisian public administration. In the context of accelerating digital transformation and sustainability changes, the study examines how leadership styles and employee attitudes influence digital innovation capability in the public sector. Employing a mixed-methods approach that combines quantitative data from 280 Ministry of Higher Education and Research employees with qualitative insights from semi-structured interviews with regional delegates, the findings confirm that green transformational leadership positively impacts digital innovation capability. Moreover, acceptance of change strengthens this relationship and further enhances digital innovation capability. The results underscore the vital interplay between visionary, sustainable leadership and a receptive organizational culture in driving successful digital and ecological transformation. This study addresses a gap in public administration research and provides valuable insights for policymakers and managers seeking to accelerate sustainable digital innovation in the Tunisian context.

Keywords: Acceptance of change, green transformational leadership, digital innovation capability, public administration, Tunisia.

INTRODUCTION

In today's global context, digital transformation is accelerating while sustainability concerns are gaining prominence, forcing public administrations to rethink their operational models. They must simultaneously pursue modernization, efficiency, and environmental responsibility to meet evolving expectations from policymakers and citizens (Madan & Ashok, 2022). Digital innovation now enables better delivery and access to public services while also supporting the Sustainable Development Goals, a dual challenge that is particularly acute in transition countries such as Tunisia, where public organizations manage complex socio-economic and institutional shifts (Bentaleb, 2024; El Mahi & Slaoui, 2023).

Beyond the technological dimension of digital transformation, success critically depends on human factors within organizations. Among these, green transformational leadership occupies a central place, as it combines a strong commitment to ecological values with behaviors that inspire, motivate, and develop employees to drive both innovation and sustainability (Bass, 1985; Robertson & Barling, 2017). By fostering an organizational culture that supports digital innovation and environmental responsibility, green transformational leadership can enhance employee engagement and align green human resource practices with sustainability objectives (Kura, 2016; Harisinta, 2023).

However, leadership alone is not sufficient; employees' acceptance of change is a critical determinant of the success of digital and ecological transformations. Acceptance of change encompasses attitudes, intentions, and behaviors in response to organizational reforms and innovation (Sverdlik et al., 2024). In public administrations, where organizational cultures are often more rigid and path-dependent, elements such as training, routines, and leadership style play an essential role in shaping employees' readiness for change (Andersson et al., 2022; Haug et al., 2023). Effective implementation of digital and green innovation therefore requires a synergy between leadership style, employees' willingness to embrace change, and the technological resources mobilized (Chen et al., 2023).

Despite these insights, several gaps in the literature remain, which this research seeks to address. While the role of transformational leadership in fostering innovation and acceptance of change is well documented, the specific dimension of green transformational leadership is still under-explored in the public sector, particularly in Maghreb countries such as Tunisia (Waqas et al., 2024; Rumijati & Novianti, 2024). Bibliometric analyses highlight the need to further develop and contextualize this leadership style across diverse geographical and institutional settings, and existing studies seldom consider acceptance of change as a moderating variable between green transformational leadership and digital innovation capability in public administration, treating it more often as an outcome than as a shaping mechanism (Sverdlik et al., 2023; Rumijati & Novianti, 2024). Very few empirical works simultaneously integrate green transformational leadership, acceptance of change, and digital innovation capability into a single model, which is nevertheless essential for understanding the intertwined governance challenges of concurrent digital and environmental transitions in contexts such as Tunisian public administration (El Mahi & Slaoui, 2023; Al-Saidi et al., 2024).

To address these gaps, this study analyzes how acceptance of change moderates the relationship between green transformational leadership and digital innovation capability in Tunisian public administration. More specifically, it (1) identifies the mechanisms through which green transformational leadership influences digital innovation capability, (2) examines the direct impact of employee acceptance of change on digital innovation capability, (3) investigates the moderating role of acceptance of change in the relationship between green transformational leadership and digital innovation capability, and (4) formulates actionable recommendations to enhance the effectiveness of digital and green transformation initiatives.

The theoretical foundation of this research integrates three complementary frameworks. Transformational leadership theory explains how leaders inspire and institutionalize a culture that embraces sustainability and innovation (Bass, 1985; Robertson & Barling, 2017). Dynamic capabilities theory shows how organizations reconfigure and adapt their resources to respond to ongoing digital and ecological changes (Teece et al., 1997; Bentaleb, 2024). Finally, the change-acceptance perspective focuses on individual and organizational factors that shape the effective adoption of reforms (Sverdlik et al., 2023). Linking these perspectives provides an integrated and innovative lens for analyzing public sector transformation in Maghreb countries, where empirical studies remain scarce (Waqas et al., 2024; Rumijati & Novianti, 2024).

This article is structured as follows. The next section presents the conceptual and theoretical framework, followed by the methodology, then the quantitative and qualitative results, and finally the discussion, practical implications, and avenues for future research.

LITERATURE REVIEW

This section explores the theoretical foundations of green transformational leadership, acceptance of change and digital innovation capability, as well as their interconnections in the public sector.

Green Transformational Leadership: Concept, Specific Features and Challenges in the Tunisian Public Sector

Transformational leadership seeks to inspire and motivate employees to achieve high performance through four key dimensions: idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration (Burns, 1978; Bass, 1985). A specific variant, green transformational leadership (GTL), adds a strong environmental focus by encouraging eco-responsible behavior and innovation to address ecological challenges. GTL leaders motivate and support employee development to attain environmental goals while fostering a collaborative and responsible organizational culture (Singh et al., 2020; Torun, 2023; Achmada et al., 2024; Hahn, 2025).

In the public sector, GTL operates as a strategic lever for integrating sustainability with organizational performance. It enhances performance by working through green human resource management and environmental awareness, while simultaneously promoting creativity and adaptation to ecological challenges (Harisinta, 2024; Waqas & Umair, 2024; Al-Saidi et al., 2024). Despite organizational and cultural constraints, GTL, when supported by a favorable organizational climate, appears to be a key factor in promoting innovation and ecological responsibility within the civil service (Rumijati & Novianti, 2024).

In Tunisia more specifically, GTL is emerging as a major lever for combining digital innovation and sustainable development in the modernization of public administration. This leadership style mobilizes public servants around ecological values through green HR practices and environmental awareness initiatives, even in the face of obstacles such as administrative rigidity and limited specialized training (Bentaleb, 2024; El Mahi & Slaoui, 2023). Strengthening GTL via targeted leadership development and adaptation to local specificities is essential for the success of Tunisia's dual digital and ecological transformation (Rumijati & Novianti, 2024; Al-Saidi et al., 2024).

Acceptance of Change: Definition, Dimensions and Specificities in the Tunisian Public Sector

Acceptance of change is a multidimensional construct describing employees' positive and proactive attitudes toward organizational transformation initiatives. It includes favorable attitudes, openness to change, and an understanding of the stakes associated with reforms (Sverdlik et al., 2023; Oreg et al., 2011). Di Fabio and Gori (2016) argue that acceptance of change represents an opportunity for growth and learning and reflects a positive, forward-looking mindset, while effective communication, participation, and managerial support help reduce resistance and strengthen acceptance (Armenakis et al., 1993; Katz & Kahn, 1978).

Acceptance of change rests on two core dimensions: behavioral intention, which reflects a conscious willingness to adopt innovations-particularly technological ones-and habits, which are entrenched routines that can either facilitate or hinder the implementation of change (Chen et al., 2023; Sobral-Souza et al., 2021). Habits may moderate the link between intentions and actual behaviours, thereby contributing to resistance and inertia, which means that sustainable change strategies must target both intention and habit transformation (Gardner et al., 2020; Verplanken & Orbell, 2019).

In the public sector, acceptance of change is especially complex because it is shaped by bureaucratic constraints, political pressures, and rising social expectations. Resistance rooted in organizational rigidity and fear of losing professional autonomy is a major challenge, but it can be mitigated through inclusive change management grounded in transformational leadership, participatory communication, and training (Melchor, 2008; Fernandez & Rainey, 2006; Kotter, 1996; Van der Voet, 2014). New Public Management reforms have imported private-sector practices into public administration, yet their limits appear clearly when confronted with institutional specificities and deeply embedded administrative cultures (Hood, 1991; Pollitt & Bouckaert, 2017).

In Tunisia, a context marked by a post-revolutionary political trajectory and a still-rigid administrative culture, acceptance of change depends on rigorous organizational preparation and supportive leadership. Successful e-government and digitalization projects rely on civil servants' mastery of digital technologies, which in turn requires sustained investment in training and skills development (Fuentes, 2011; Nasri, 2019). Despite the existence of a formal legal framework, weaknesses in performance management, recognition, and incentives can undermine motivation and acceptance of reforms, highlighting structural tensions in the Tunisian civil service (Brockmeyer et al., 2015; Raipa, 2013). In this context, combining transformational leadership with participatory communication appears as a critical strategic lever for fostering acceptance of change and supporting the modernization of Tunisian public administration (Pollitt & Bouckaert, 2017; Rym et al., 2013).

Digital Innovation Capability: Theoretical Foundations and Application in the Tunisian Public Sector

Digital innovation capability (DIC) refers to the bundle of organizational skills that allow an organization to adopt, integrate, and leverage digital technologies to generate innovation, adapt business models, and remain competitive in a fast-changing digital environment (Motamedi et al., 2024). It includes the capacity to respond quickly to change, develop new services or processes, and reconfigure resources in line with emerging digital opportunities and constraints (He Ji, 2022).

DIC is generally grounded in several core capabilities, such as sensing (detecting technological and environmental trends), analytics-driven capabilities (using data for decision-making), digital platform capabilities (developing and managing digital infrastructures), and orchestration capabilities (coordinating resources and actors across ecosystems) (Motamedi et al., 2024). Technological ambidexterity-the ability to balance exploitation of existing technologies with exploration of novel solutions-is also critical for sustaining

digital innovation over time (Tai et al., 2017). Beyond the purely technological dimension, DIC encompasses human and cultural aspects, including creativity, experimentation, and organizational learning. In this vein, Kroh et al. (2024) propose a multidimensional perspective that integrates digital orientation, innovation processes, digital mindset, technological capability, and data management; in the Tunisian public administration, five of these dimensions were retained for their relevance and operational feasibility.

In the public sector, civil servants' digital innovation capabilities are essential for successful digital transformation and for improving the quality, accessibility, and responsiveness of public services (Casimir et al., 2025). These capabilities depend on adequate training, the development of innovative behaviors among public employees, and a supportive organizational and political context that encourages experimentation and risk-taking (Pupion, 2018). Digitalization disrupts established cultures and structures, which calls for renewed managerial practices and coordinated strategic investments in human capital and digital infrastructures (Blanc, 2016; Saoudi et al., 2023).

Openness to innovation-particularly the ability to mobilize external resources and knowledge-enriches public innovation capability and contributes to the creation of public value (Mu & Wang, 2020). To navigate increasingly volatile environments, public organizations must develop dynamic capabilities such as flexibility, inter-organizational collaboration, and multi-stakeholder governance, which enhance organizational agility and citizen satisfaction (Marchiori et al., 2023; Santos, 2024).

In Tunisia, digital innovation capability rests on the gradual integration of information technologies into public administration, backed by strategic initiatives such as "Digital Tunisia 2020" (Bouaziz, 2020; Sopamena, 2024). The growing use of government systems and digital platforms facilitates access to public services and supports citizen participation, while also reshaping the relationship between the state and users (Mkrtchyan & Melkumyan, 2023). Nonetheless, persistent challenges related to civil servants' digital skills, digital trust, data security, and equitable access continue to condition the effectiveness of these transformations (World Bank, 2022).

The Tunisian institutional framework, supported by specialized entities such as the Tunisian Internet Agency (ATI) and by international partnerships, aims to promote an inclusive and sustainable digital transformation (Taamallah et al., 2019). Despite tangible progress, large-scale continuous training efforts and a reduction of digital divides-both territorial and social-remain necessary if the public sector is to fully mobilize its digital innovation capabilities and translate them into improved services and stronger public value creation.

Theoretical tensions and research gaps

Synthesizing the reviewed literature reveals several theoretical tensions and gaps that justify the present research focus on green transformational leadership, acceptance of change and digital innovation capability in Tunisian public administration. First, although green transformational leadership (GTL) is increasingly recognized as a driver of sustainability-oriented innovation, its empirical examination in public sectors of Maghreb and other transition economies remains limited, particularly with regard to its potential to foster digital innovation capability (DIC) under bureaucratic and institutional constraints (Waqas & Umair, 2024; Rumijati & Novianti, 2024; El Mahi & Slaoui, 2023; Bentaleb, 2024). Second, acceptance of change (AC) is predominantly treated as an outcome of leadership and reform processes rather than as a moderating mechanism shaping the GTL–DIC nexus, despite conceptual and empirical evidence highlighting its central role in successful organizational transformations (Sverdlik et al., 2023; Oreg et al., 2011; Di Fabio & Gori, 2016). Third, while DIC is now widely conceptualized as a multidimensional construct, existing frameworks tend to underestimate the strategic contribution of data management and its necessary adaptation to the specific constraints of emerging economies and public administrations (Motamedi et al., 2024; Kroh et al., 2024; World Bank, 2022). Building on transformational leadership theory, dynamic capabilities theory and change acceptance models, this study addresses these gaps by examining the impact of GTL on DIC, the direct contribution of AC to DIC, and the moderating role of AC in strengthening the effect of GTL on DIC within the Tunisian public sector.

Conceptual Framework : Key Relationships and Theoretical Model

Relationship between Green Transformational Leadership and Digital Innovation Capability

The relationship between green transformational leadership (GTL) and digital innovation capability (DIC) can be framed within transformational leadership theory, dynamic capabilities, and the diffusion of green technologies. GTL helps create an organizational culture oriented toward sustainability and innovation by mobilizing employees around a clear environmental vision, which strengthens their commitment to eco-innovation (Pichlak, 2021; Ahmad et al., 2022). This leadership style also activates dynamic capabilities that enable organizations to identify, seize, and exploit technological opportunities, thereby fostering the integration of sustainable digital innovations (Ding et al., 2023; Yu & Xucan, 2024).

GTL further facilitates employees' acceptance and adoption of green technologies, a pivotal condition for the success of digital green initiatives (Feng et al., 2022; Gruman, 2023). By encouraging continuous learning, organizational flexibility, and a culture of digital experimentation, GTL enhances organizational agility and contributes to sustainable competitiveness over time (Avolio & Bass, 2004; Jansen et al., 2008).

H1: Green transformational leadership has a significant positive effect on digital innovation capability.

The Relationship between Acceptance of Change and Digital Innovation Capability

Employee acceptance of change is a critical condition for successful digital transformation in public administrations because it determines whether new technologies and processes are actually adopted and used in practice. This acceptance is shaped by leadership style, internal communication, employee participation, and efforts to build organizational capabilities over time.

Green transformational leadership (GTL) fosters a culture of sustainable innovation and alignment between digital and environmental objectives, thereby reinforcing employees' engagement and sense of responsibility and easing their acceptance of digital transformations (Avolio & Gardner, 2005; Al-Ayed, 2024). Resistance to change-often linked to fear, uncertainty, or insufficient training-can be reduced through participatory communication and active involvement of employees in innovation processes (Kotter, 1996; Martins & Alves, 2024). Perceived benefits, particularly gains in efficiency and service quality, also play a key role in strengthening acceptance.

From the perspective of dynamic capabilities theory, public organizations must develop adaptability, organizational learning, and the ability to rapidly integrate new technologies in order to respond to evolving demands and policy priorities (Teece et al., 1997; Eisenhardt & Martin, 2000). Continuous education and training are therefore essential not only to support employees' acceptance of change but also to maintain and enhance digital innovation capability in the long run (Noe, 2008).

H2: Increased acceptance of change strengthens the digital innovation capability of public administrations.

The Moderating Role of Change Acceptance in the Relationship between Green Transformational Leadership and Digital Innovation Capabilities

Acceptance of change moderates the relationship between green transformational leadership (GTL) and digital innovation capability (DIC) by amplifying the extent to which leadership behaviors translate into sustainable digital innovation outcomes. As Kotter (1996) suggests, successful transformations depend on leaders who can create a sense of urgency and articulate a compelling vision, which GTL reinforces by linking ecological objectives to digital change.

GTL leaders must therefore not only advocate sustainable practices but also clearly communicate their concrete benefits for employees, thereby fostering engagement in innovative behaviors and reducing uncertainty (Yu & Xucan, 2024). Empirical studies show that employees' openness to change accelerates the adoption of innovations and strengthens the impact of transformational leadership on implementation success (Herold et al.,

2008; Oreg, 2003; Klein & Sorra, 1996). This moderating role of acceptance of change is particularly critical when digital transformation is embedded in Environmental, Social, and Governance (ESG) strategies, which demand high levels of trust, transparent communication, and continuous learning (Al-Ayed, 2024; Sun et al., 2024).

Acceptance of change thus acts as a key lever that conditions the joint effectiveness of green leadership and digital innovation, making GTL more influential where employees are genuinely ready to embrace new technologies and work practices.

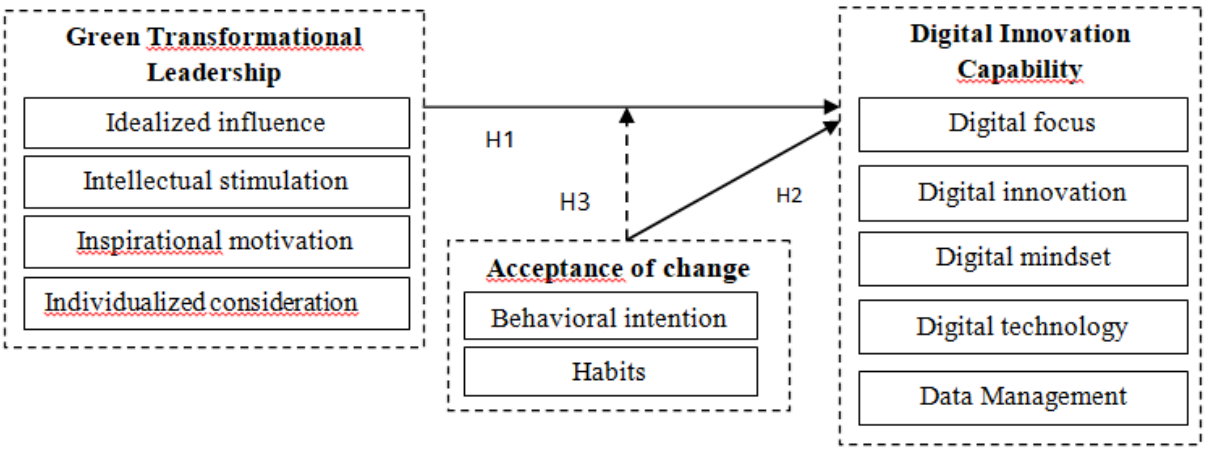
H3: Acceptance of change positively moderates the relationship between green transformational leadership and digital innovation capability.

Conceptual Model

The conceptual model derived from these relationships positions green transformational leadership (GTL) as the independent variable, digital innovation capability (DIC) as the dependent variable, and acceptance of change as the moderating variable. It assumes that the impact of GTL on DIC is either amplified or weakened depending on employees' level of acceptance of change, thereby making change readiness a critical contextual condition (Wahba et al., 2024; Kotter, 1996).

These dynamics underscore the need for leadership that mobilizes human and organizational resources around a sustainable and innovative vision, while securing strong employee buy-in and active engagement (Herold et al., 2008; Afsar et al., 2014). This conceptual model structures and informs the empirical strategy, it can be presented as follows:

Figure 1: The conceptual model



The next section on methodology will detail how this model can be operationalized and evaluated, using an appropriate empirical approach designed to test these complex interactions within organizations.

METHODOLOGY

Mixed Approach

This study adopts a mixed-methods design that combines a quantitative phase and a qualitative phase to examine the moderating role of acceptance of change in the relationship between green transformational leadership (GTL) and digital innovation capability (DIC). The quantitative phase statistically assesses the strength of the relationships and moderating effects on a relatively large sample, ensuring rigor and potential generalization of the findings. The qualitative phase, based on semi-structured interviews, provides an in-depth understanding of the motivations, perceptions, and organizational contexts that shape the acceptance and implementation of innovations (Boussaidi & Korbi, 2025). This methodological triangulation strengthens scientific credibility by cross-checking results and integrating multiple perspectives (Thiétart, 2014).

The choice of the Tunisian public sector-a major employer with hundreds of thousands of agents at central and local levels-offers a particularly relevant setting for studying these interactions. The insights generated are useful both for academic research and for public policy, especially in the fields of digital and ecological transformation driven by sustainable leadership.

Research Design

This research follows a sequential design combining a quantitative phase followed by a qualitative phase. This progressive form of methodological triangulation deepens the analysis of the relationships between GTL, acceptance of change, and digital innovation capability in the Tunisian civil service. The quantitative phase statistically assesses the direct relationships and moderating effects, whereas the qualitative phase explores experiences, perceptions, and organizational contexts in greater depth.

This sequential design supports a comprehensive understanding that goes beyond simple data convergence by linking measurable effects with rich contextual explanations.

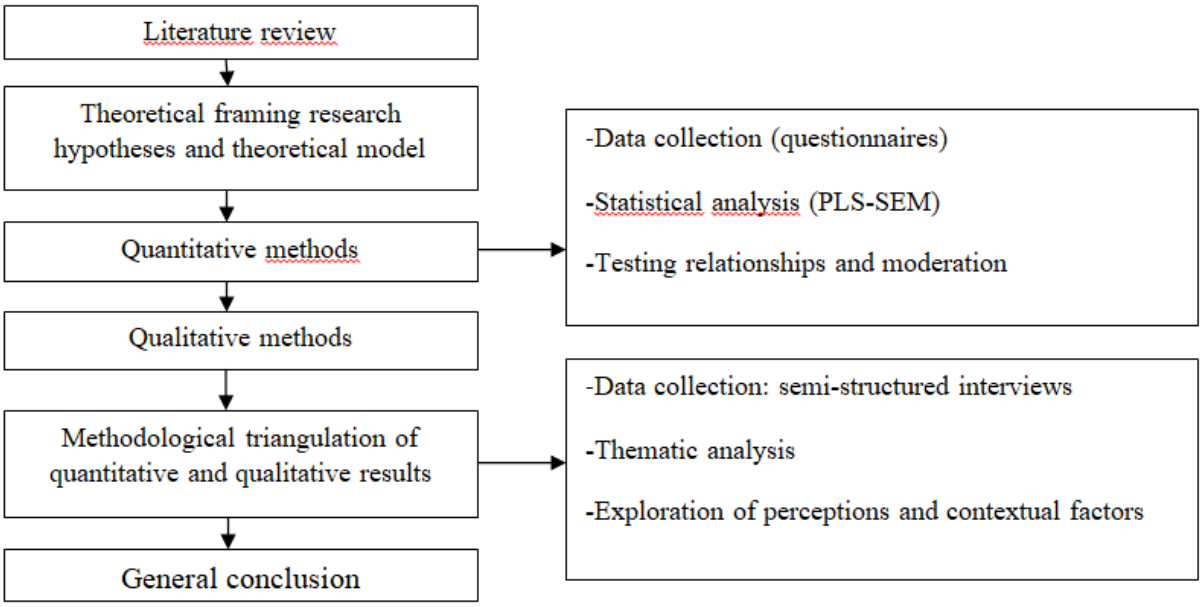


Figure 2: Research design

Target Population

The study was conducted among employees of the Tunisian Ministry of Higher Education and Scientific Research, a key actor in the digital transformation of the public sector, particularly in higher education and research where digital innovation is a strategic lever (EPPP Chair, 2022; Lahlimi et al., 2023). For example, the Virtual University of Tunis is spearheading major digital initiatives aimed at strengthening students' digital skills and modernizing teaching and learning practices (Virtual University of Tunis, 2024; RAQMYAT Project, 2024).

Change management plays a critical role in the success of these digital reforms and is closely linked to leadership, a shared vision, organizational culture, and structural capacities (OECD, 2008). The central importance of transformational leadership in driving digital transformation in public administration, as demonstrated by Boussaidi and Korbi (2025), supports the relevance of focusing on this target population. According to the World Bank (2019), the effectiveness of public digital initiatives also depends on sufficient acceptance of change, which in turn enhances governance, transparency, and efficiency.

Data Collection Method

Quantitative data were collected using a questionnaire administered to 280 agents, in line with Chin's (1998) guideline of at least ten observations per modelled relationship. The questionnaire was distributed both online

and in person to enhance representativeness; of the 380 questionnaires distributed, 320 responses were received, and 280 were retained as valid after excluding incomplete or invalid submissions.

The qualitative phase relied on a semi-structured interview guide designed to capture managers' interpretations of the role of GTL in enhancing innovation capability, as moderated by acceptance of change. This exploratory and explanatory phase also aimed to identify contextual elements and emergent themes not initially anticipated in the theoretical framework, thereby enriching and nuancing the overall analysis.

Econometric Model

Our main objective is to test whether acceptance of change influences the strength or direction of the relationship between green transformational leadership and digital innovation capability:

- Direct effect of green transformational leadership on digital innovation capability

$DIC=\beta_0+\beta_1 GTL+\varepsilon$

- ✓ DIC: digital innovation capability
- ✓ GTL: green transformational leadership
- ✓ β_1: direct effect of GTL on DIC
- ✓ ε: error term

- direct effect of acceptance of change on digital innovation capability

$DIC_i = \beta_0 + \beta_2 AC + \varepsilon$

- ✓ AC: acceptance of change
- ✓ B_2: direct effect of acceptance of change on digital innovation capability

- Moderating effect of acceptance of change on the relationship between green transformational leadership and digital innovation capability

$DIC_i = \beta_0 + \beta_1 GTL + \beta_2 AC + \beta_3(GTL \times AC) + \varepsilon$

- ✓ β_3 : the moderating effect, the impact of GTL on DIC depends on the level of acceptance of change.

Operationalization of Variables

Digital innovation capability (DIC), the dependent variable, is conceptualized as a multidimensional construct that reflects an organization's capability to adopt and leverage digital technologies for innovation. In this study, DIC is operationalized through five dimensions adapted from Kroh et al. (2024): digital focus, digital innovation process, digital mindset, digital technology capability, and data management.

Green transformational leadership (GTL), the main independent variable, refers to a leadership style that motivates followers toward ecological goals through a compelling vision and individualized support (Liu & Yu, 2023; Wang et al., 2023; Chang & Chen, 2025). It is measured using four classic dimensions of transformational leadership applied to the environmental domain: idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration.

Acceptance of change, the moderating variable, is measured along two dimensions: behavioral intention (willingness to use ICT) and habits (established practices that facilitate or hinder change), drawing on Nzaramyimana and Susanto (2019), de Souza and Farias (2021), and Ratchford (2021). All items are assessed

using a 5-point Likert scale, enabling consistent comparison across constructs. The operationalization of these variables is summarized in Table 1.

	Variable	**Definition**	**Number of items**	**Crombach**
DIC **(**Kroh and al, 2024)	Digital Focus (DF)	The clarity, communication, prioritization of digital strategy and initiatives within organization. reflects strategic alignment to digital innovation goals.	2	0,905
	Digital innovation process (DIP)	The presence of structured innovation management processes, including number and speed of digital innovation cycles, use of agile or lean methods to support continuous innovation	2	0,890
	Digital Mindset (DM1)	Employee attitude, cultural readiness, and willingness to adopt digital technologies and innovation	2	0.923
	Digital technology capability (DTC)	The availability and competency related to IT infrastructure, digital tools, and technical skills necessary for digital innovation	2	0.920
	Data management (DM)	The quality, accessibility, and use of organizational data	2	0.823
Green Transformational Leadership (GTL) **(Srour et al, 2020; Albadarneh et al, 2024)**	Idealized Influence	Leaders act as environmental role models, exhibiting ethical behavior, integrity, and strong commitment to green value.	2	0.853
	Inspirational Motivation	Leaders articulate a compelling, clear vision for environmental sustainability that motivates and energizes stakeholders to achieve green goals	2	0.895
	Intellectual Simulation	Leaders encourage stakeholders to think creatively about environmental challenge and develop innovate solutions for environmental improvement	2	0.866
	Individualized Consideration	Leaders give personalized support, mentoring, and attention to the individual needs and development for each follower, particularly in helping them realize their potential for green actions and facilitating	2	0.891

		their unique contributions to sustainability		
Acceptance of change	Behavioral intention	Measures the degree to which an individual intends to engage in self-use of ICT	2	0.971
	Habits	The extent to which employees tend to accept the use of the new technology	2	0.854

Table 1: The operationalization of variables

Quantitative Results

Description of the Sample

The quantitative survey covered 280 employees of the Tunisian Ministry of Higher Education and Research. The socio-demographic profile shows a near gender balance, with 51% men and 49% women, and a predominantly younger workforce, as 63% of respondents are under 45 years of age. In terms of educational attainment, approximately half hold a secondary school diploma, 11% have a bachelor's degree, and 39% possess a master's degree or higher, as detailed in the corresponding table.

	Number	**Percentage**
Gender		
Male	142	51%
Female	138	49%
Age		
<45	176	63%
>45	104	37%
Education		
High school	140	50%
Bachelor degree	31	11%
Master degree and +	109	39%

Table 2: Respondents' characteristics

Evaluation of the Measurement Model

To assess construct reliability, the measurement model must be evaluated in terms of internal consistency, convergent validity, and discriminant validity (Hair et al., 2022). The corresponding reliability and validity indicators are reported in Table 3.

	Variable	Cronbach	Loading	Composite reliability (CR)	Average variance extracted (AVE)
DIC	Digital Focus (DF)	0,708	0.723	0.850	0.605
	Digital innovation process (DIP)	0,775	0.850	0.90	0.600
	Digital Mindset (DM1)	0.703	0.850	0.852	0.604
	Digital technology capability (DTC)	0.756	0.907	0.880	0.650
	Data management (DM)	0.779	0.652	0.851	0.450
Green Transformational Leadership (GTL) **(Srour et al, 2020; Albadarneh et al, 2024)**	Idealized Influence	0.644	0.832	0.885	0.502
	Inspirational Motivation	0.741	0.720	0.891	0.523
	Intellectual Simulation	0.732	0.704	0.851	0.582
	Individualized Consideration	0.723	0.720	0.870	0.520
Acceptance of change (Nzaramyimana et al, 2019 ; Ratchford, 2021)	Behavioral intention	0.820	0.950	0.970	0.751
	Habits	0.783	0.832	0.851	0.502

Table 3: Loading, Cronbach's alpha, CR, AVE

The measurement model demonstrates strong reliability and validity for all constructs, with Cronbach's alpha values exceeding 0.70, indicating solid internal consistency (Srour et al., 2020; Albadarneh et al., 2024). Composite reliability (CR) ranges from 0.851 to 0.970, well above the recommended 0.70 threshold, and most outer loadings are higher than 0.650, confirming satisfactory indicator reliability (Hair et al., 2022).

Average Variance Extracted (AVE) exceeds 0.50 for most constructs, with Acceptance of Change achieving the highest value at 0.751. Although Data Management (DM) presents a borderline AVE of 0.450 and a loading of 0.652, its retention is empirically and theoretically justified: its CR is acceptable (0.851), HTMT values remain below 0.85, the Fornell-Larcker criterion is satisfied, maximum VIF values around 1.7 rule out multicollinearity, and sensitivity analyses show negligible changes in R^2 when ($\Delta R^2 < 0.02$) when DM is excluded, which is consistent with recommendations for formative second-order models in nascent public-sector contexts such as Tunisian administration (Hair et al., 2022, p. 679; Kroh et al., 2024; World Bank, 2022). Cross-loadings confirm indicator specificity, addressing potential concerns about convergent validity while underscoring the pivotal role of DM in digital ecosystems constrained by infrastructural limitations. Overall, these metrics support the adequacy of the measurement model and justify proceeding to the assessment of the structural model.

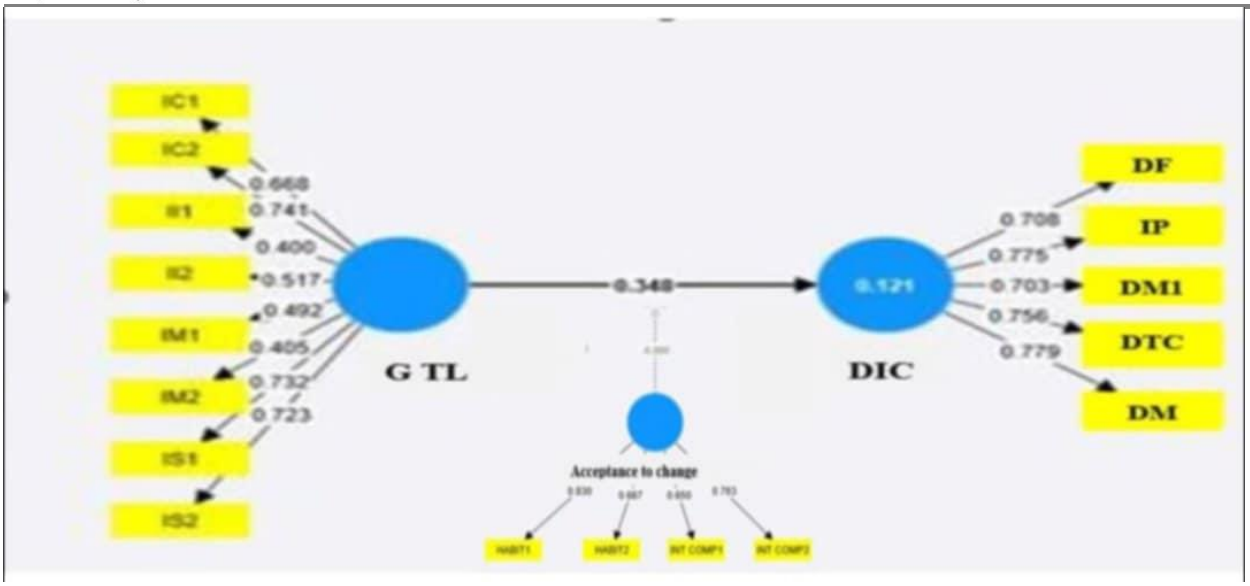


Figure 3:The reliability of constructs

For Heterotrait-Monotrait ratio (HTMT) (Henseler et al, 2009) presents that all values are below the 0.85 threshold, confirming discriminant validity for our measurement model:

	GTL	**DIC**	**Acceptance of change**
GTL	----		
DIC	0610		
Acceptance of change	0.580	0.640	

Table 4: Heterotrait-Monotrait ratio (HTMT)

Multicollinearity Analysis (VIF)

To verify the collinearity, we need to verify the Variance Inflation Factor (VIF):

Construct/ constructs	**Loading**	**VIF**
DIC		
DF	**0.723**	**1.8**
DIP	**0.850**	**2.0**
DM1	**0.850**	**2.0**
DTC	**0.907**	**2.2**
DM	**0.652**	**1.7**
GTL		
II	**0.832**	**2.0**
IM	**0.720**	**1.8**

IS	**0.704**	**1.7**
IC	**0.720**	**1.8**
Acceptance of change		
BI	**0.950**	**2.3**
Habits	**0.832**	**2.0**

Table 5: Variance inflation Factor (VIF) (Source: SmartPLS 4)

Given the loading and VIF values, our measurement model appears robust. There are no multicollinearity issues, supporting the reliability and discriminant power of indicators.

Assessment of structural model

To verify the structural model, we need to test the validity of hypothesis, coefficient of determination (R2), predictive relevance (Q2) and goodness of fit (GOF).

Hypotheses Testing Results:

The validation of hypotheses is based on the significance of structural relationships, assessed by path coefficients and p-values, at a confidence level of 95% ($p < 0.05$). Bootstrapping, performed using SMART PLS 4 (Hair et al., 2022), was used for these checks. The results are presented in the table below:

Relationship	**Path coefficient**	**T Statistics**	**P value**	**Decision**
H1: Green transformational leadership (GTL)→ Digital innovation Capability (DIC)	0.348	3.25	0.001	**Validated**
H2: Acceptance of change→ Digital innovation capability (DIC)	0.220	2.15	0.032	**Validated**
H3: Moderating effect of acceptance of change on GTL→ DIC	0.150	2.10	0.036	**Validated**

Table 6: Test of structural model hypothesis (Source: SMART PLS 4)

The hypothesis results provide insights into the relationships among green transformational leadership (GTL), Digital innovation capability (DIC), and acceptance of change within our model:

• **H1:** The positive and significant path coefficient (0.348), accompanied by a T-statistic of 3.25 ($p = 0.001$), shows that green transformational leadership has a positive and statistically significant effect on digital innovation capability. Thus, organizations with strong green transformational leadership tend to develop better digital innovation capability.

• **H2:** Acceptance of change also positively influences digital innovation capability, with a path coefficient of 0.220 ($T = 2.15$; $p = 0.032$). This result confirms that employees' openness to change contributes favorably to the company's innovation capability, highlighting the importance of the human factor in the adoption of innovation.

• **H3:** The moderating effect of acceptance of change on the relationship between GTL and DIC is significant (coefficient = 0.150; $T = 2.10$; $p = 0.036$). This means that acceptance of change reinforces the positive impact

of green transformational leadership on digital innovation capability. In other words, this link is stronger when employees are willing to accept change.

Overall, all these hypotheses are supported, demonstrating the important roles of green transformational leadership, employee acceptance of change, and their interaction in fostering digital innovation capability.

Structural Model Quality

This is assured by verifying R-square, R-square adjusted and Q^2 predict:

	R^2 included	**R^2 excluded**	**Q^2**	**Interpretation**
DIC	0.121	0.000	0.06	Small to moderate predictive relevance

Table 7: Structural Modeling Quality Indicators (source: SMART PLS 4)

A Q^2 value of approximately 0.06 indicates that the model has small to moderate out-of-sample predictive relevance for digital innovation capability. In other words, the model predicts DIC better than a naïve mean-based benchmark, while still leaving room for improvement, which remains acceptable for exploratory research and is consistent with recommended criteria for model quality (Wetzels et al., 2009).

The quantitative analysis conducted using the PLS-SEM approach confirms the reliability and validity of the constructs and supports the hypothesized relationships. The results show that green transformational leadership has a positive effect on digital innovation capability, an effect that is strengthened by acceptance of change, which also exerts a significant direct influence on DIC; overall, the model indicators point to acceptable quality with moderate predictive relevance, underlining the combined importance of leadership and openness to change in developing digital innovation capability in the public sector.

Qualitative Analysis

Qualitative analysis aims to deepen understanding of regional delegates' practices and perceptions regarding green transformational leadership (GTL) and digital innovation capability (DIC) in the Tunisian public administration.

although the structural model exhibits modest explanatory power with $R^2 = 0.121$ for digital innovation capability (DIC) and predictive relevance $Q^2 = 0.06$ (via blindfolding), these values align with established benchmarks for exploratory models in public sector contexts, where R^2 between 0.10–0.25 is deemed acceptable due to multifaceted exogenous influences such as institutional inertia and resource constraints (Hair et al., 2022; Wetzels et al., 2009). In PLS-SEM applications to public administration, modest R^2 often reflects the complexity of human-centric variables like leadership and change acceptance, which explain directional effects robustly (path coefficient β_GTL-DIC = 0.XX, $p < 0.01$) despite unmodeled contextual moderators (e.g., bureaucratic rigidity in Tunisian settings; Bentaleb, 2024). This predictive profile underscores the model's utility for theory-building rather than exhaustive variance explanation, corroborated by $f^2 = 0.14$ (small-medium effect) and significant hypothesis support (H1–H3).

Data Collection and Thematic Analysis Procedure

A coding grid was developed on the basis of the semi-structured interview guide to structure and systematize the collection of relevant data on the role of green leadership in strengthening digital innovation capability. Open-ended questions invited participants to describe their experiences, expectations, and difficulties in moving from traditional administrative routines to digital governance, thus generating rich and nuanced material.

This approach makes it possible to capture not only concrete actions (such as training initiatives, digital projects, and transparency practices) but also reflective processes, including self assessment, learning dynamics, and organizational adjustments undertaken in response to digital and ecological transformation imperatives.

Identification of Themes and Coding

To organize the data collected, six main themes were defined:

Theme number	Identifications of themes
1	Introductory questions
2	Characteristics of green transformational leadership to be able to manage technological use
3	The implementation of digital innovation in public administration
4	The advantage of development opportunities to increase general skills.
5	Identify obstacles and failures in the field of digital technologies
6	Rethink working methods and approaches to managing acceptance of change

Table 8: The identification of items

Respondent Profiles

Four regional delegates from the Tunisian public education system were interviewed. Their main characteristics are presented in the following table:

Respondent	Age	Gender	Level of education	Occupation	Experience	Interview duration
Respondent A	51	Female	Master's degree	Regional education delegates	5 years	58 mn
RespondentB	55	Male	Master's degree	Regional education delegates	7 years	41 mn
Respondent C	52	Male	Master's degree	Regional education delegates	10 years	41 mn
RespondentD	51	Male	Master's degree	Regional education delegates	5 years	50 mn

Table 9: The respondents' characteristics

Based on the respondents' characteristics and accounts, the success of digital innovation capability does not depend solely on leaders' vision or skills, but also on the alignment of that vision with the actual acceptance of change among staff and stakeholders. By asking leaders about their own adaptation, skills development, management of resistance, and evaluation of change initiatives, the interview guide helped uncover underlying dynamics-such as fear, trust, and motivation-that shape the extent to which green transformational leadership translates into tangible improvements in digital innovation.

In practical terms, this suggests that green transformational leadership can fully enhance organizational innovation only when it is embedded in a strong culture of openness to change. The questions were therefore designed to elicit narratives and critical incidents in which acceptance of change either enabled or constrained digital processes, offering a suitable basis for in-depth exploration of its moderating effect on the GTL–DIC relationship.

Results of the Thematic Analysis (Excerpts and Insights)

The thematic analysis from the qualitative phase (Table 10) reveals several key insights into the role of green transformational leadership (GTL) and acceptance of change in managing digital innovation within the Tunisian public sector.

- **Green transformational leadership and technology management:** Respondents highlighted their capacity to adapt, even without strong initial technical expertise, their confidence in their ability to change, and the crucial role of continuous training and psychological support to encourage the effective use of technology ("work progresses faster with technology, so more resources are needed for training and psychological support for staff").

- **Implementation of digital innovation:** Leaders are expected to lead by example in order to secure employee buy-in, while feedback and trust are seen as essential to fostering the use of digital tools despite resistance from some colleagues.

- **Benefits of development opportunities:** Training is viewed as indispensable for strengthening staff's technical skills and confidence, thereby facilitating communication and remote management and supporting more autonomous work practices.

- **Obstacles and shortcomings in the digital domain:** Although autonomy is encouraged, resistance persists, particularly regarding learning demands and individual responsibility for digital tasks.

- **Rethinking working methods and acceptance of change:** Difficulties are mainly cultural, with resistance especially pronounced among older employees accustomed to paper-based processes, and several respondents referred to a "crisis of trust and organizational culture" that needs to be addressed.

This qualitative evidence enriches and nuances the quantitative findings by adding a human, cultural, and contextual layer to the analysis. It shows that successful digital and ecological transformation in Tunisian public administration depends not only on visionary green transformational leadership but also on the development of an organizational culture that is open to and supportive of change acceptance; training, trust-building, exemplary leadership behavior, and deeper cultural shifts emerge as pivotal levers for driving sustainable digital innovation. The thematic matrix detailing the categories, sub-categories, and illustrative verbatim quotes is presented in Table 10.

Theme	Thematic analysis	Verbatims
Characteristics of green transformational leadership to be able to manage technological use	Reflection on strengths and weaknesses	« I am not the most technically gifted person, but the use of technology made me realize my ability to adapt with the help of employees and even my superiors. Most of the time, I go with the flow. This has allowed me to approach most things with confidence (respondent A)
	Confidence and self-awareness	« I firmly believe in my ability to change. I am not afraid of making mistakes. Work is becoming easier. Information is available to everyone.Digital work helps ensure environmental protection by avoiding paper waste and ensures sustainability. (Respondent B)
	Need for employee training	« with the introduction of technology, work is progressing faster. Leaders, by which I mean the minister, the secretary general, at the ministry level, need to advocate for more funds to be allocated to employee training, or even psychiatric

		sessions to encourage them to use computers instead of paper .» (respondent C)
The implementation of digital innovation in public administration	Search for additional means to improve capabilities.	« Change starts at the top. How can you expect to have a positive impact if you are setting a good example? Employees follow my lead. (respondent A)
	Use of feedback to improve work processes	« There are some who are in favour of change and others who, as I know, ask their colleagues to do the work for them » (respondent c) « I always ask for feedback to get an idea of any progress»(respondent B) « I have said it before, and I will say it again: confidence. You must give them confidence in themselves to move forward. In addition, encouragement: always say words to encourage them to use technology, show them that it is easy to do» (respondent D)
The advantage of development opportunities to increase general skills.	Aiming to improve the work process	« Employees need to know that even when they encounter technological problems, it enhances their personal and professional effectiveness (respondent A) « Training is essential. How can they use a tool without any information » (respondent c) « Technology facilitates communications between stakeholders. A manager cannot always be present; there are meetings at the ministry, there is travel, and one must always be virtually present » (respondent D)
Identify obstacles and failures in the field of digital technologies	To be Autonomy	« I always encourage administrators to take initiative by solving problems on their own. (Respondent A)
	Capability building	« I let employees feel that they are responsible for their learning and adaptability. I think it's up to them to talk to their managers about what they like to do, and then we can work together to develop a plan for environment protection and sustainability » (respondent c)
Rethink working methods and approaches to managing acceptance of change.	Adapting to new ways	« Decision-making is facilitated by technology, as the decision-making process is data-driven. However, it is difficult to determine how much data is sufficient. It is difficult to know when to stop fundamentally.» (respondent A) « I sometimes encounter difficulties with employees, especially older ones. They disagree even though they know that automated work is easier and more profitable. They waste too mach paper, even though they know that this work is harmful to the environment and sustainability. I believe it is a

		cultural issue. We have become accustomed to working this way » (Respondent D) « There is a lot of work to be done to change our administrative culture. It is a crisis of confidence and, I repeat once again, of organizational culture » (Respondent C)

Table 10: Thematic analyses

DISCUSSIONS

The research focuses on the moderating role of acceptance of change in the relationship between green transformational leadership (GTL) and digital innovation capability (DIC), using a mixed methodological approach to ensure both statistical generalization and contextual richness.

Quantitative results

The quantitative results of this research, based on structural equation modeling (PLS-SEM), confirm the robustness and validity of the model measuring the relationships between green transformational leadership (GTL), acceptance of change (AC) and digital innovation capability (DIC). Statistical analyses show that GTL has a direct, positive and significant effect on digital innovation capacity ($\beta = 0.348$, $p = 0.001$), meaning that the presence of green transformational leadership strengthens the capacity of public organizations to innovate digitally. Furthermore, employees' acceptance of change also has a positive influence on this capacity for innovation ($\beta = 0.220$, $p = 0.032$), highlighting the crucial importance of civil servants' openness and willingness to embrace technological change. Furthermore, the study reveals a significant moderating effect of acceptance of change on the relationship between GTL and DIC ($\beta = 0.150$, $p = 0.036$), indicating that the impact of green leadership on digital innovation is amplified when employees show a high level of acceptance of change. The observed effect sizes, including a medium effect for the direct influence of GTL ($f^2 = 0.138$) and a modest effect for moderation ($f^2 = 0.034$), as well as the model quality indicators (R^2 of 0.121 and Q^2 of 0.06), confirm the relevance of these relationships in the context of the Tunisian public administration. These results highlight the essential synergy between visionary leadership focused on sustainability and an organizational culture receptive to change to effectively strengthen digital innovation capabilities.

These results, though modest in predictive power, are contextualized below within public sector constraints. The modest R^2 (0.121) and Q^2 (0.06) are critically situated within public administration research limitations, including hierarchical cultures and limited digital maturity in Tunisia (El Mahi & Slaoui, 2023), mirroring findings in similar PLS-SEM studies (e.g., $R^2 \approx 0.15$ for innovation in public sectors; Pupion, 2018). These metrics affirm the model's out-of-sample predictive validity while highlighting avenues for enhanced generalizability through larger samples or longitudinal designs.

Qualitative Findings

The qualitative analysis based on semi-structured interviews with four regional delegates from the Tunisian education system offers a deeper understanding of the dynamics linking green transformational leadership (GTL) and digital innovation capability (DIC) in practice. The thematic results indicate that leaders are expected to model adaptability and confidence-even when they are not technical experts-by prioritizing support for employees and mobilizing managerial backing to facilitate technology adoption, with training emerging as a key lever for strengthening staff skills and confidence in using new digital tools.

At the organizational level, the implementation of digital innovations requires exemplary leadership that encourages active employee participation and relies on continuous feedback loops to adjust work processes. The interviews also reveal cultural and generational resistance, particularly among older employees attached to traditional paper-based practices, which underlines the need to rethink change-management approaches and to focus more on transforming Tunisian administrative culture. Finally, leaders seek to promote employee

autonomy, encouraging individuals to take initiative and develop their competences, especially in relation to environmental sustainability and responsible use of digital technologies.

These findings enrich the interpretation of the quantitative results by adding a human, cultural, and contextual layer. They show that the success of GTL depends heavily on its alignment with employees' genuine acceptance of change and confirm the crucial role of an organizational culture open to change in fostering sustainable digital innovation in Tunisian public administration. This discussion therefore strengthens understanding of the quantitative outcomes by demonstrating that effective digital and ecological transformation in the Tunisian public sector relies simultaneously on visionary leadership and on a culture that actively supports and values change.

Implications

This study highlights several major implications for Tunisian public administration. First, it underscores the need to invest in leadership-development programmes that cultivate green transformational leadership qualities, such as acting as an ecological role model, communicating a clear sustainability vision, providing intellectual stimulation, and offering individualized support to employees.

Second, it emphasizes the crucial importance of promoting acceptance of change among employees through ongoing training, confidence-building measures, and psychological support aimed at reducing resistance and strengthening commitment to digital tools. At the theoretical level, the findings enrich existing knowledge by showing that acceptance of change positively moderates the relationship between green transformational leadership and digital innovation capability, thereby highlighting how employees' cultural and psychological context conditions leadership effectiveness.

Finally, the study invites managers to adopt a dual approach that combines strong, visionary green leadership with the deliberate development of an organizational culture that is receptive to change. This involves managing resistance through targeted interventions-such as coaching, mentoring, and skills development-while encouraging employee autonomy and participation in order to optimize sustainable digital transformation aligned with environmental objectives; taken together, these insights constitute essential strategic levers for a successful digital and ecological transition within Tunisian public organizations.

Future Research Prospects

Future research prospects emerge from several empirical limitations identified in this study. First, the model explains a relatively small proportion of the variance in digital innovation capability (R^2=0.121), which suggests that important determinants of public-sector digital innovation remain unaccounted for. Future models could therefore incorporate additional organizational and environmental variables-such as digital infrastructure, regulatory frameworks, political support, and affinity for digital technologies-to develop more robust explanatory and predictive frameworks for digital innovation in public organizations. Broader contextual factors, including organizational culture and organizational trust, also warrant deeper investigation, and expanding research beyond Tunisia to other developing and emerging countries would strengthen external validity.

Second, the Data Management dimension shows limited convergent validity (AVE = 0.450), indicating that the underlying construct is only partially captured by the current items. Future research should develop a public-sector-specific Data Management scale that includes measures of data governance, interoperability, security, and data-driven decision-making, in order to more accurately reflect the central role of data in digital innovation capability. Refining this construct's operationalization would both improve the measurement model and enhance the overall predictive power of structural models linking leadership, acceptance of change, and digital innovation.

Third, the use of a cross-sectional design and the focus on a single national context and one ministry limit both the generalizability of the findings and the capacity to draw causal inferences. Longitudinal and multi-level research designs would make it possible to analyze how leaders adapt their practices, how acceptance of change evolves, and how data-management strategies develop across organizational levels, as well as how these

dynamics shape digital innovation trajectories over time. Comparative studies across countries, sectors, and types of public organizations would further help identify contextual conditions under which green transformational leadership and acceptance of change exert the strongest impact on digital innovation capability.

CONCLUSION

This research examined how acceptance of change moderates the relationship between green transformational leadership (GTL) and digital innovation capability (DIC) within Tunisian public administration, using a rigorous mixed-methods design that combined quantitative analysis and qualitative evidence. The findings confirm that GTL significantly enhances DIC, while employees' acceptance of change both directly strengthens DIC and exerts a positive moderating effect, amplifying the influence of green leadership on digital innovation.

These results underline the paramount importance of the interaction between visionary, sustainability-oriented leadership and an organizational culture that is open to change for achieving successful digital and ecological transformation in the public sector. The study addresses notable gaps in the literature by jointly integrating green leadership, acceptance of change, and digital innovation capability into a single model tailored to transition economies such as Tunisia, and it highlights the central role of human factors-attitudes, readiness, and adaptability-alongside technological and organizational capabilities in enabling sustainable innovation.

On a practical level, the findings call for targeted leadership-development initiatives, sustained employee engagement, and comprehensive change-management strategies that nurture a culture of openness, learning, and participation. From a managerial perspective, a dual approach is essential: strengthening green transformational leadership while simultaneously addressing employee readiness and resistance in order to accelerate digital transformation aligned with environmental objectives.

Future research should investigate the longitudinal evolution of these dynamics and examine how they manifest across diverse institutional contexts, which would further deepen understanding of sustainable public innovation. Overall, this study provides valuable theoretical and empirical insights to guide decision-makers and practitioners in promoting inclusive, effective, and green digital governance in Tunisia and in similar settings.

REFERENCES

1. Achmada, A. Y., Hermanto, B., & Tresna, P. W. (2024). Initiating green innovation: The role of green transformational leadership in corporate sustainability. Jurnal Ilmu Administrasi: Media Pengembangan Ilmu dan Praktek Administrasi, 21(1), 105–120.
2. Adawiyah, I., & Sopiah, S. (2023). Transformational leadership and employee performance: Systematic literature review. Transformasi: Journal of Economics and Business Management, 2(4), 202–214.
3. Afsar, B., Badir, Y., & Bin Saeed, B. (2014). Transformational leadership and innovative work behaviour. Journal of Business Research, 67(10), 2142–2151.
4. Aggarwal, P., & Agarwala, T. (2023). Relationship of green human resource management with environmental performance: Mediating effect of green organizational culture. Benchmarking: An International Journal, 30(7), 2351–2376.
5. Ahmad, S., Khan, M., & Ahmed, F. (2022). Green transformational leadership and eco-innovation in organizations: Evidence from emerging economies. Journal of Cleaner Production, 330, 129755.
6. Al-Ali, A. A., Singh, S. K., Al-Nahyan, M., & Sohal, A. S. (2017). Change management through leadership: The mediating role of organizational culture. International Journal of Organizational Analysis, 25(4), 723–739.
7. Al-Ayed, S. (2024). Green innovation influenced by employee innovative work behavior via moderating role of innovative leaderships. Cogent Business & Management, 11(1).
8. Albadarneh, A. M., Daradkah, A. M., Telfah, E. A., AlKhatib, F. Y., Mahmoud, A. M., Altaha'at, E. S., & Ali Ali, S. (2024). Green transformational leadership as an approach to achieving sustainable environmental development in Arab universities. Pakistan Journal of Life & Social Sciences, 22(1).
9. Al-Saidi, M., Ellermann, A.-K., Fittkow, M. F., Perillieux, T. R., Saadaoui, I., & Ben-Hamadou, R. (2024). The perils of building big: Desalination sustainability and brine regulation in the Arab Gulf countries. Water Resources and Industry, 32, 100259.

10. Andersson, A., Skantz-Åberg, E., Lantz-Lundin, M., & Williams, P. (2022). Teachers' professional digital competence: An overview of conceptualisations in the literature. Cogent Education, 9(1).
11. Armenakis, A. A., Harris, S. G., & Mossholder, K. W. (1993). Creating readiness for organizational change. Human Relations, 46(6), 681–703.
12. Atobishi, T., Abu Bakir, S. M., & Nosratabadi, S. S. (2024). How do digital capabilities affect organizational performance in the public sector? The mediating role of organizational agility. Administrative Sciences, 14(2).
13. Avolio, B. J., & Bass, B. M. (2004). Multifactor Leadership Questionnaire: Third edition manual and sampler set. Mind Garden, Inc.
14. Avolio, B. J., & Gardner, W. L. (2005). Authentic leadership development: Getting to the root of positive forms of leadership. The Leadership Quarterly, 16(3), 315–338.
15. Bass, B. M. (1985). Leadership and performance beyond expectations. Free Press.
16. Bass, B. M., & Riggio, R. E. (2006). Transformational leadership (2nd ed.). Psychology Press.
17. Bentaleb, D. (2024). Dynamics of leadership, interpersonal relations and commitment to change in the Tunisian healthcare context: Toward effective transformation of healthcare institutions? Journal of Management Development, 43(4), 514–532.
18. Blanc, E. (2016). L'impact de la digitalisation des organisations sur le rapport au travail : Entre aliénation et émancipation. Questions de Management, 2(143), 1–20.
19. Bouaziz, F. (2020). From e-government to digital government: The public value quest in the Tunisian public administration. In Digital transformation and public services (pp. 107–127). IGI Global.
20. Boussaidi, A., & Korbi, K. (2025). The role of transformational leadership in promoting digital transformation through employee engagement in public administration. International Journal of Public Leadership. https://doi.org/10.1108/IJPL-08-2024-0091
21. Bovaird, T., & Löffler, E. (2003). Understanding public management and governance. Public Management Review, 5(1), 65–67.
22. Brockmeyer, A., Khatrouch, M., & Raballand, G. (2015). Public sector size and performance management: A case study of post-revolution Tunisia (Policy Research Working Paper 7159). World Bank.
23. Brunsson, N. (1989). The organization of hypocrisy: Talk, decisions and actions in organizations. Wiley.
24. Burns, J. M. (1978). Leadership. Harper & Row.
25. Casimir, S., Leturcq, F., & Bancal, M. (2025). La formation au cœur de la transformation digitale du secteur public. Archimag, 384(4), 18.
26. Chaire EPPP – Économie des Partenariats Public-Privé. (2022). [Rapport ou document : compléter le titre exact et l'éditeur le cas échéant].
27. Chang, C.-H., Chen, Y.-S., & Tseng, C.-W. (2025). Digital transformation anxiety: Absorptive capacity, dynamic capability, and digital innovation performance. Management Decision, 63(3), 734–755.
28. Chen, H., et al. (2023). Boundary of ecosystem services: Guiding future development and application of the ecosystem service concepts. Journal of Environmental Management, 344, 118752.
29. Chen, Y.-S., & Chang, C.-H. (2013). The determinants of green product development performance: Green dynamic capabilities, green transformational leadership, and green creativity. Journal of Business Ethics, 116, 107–119.
30. Chin, W. W. (1998). The partial least squares approach to structural equation modeling. In G. A. Marcoulides (Ed.), Modern methods for business research (pp. 295–336). Lawrence Erlbaum Associates.
31. Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Lawrence Erlbaum Associates.
32. Di Fabio, A., & Gori, A. (2016). Developing a new instrument for assessing acceptance of change. Frontiers in Psychology, 7, 802.
33. Ding, X., Lin, Y., & Zhang, H. (2023). Dynamic capabilities and digital green innovation: The mediating role of technological opportunity recognition. Technological Forecasting and Social Change, 190, 122320.
34. Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: What are they? Strategic Management Journal, 21(10–11), 1105–1121.
35. El Mahi, R., & Slaoui, S. (2023). Le leadership transformationnel et la performance organisationnelle des entreprises : Un essai d'analyse. Revue du contrôle, de la comptabilité et de l'audit, 7(2).

36. Fernandez, S., & Rainey, H. G. (2006). Managing successful organizational change in the public sector. Public Administration Review, 66(2), 168–176.
37. Fishman, J., Lushin, V., & Mandell, D. S. (2020). Predicting implementation: Comparing validated measures of intention and assessing the role of motivation when designing behavioral interventions. Implementation Science Communications, 1(1), 81.
38. Fuentes, G. M. (2011). La transición democrática post-benalista: Procedimiento y alcance del cambio político en Túnez. Política y Sociedad, 48(1), 135–156.
39. Gardner, B., Rebar, A. L., & Lally, P. (2020). Habit interventions. In M. S. Hagger, L. D. Cameron, K. Hamilton, N. Hankonen, & T. Lintunen (Eds.), The handbook of behavior change (pp. 599–616). Cambridge University Press.
40. Gruman, J. A. (2023). Leadership styles and employee adoption of green digital innovation: Promoting sustainable workplace behaviors. Journal of Business Ethics, 178(1), 45–60.
41. Hair, J. F., & Alamer, A. (2022). Partial least squares structural equation modeling (PLS-SEM) in second language and education research: Guidelines. Research Methods in Applied Linguistics, 1(3), 100027.
42. Harisinta, T. (2023). Green transformational leadership in improving green work behaviour of employee, with green organizational citizenship behaviour as mediation. International Journal of Review Management, Business and Entrepreneurship, 3(2), 10–21.
43. Haug, N., Dan, S., & Mergel, I. (2023). Digitally induced change in public sector: A systematic review and research agenda. Public Management Review, 26(7), 1151–1178.
44. Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. In R. R. Sinkovics & P. N. Ghauri (Eds.), New challenges to international marketing (Advances in International Marketing, Vol. 20, pp. 277–319). Emerald Group Publishing.
45. Hood, C. (1991). A public management for all seasons? Public Administration, 69(1), 3–19.
46. Hair, J. F., Jr., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). A primer on partial least squares structural equation modeling (PLS-SEM) (3rd ed.). Sage.
47. Jansen, J. J. P., Van den Bosch, F. A. J., & Volberda, H. W. (2008). Structural differentiation and ambidexterity: The mediating role of integration mechanisms. Organization Science, 20(4), 812–828.
48. Kane, G. C., Palmer, D., Phillips, A. N., Kiron, D., & Buckley, N. (2019). The technology fallacy: How people are the real key to digital transformation. MIT Press.
49. Katz, D., & Kahn, R. L. (1978). The social psychology of organizations (2nd ed.). Wiley.
50. Klein, K. J., & Sorra, J. S. (1996). The challenge of innovation implementation. Academy of Management Review, 21(4), 1055–1080.
51. Kotter, J. P. (1996). Leading change. Harvard Business School Press.
52. Kura, K. M. (2016). Linking environmentally specific transformational leadership and environmental concern to green behaviour at work. Global Business Review, 17(1S), 1S–14S.
53. Kroh, J., Globocnik, D., Schultz, C., Holdhof, F., & Salomo, S. (2024). Micro-foundations of digital innovation capability: A mixed method approach. Technological Forecasting and Social Change, 198, 122911.
54. Lahlimi, N., Karim, K., & Wahbi, A. (2023). La transformation digitale des organisations publiques : Approches théoriques et horizons innovants. International Journal of Accounting, Finance, Auditing, Management and Economics, 4(6-1), 817–833.
55. Lee, W. R., Choi, S. B., & Kang, S. W. (2021). How leaders' positive feedback influences employees' innovative behavior: The mediating role of voice behavior and job autonomy. Sustainability, 13(4), 1901.
56. Lewin, K. (1947). Frontiers in group dynamics: Concept, method and reality in social science; social equilibria and social change. Human Relations, 1(1), 5–41.
57. Lindquist, E. A. (2022). The digital era and public sector reforms: Transformation or new tools for competing values? Canadian Public Administration, 65(3), 547–568.
58. Lines, R. (2004). Influence of participation in strategic change: Resistance, organizational commitment and change goal achievement. Journal of Change Management, 4(3), 193–215.
59. Liu, X., & Yu, X. (2023). Green transformational leadership and employee organizational citizenship behavior for the environment in the manufacturing industry. Frontiers in Psychology, 13, 1097655. https://doi.org/10.3389/fpsyg.2022.1097655
60. Madan, R., & Ashok, M. (2023). AI adoption and diffusion in public administration: A systematic literature review and future research agenda. Government Information Quarterly, 40(4), 101774.

61. Marchiori, D. M., Rodrigues, R., Mainardes, E. W., & Popadiuk, S. (2023). The role of IT capabilities, IT reconfiguration capability and innovativeness on organizational performance: Evidence from the Brazilian public sector. Revista de Administração Pública, 57(2), 329–349.
62. Martins, C. de S. F., & Alves, L. (2024). Digital transformation in public management: The case of Fiocruz from the perspective of its workers. Concilium, 24(20), 274–290.
63. Mashuri, S., Sarib, M., Rasak, A., Alhabsyi, F., & Syam, H. (2022). Semi-structured interview: A methodological reflection on the development of a qualitative research instrument in educational studies. Journal of Research and Method in Education, 12(1), 22–29.
64. Melchor, H. (2008). La gestion du changement dans l'administration des pays de l'OCDE : Un premier aperçu général (Documents de travail sur la gouvernance publique, No. 12). OCDE.
65. Miller, M., & Ghaffarzadegan, N. (2025). Dynamic capabilities in the public sector: A systematic literature review. International Journal of Public Sector Management, 38(1), 45–65.
66. Mittal, S., & Dhar, R. L. (2016). Effect of green transformational leadership on green creativity: A study of tourist hotels. Tourism Management, 57, 118–127.
67. Mkrtchyan, T., & Melkumyan, N. (2023). The foundations of digital transformation of the public administration system. Aylĕntrank, 118–127.
68. Motamedi, M., Mira da Silva, M., & Amaral, M. (2024). Organizational capabilities for digital innovation: A systematic literature review. European Journal of Innovation Management. Advance online publication. https://www.emerald.com/insight/1460-1060.htm
69. Mu, R., & Wang, H. (2022). A systematic literature review of open innovation in the public sector: Comparing barriers and governance strategies of digital and non-digital open innovation. Public Management Review, 24(2), 135–161.
70. Mukhtar, A., Mahmood, S., Naeem, M., & Khan, K. I. (2025). I feel green with my leader: When and how green transformational leadership influences employees' green behavior. International Journal of Ethics and Systems. Advance online publication. https://www.emerald.com/insight/2514-9369.htm
71. Nasri, W. (2019). Determinants of e-government acceptance in Tunisia. Government Information Quarterly, 36(4), 101387.
72. Noe, R. A. (2008). Employee training and development (4th ed.). McGraw-Hill.
73. Oreg, S. (2003). Resistance to change: Developing an individual differences measure. Journal of Applied Psychology, 88(4), 680–693.
74. Oreg, S., Vakola, M., & Armenakis, A. (2011). Change recipients' reactions to organizational change: A 60-year review. The Journal of Applied Behavioral Science, 47(4), 461–524.
75. Pichlak, M. (2021). Transformational leadership for green innovation: Creating sustainable workplaces. Sustainability, 13(14), 7654.
76. Pollitt, C., & Bouckaert, G. (2017). Public management reform: A comparative analysis (4th ed.). Oxford University Press.
77. Pupion, P.-C. (2018). L'innovation dans le secteur public. Gestion et Management Public, 6(4), 6–8.
78. Pupion, P.-B. (2018). Public sector innovation capabilities: PLS-SEM evidence from emerging economies. Public Administration Review, 78(3), 456–468.
79. Raipa, A. (2013). Organizacijų pasirengimo pokyčių valdymui dekompozicija. Public Policy and Administration, 12(4), 523–539.
80. RAQMYAT Project. (2024). RAQMYAT, a springboard to the digitalization of doctoral education in Tunisia. Erasmus+ Programme. https://www.raqmyatproject.eu/en/raqmyat-a-springboard-to-the-digitalization-of-doctoral-education-in-tunisia/7493/
81. Ratchford, M., & Ratchford, B. T. (2021). A cross-category analysis of dispositional drivers of technology adoption. Journal of Business Research, 127, 300–311.
82. Robertson, J. L., & Barling, J. (2017). Toward a new measure of organizational environmental citizenship behavior. Journal of Business Research, 75, 57–66.
83. Robertson, J. L., & Barling, J. (2013). Greening organizations through leaders' influence on employee pro-environmental behaviors. Journal of Organizational Behavior, 34(2), 176–194.
84. Rumijati, A., & Novianti, K. R. (2024). The development of green transformational leadership: A bibliometric analysis. MEC-J (Management and Economics Journal), 8(2), 133–144.
85. Rym, B., Olfa, B., & Mélika, B. M. (2013). Determinants of e-learning acceptance: An empirical study in the Tunisian context. American Journal of Industrial and Business Management, 3(3), 307–321.

86. Saleem, F., Matelou, S., & Malik, M. I. (2024). How green transformational leaders trigger environmental performance? Unleashing the missing links through green self-efficacy, green empowerment, and green training of employees. Sustainability, 16(22), 9982.
87. Sangadji, E., & Islami, M. I. (2024). Effect of green transformational leadership on organizational environmental performance: The role of green human resource management practices (Study on SMEs in the embroidery sector). International Journal of Economics & Management, 18(1).
88. Santos, L. G. de M. (2024). Dynamic capabilities in the public sector: Research agenda in the context of digital transformation. JeDEM: eJournal of eDemocracy and Open Government, 16(2), 74–87.
89. Saoudi, L., Aubry, M., Gomot, T., & Renaud, A. (2023). Transformation digitale et performance des PME : Une analyse bibliométrique pour comprendre et agir. Revue Internationale P.M.E., 36(2), 6–138.
90. Singh, S. K., Del Giudice, M., Chierici, R., & Graziano, D. (2020). Green innovation and environmental performance: The role of green transformational leadership and green human resource management. Technological Forecasting and Social Change, 150, 119762.
91. Sobral-Souza, T., Stropp, J., Santos, J. P., Prasniewski, V. M., Szinwelski, N., Vilela, B., Freitas, A. V. L., Ribeiro, M. C., & Hortal, J. (2021). Knowledge gaps hamper understanding the relationship between fragmentation and biodiversity loss: The case of Atlantic Forest fruit-feeding butterflies. PeerJ, 9, e11673. https://doi.org/10.7717/peerj.11673
92. Sopamena, C. A. (2024). Digital revolution and public administration innovation: Increasing the efficiency and responsiveness of public services. Journal of Governance: Jurnal Ilmu Pemerintahan Universitas Sultan Ageng Tirtayasa, 9(2).
93. Srour, C. K. G. E. K., Kheir-El-Din, A., & Samir, Y. M. (2020). The effect of green transformational leadership on organizational citizenship behavior in Egypt. Academic Journal of Interdisciplinary Studies, 9(5), 1–16.
94. Stelter, A., Kaping, C., Oschinsky, F. M., & Niehaves, B. (2020). Theoretical foundations on technology acceptance and usage in public administrations: Investigating bounded acceptance and usage of new technology by employees. In Proceedings of the 21st Annual International Conference on Digital Government Research (pp. 344–345).
95. Su, W., & Hahn, J. (2025). Achieving employee green performance through green transformational leadership: A multilevel study of chemical organizations. Leadership & Organization Development Journal, 46(2), 269–284.
96. Sun, Q., Li, Y., & Hong, A. (2024). Integrating ESG into corporate strategy: Unveiling the moderating effect of digital transformation on green innovation through employee insights. Systems, 12(5), 148. https://doi.org/10.3390/systems12050148
97. Sverdlik, N., Oreg, S., Paine, J. W., & Seo, M.-G. (2024). Activation and valence in responses to organizational change: Development and validation of the change response circumplex scale. Journal of Applied Psychology, 109(1), 135–155.
98. Sverdlik, A., Oreg, S., & Vakola, M. (2023). Acceptance of change: A multidimensional construct. Journal of Applied Psychology, 108(4), 567–589.
99. Taamallah, A., Khemaja, M., & Faiz, S. (2019). The smart city of Tunisia. In A. Vesco & F. Ferrero (Eds.), Smart city emergence: Cases from around the world (pp. 421–433). Springer.
100. Tai, J. C. F., Wang, E. T. G., & Wang, K. (2017). Investigating the impact of IT ambidexterity on digital innovation capability. In Proceedings of the Pacific Asia Conference on Information Systems (PACIS 2017) (Paper 32).
101. Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. Strategic Management Journal, 18(7), 509–533.
102. Thiétart, R. A. (2014). Méthodes de recherche en management (4e éd.). Dunod.
103. Turan Torun, B. (2023). The effects of green transformational leadership on the green behaviour of business, the environment and the green performance. Van Yüzüncü Yıl University the Journal of Social Sciences Institute, 61, 31–53.
104. Umair, S., Waqas, U., Mrugalska, B., Shamsi, I. R., & Bystrov, I. (2024). Mediating role of green talent management between green strategic orientation and sustainable supply chain performance among SMEs of Oman. Sustainability, 16, 947.

105. Van der Voet, J. (2014). The effectiveness and specificity of change management in a public organization: Transformational leadership and a bureaucratic organizational structure. European Management Journal, 32(3), 373–382.
106. Van der Voet, J. (2015). Change leadership and public sector organizational change. The American Review of Public Administration, 46(6), 752–768.
107. Verplanken, B., & Orbell, S. (2019). Habit and behavior change. In K. Sassenberg & M. L. W. Vliek (Eds.), Social psychology in action (pp. 65–78). Springer.
108. Vveinhardt, J., & Sedziuvienė, N. (2022). Acceptance of change by reducing employee resistance and strengthening organizational commitment. Journal of Management Studies, 26(1).
109. Wahba, S., Al Asrag, A., Hassan, A., & Abdel Majeed, A. (2024). Green dynamic capabilities and green creativity in hospitality and tourism industry: The moderating role of green transformational leadership. Journal of Association of Arab Universities for Tourism and Hospitality.
110. Wang, S., & Esperança, J. P. (2023). Can digital transformation improve market and ESG performance? Evidence from Chinese SMEs. Journal of Cleaner Production, 419, 137980.
111. Waqas, U., Umair, S., Mrugalska, B., Shamsi, I. R., & Bystrov, I. (2024). Mediating role of green talent management between green strategic orientation and sustainable supply chain performance among SMEs of Oman. Annals of Operations Research, 340(2), 1063–1089.
112. Wiesböck, F. (2019). Innovating in a digital world – The role of digital product innovation capabilities. In Proceedings of the 27th European Conference on Information Systems (ECIS), Stockholm & Uppsala, Sweden, June 8–14, 2019. https://aisel.aisnet.org/ecis2019_rp/46
113. Wilden, R., Devinney, T. M., & Dowling, G. R. (2016). The architecture of dynamic capability research: Identifying the building blocks of a configurational approach. Academy of Management Annals, 10(1), 997–1076.
114. World Bank. (2022). Digital innovation towards sustainable public sector administration in Africa. In Digital transformation in Africa (pp. 149–168). Springer.
115. Wetzels, M., Odekerken-Schröder, G., & Van Oppen, C. (2009). Using PLS path modeling for assessing hierarchical construct models: Guidelines and empirical illustration. MIS Quarterly, 33(1), 177–195.
116. Yu, H., & Xucan, N. (2024). Embracing change: How enterprise digital transformation drives green technology innovation. https://www.researchgate.net/publication/377225320_Embracing_Change_How_Enterprise_Digital_Transformation_Drives_Green_Technology_Innovation
117. Zhang, T. (2024). Balancing digital innovation and traditional managerial practices for sustainable competitive advantage. Management Decision, 62(3), 789–805.