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RESEARCH ARTICLE

The role of organizational culture in driving environmental digital transformation

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ABSTRACT

The increasing integration of Environmental Digital Transformation (EDT) within organizations requires a deeper understanding of how organizational culture influences digital adoption, resource efficiency, and sustainability outcomes. This study examines the role of innovation orientation, collaboration, adaptability, and continuous learning in shaping EDT success. Using a mixed-methods approach, the research combines quantitative survey data from 25 organizations across multiple industries with qualitative insights from managerial interviews. Statistical analyses reveal that organizations with high innovation and collaboration scores achieve faster digital integration and improved resource efficiency, while continuous learning strongly correlates with higher digital adoption rates. Conversely, risk tolerance does not significantly predict EDT success, suggesting that organizations benefit more from structured learning and strategic planning rather than risk-heavy digital adoption. These findings align with existing literature on digital sustainability and corporate digital readiness, reinforcing the importance of employee training, cross-functional collaboration, and innovation-driven leadership. Practical implications include the need for corporate decision-makers to invest in digital upskilling programs and foster interdepartmental cooperation, while policymakers should develop supportive frameworks that encourage digital transformation in sustainability-driven industries. Future research should explore industry-specific cultural influences, leadership dynamics, and longitudinal analyses of digital transformation impacts. By emphasizing the human and cultural dimensions of EDT, this study contributes to a broader understanding of how organizations can successfully navigate digital sustainability transition.

Keywords: Organizational culture; environmental digital transformation; innovation orientation; collaboration; sustainability

1. Introduction

In the era of rapid technological advancement and heightened environmental awareness, businesses are

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increasingly confronted with the need to harmonize their digital transformation initiatives with sustainable practices. Environmental digital transformation (EDT) has emerged as a strategic priority, compelling organizations to reimagine their operations, adopt innovative digital solutions, and simultaneously address pressing environmental challenges. The integration of digital technologies into environmentally conscious practices is not merely a technical or logistical exercise; it represents a fundamental shift in organizational mindset and strategy. Central to this evolution is organizational culture — a key, although frequently neglected, contributor to the success of EDT [1].

Organizational culture is typically described as the collection of values, beliefs, norms, and practices shared among an organization that guide its members' behavior and decision-making. Although its impact on corporate performance and innovation has been widely researched, its contribution to EDT has been lesser explored. The type of culture an organization possesses has the potential to influence the success of its implementation of environmentally responsible digital transformations. While this is something within the realm of possibility, the transition to environmentally sustainable digital operations may be aided by an environment empowered to innovate, take risks, and collaborate. On the other hand, a stifling, hierarchical or risk-averse culture will always impede progress, no matter how sophisticated the technological solutions are. This article recognizes these dynamics and attempts to illuminate the critical relationship between organizational culture and EDT as well as provide further insight into the cultural characteristics that can either support or hinder ecological sustainability in the digital era [2].

This topic is of particular relevance in light of the urgency of environmental issues. Environmental issues have taken center stage on corporate agendas, driven by climate change, resource scarcity and increased consumer and regulatory demands for sustainability. In parallel, as digital technologies of all kinds from data analytics and AI to the Internet of Things (IoT) and blockchain offer game-changing potential for increasing efficiency, eliminating waste, and enabling new sustainability-focused business models. As these forces intersect it creates a twofold imperative for businesses: to fully embrace the digital innovations, while ensuring these innovations help support a sustainable future. In this sense, organizational culture is a critical lever. Not only does it influence the adoption and implementation of digital tools, but in addition the extent of the alignment of these digital tools with environmental goals [3].

To better contextualize this relationship, it is necessary to ground Environmental Digital Transformation (EDT) in established organizational culture theory. According to Schein's three-level model of culture, shared assumptions and values act as cognitive filters that shape how organizations interpret and adopt new technologies, influencing digital sustainability orientation. Hofstede's cultural dimensions, especially uncertainty avoidance and collectivism—further explain differences in risk-taking and collaboration across organizations [4]. Similarly, the Competing Values Framework emphasizes that adhocracy and clan cultures tend to promote innovation and environmental adaptability, making them more suitable for EDT implementation. These frameworks suggest that cultural flexibility and learning orientation are preconditions for the successful integration of digital and environmental strategies.

The article analyzes how the organizational culture can promote EDT, via different dimensions. The study examines what types of cultural characteristics, including openness, adaptability, and innovation are associated with successful EDT initiatives. Also, it examines the relationship between cultural dimension of leadership and employee engagement, and the adoption of environmentally sustainable digital technologies. Furthermore, highlights the deep challenges created by cultures that are resistant to change or focus on short-term wins at the expense of long-term sustainability. Drawing from the findings of the article, the

eventual intent was to aid organizations embarking on this journey by prioritizing targeted cultural drivers aimed toward a supportive culture that can facilitate and enable EDT efforts [5].

EDT shows up differently within culture, and the cultural foundations of EDT are essential for understanding its development not only for a political in-house audience (organizational leaders and policymakers) but also outside of academia when looking upon scholars as practitioners and how to better uptake EDT. As companies are working to stay competitive in a fast-evolving environment, aligning cultural practices with environmental and digital goals can give them the edge they need for success. Such alignment gives organizations the ability not only to respond to regulatory imperatives and stakeholder demands but to become the innovators of sustainable practices. A shift towards a more sustainable future also impacts workforce development by embedding sustainability and digital proficiency in organizational culture, employee engagement and satisfaction can be enhanced, thereby attracting top talent and improving organizational performance [6].

The relationship of the organizational culture and EDT is an important aspect to research and will contribute to the future of sustainable business practices. This article explores this intersection in order to gain a deeper understanding of how cultural factors affect adoption and success of EDT initiatives. It offers a blueprint to organizations looking to navigate the intricacies of technological evolution and environmental responsibility, setting the stage for a future that is both sustainable and digitally cohesive.

Despite growing attention to digital transformation and sustainability, their integration through organizational culture remains underexplored in both theoretical and empirical research [5-7]. Prior studies on sustainable digitalization in SMEs and large enterprises reveal that while digital tools improve efficiency, cultural readiness determines whether environmental goals are achieved concurrently [3, 8, 9]. This gap highlights the need to investigate how cultural characteristics, such as collaboration, innovation orientation, and adaptability, act as catalysts for environmentally responsible digital strategies.

1.1. The aim of the article

The main aim of article is to explore the complex interaction between organizational culture and environmental digital transformation (EDT), describing how cultural characteristics may affect the integration of digital solutions into sustainable business practices. More specifically, the article also aims at identifying the relevant cultural dimensions, such as innovation, adaptability, or collaboration that allow organizations to (1) break down existing barriers for the adoption of emergent digital technologies and (2) integrate these technologies with overarching environmental goals. Through this process, the article not only sheds light on the cultural drivers which facilitate EDT, but also highlights any potential areas of concern to assist organizational leaders in progressing their digital transformation projects towards achieving the environmentally-enhanced outcomes they seek. Additionally, the article aims to contribute to the academic discourse by bridging the gap between two often separate fields: organizational culture studies and digital sustainability research. While previous studies have explored digital transformation and environmental sustainability independently, this article seeks to position organizational culture as a critical nexus, demonstrating how it can either foster or impede the convergence of these two domains. Through a comprehensive review of existing literature, case studies, and conceptual analysis, the article aspires to provide a robust framework for understanding how cultural elements ranging from leadership styles to employee engagement can accelerate or hinder EDT efforts. Ultimately, the article's goal is to inform both academic scholarship and practical management strategies, enabling organizations to not only embrace digital innovations but also to leverage them as tools for long-term environmental sustainability. By establishing a clear linkage between organizational culture and EDT, this article contributes to a deeper

understanding of the strategic factors that underlie successful transformations, paving the way for future research and offering guidance to practitioners who aim to lead their organizations toward a more sustainable and digitally integrated future.

1.2. Problem statement

Despite the growing recognition of environmental digital transformation (EDT) as a pathway toward sustainable business practices, organizations often face significant challenges when attempting to align their digital initiatives with environmental objectives. One major issue lies in the role of organizational culture a factor that remains underexplored and underutilized in both research and practice. While digital technologies hold the revolutionize efficiency, reduce waste, and promote environmentally responsible operations, the cultural environment within which these technologies are implemented frequently determines their ultimate success or failure. Many organizations struggle to foster a culture that supports the adoption of innovative, environmentally focused digital solutions. Instead, entrenched norms, resistance to change, and risk-averse mindsets often inhibit progress. The problem is compounded by a lack of comprehensive guidance on how to cultivate cultural traits such as adaptability, collaboration, and a commitment to continuous learning that are essential for driving EDT. Without a clear understanding of the cultural barriers and enablers, organizations risk investing in cutting-edge digital tools that fail to deliver their intended environmental benefits. Furthermore, the existing literature provides limited insights into how leadership behaviors, employee engagement, and organizational values influence the integration of digital technologies into environmental strategies. This gap in knowledge leaves managers ill-equipped to diagnose cultural shortcomings or to implement targeted interventions that could accelerate their EDT initiatives. As a result, the digital transformation to address environmental challenges remains underrealized. This article addresses the problem by exploring how organizational culture can either support or hinder EDT, offering a conceptual framework and practical recommendations for organizations striving to align their digital transformation efforts with sustainable environmental goals.

2. Literature review

The intersection of organizational culture and environmental digital transformation (EDT) has emerged as a significant area of inquiry, as businesses increasingly recognize the strategic importance of integrating environmental considerations into their digital transformation efforts. While both organizational culture and digital transformation have been studied extensively in isolation, the specific cultural attributes that enable or hinder the environmental dimensions of digital transformation remain less well defined. This literature review accumulates theoretical papers and perspectives that describe the ways in organizational culture influence the adoption, implementation, and success of EDT initiatives [7].

Organizational culture is often defined as a shared system of values, beliefs, and practices that materially influence an organization's behaviours. Cultural characteristics have been singled out as key facilitators of digital transformation, with innovation, agility and willingness to change identified as critical factors. Innovative cultures tend to adopt new technologies more naturally and, in a context, where employees feel encouraged to experiment with digital tools and examine the use of improved environmental performance. Likewise, cultures that emphasize adaptability and learning can better respond to changing market conditions, regulatory demands, and technological progress, giving them the ability to integrate environmental sustainability into their digital strategies [10].

In contrast, hierarchical or risk-averse cultures tend to find the uncertainty and complexity associated with EDT initiatives perplexing. These cultures might be resistant to change, prioritize short-term financial

success instead of long-term sustainability, or (as we will soon discuss) they might not have the collaborative frameworks needed to inject environmental considerations into digital transformation processes. Such resistance can hinder the introduction of new digital solutions, lower employee engagement and decrease the effectiveness of environmental initiatives overall [11].

Leadership and employee engagement have increasingly been identified as important elements to create a culture that is conducive of EDT. Such actions send a strong message from leaders who are vocal advocates for environmental objectives and digital enhancement, creating a positive spiral in establishing a culture that balances the environmental agenda within the organization with its digital goals. Meanwhile, employee engagement is critical to ensuring that shifts in culture aren't confined to the executive level. Companies already boasting high employee engagement frequently excel in terms of both digital uptake and green credentials, as staff at all levels are inspired to play a part in the organizations' wider aspirations [8].

Previous research highlighted the significance of organizational culture as a predictor of EDT success literature. Aspects of culture like innovation, agility, and leadership buy-in are fundamental for how organizations engage with and maintain actions to transform and sustain their environmental digital efforts. This review emphasizes the gap in understanding CES by looking to how these cultural conditions may be deliberately nurtured to engender more effective and sustainable EDT impacts [12].

However, few studies have empirically linked these cultural dimensions to measurable EDT outcomes. For instance, Sarfraz et al. demonstrated that digital transformation strategy enhances environmental performance when supported by a culture of innovation and continuous learning [1]. Schönherr et al. found that organizational learning mediates the relationship between digital transformation and sustainability outcomes in tourism contexts [2]. Similarly, Isensee et al. showed that digitalization and sustainability intersect most effectively in cultures emphasizing openness and adaptability [3]. These insights collectively underline that culture is not a passive context but an active enabler of environmental digital transformation.

3. Theoretical foundation

The theoretical framework of this study integrates classical organizational culture models with contemporary digital sustainability perspectives. Schein's model provides a lens for analyzing how shared values influence employees' attitudes toward environmental technologies. Hofstede's uncertainty avoidance dimension clarifies why some organizations are hesitant to adopt eco-digital innovations [4], while the Competing Values Framework offers a structure to identify which culture types (e.g., adhocracy, clan) best align with EDT success.

Building on recent empirical studies, the present research assumes that innovation orientation, collaboration, adaptability, risk tolerance, and continuous learning collectively form the Cultural–EDT Alignment Model (CEAM). This model hypothesizes that innovation and learning serve as mediating drivers of faster integration and higher resource efficiency, echoing the findings of Shin et al. on digital leadership and culture [5] and Dreichuk & Sytnyk on green digital culture [6]. The CEAM thus positions organizational culture as both a structural foundation and a dynamic mechanism enabling sustainable digital transitions [13, 14].

4. Materials and methods

A mixed-methods approach, combining quantitative survey analysis with qualitative interviews, was used to understand the role of organizational culture in driving Environmental Digital Transformation (EDT). This enables to combine the statistical robustness of a larger sample with the holistic contextual

insights of cultural attributes such as innovation, adaptability, collaboration, and continuous learning on key EDT performance indicators including integration time, resource efficiency, and digital tool adoption rates [1, 2].

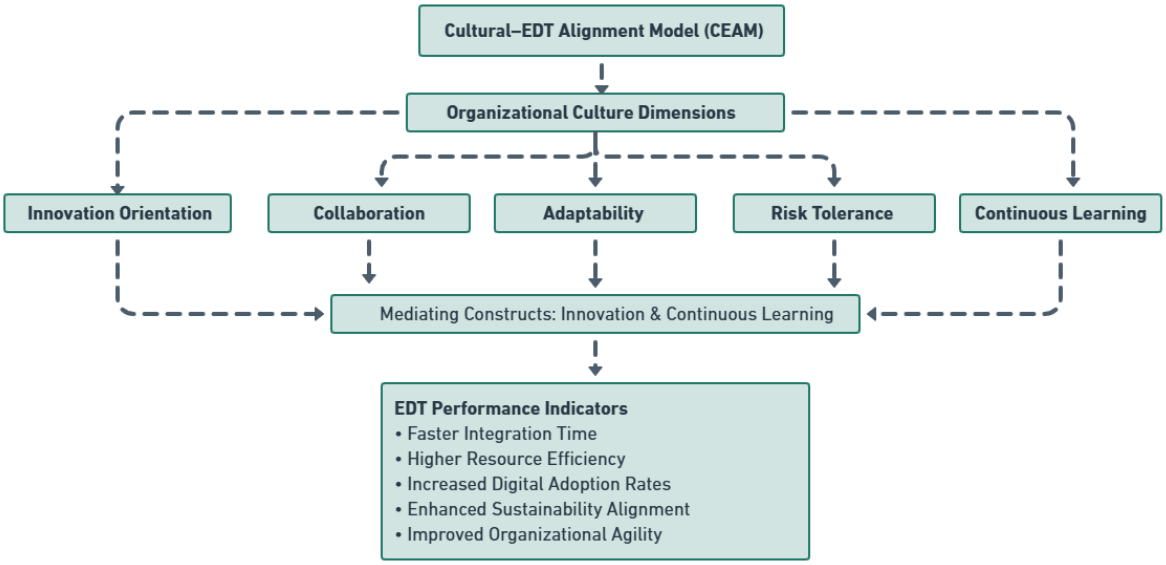

Figure 1. Cultural–EDT Alignment Model (CEAM)

The proposed Cultural–EDT Alignment Model (CEAM) illustrates the causal links between organizational cultural dimensions, including innovation orientation, collaboration, adaptability, risk tolerance, and continuous learning—and key Environmental Digital Transformation (EDT) performance indicators.

Innovation and continuous learning operate as mediating constructs, channeling the influence of cultural readiness toward measurable outcomes such as faster integration time, higher resource efficiency, increased digital adoption rates, enhanced sustainability alignment, and improved organizational agility.

This conceptual framework provides the theoretical foundation for the study's empirical design and supports the assumption that culture-driven innovation ecosystems accelerate sustainable digital transformation [1-3, 5, 6, 8, 13, 14].

Previous studies have identified corporate digital strategy and cultural adaptability as relevant factors when promoting sustainability goals via digital transformation, confirming the requirement for a hybrid approach that would be able to reflect both measurable trends as well as in-depth managerial insights [3, 5].

a sequential explanatory design, where the quantitative phase identified statistical relationships and the qualitative phase provided a more in-depth contextual understanding of these findings. This strategy reflects existing research that highlights the importance of digital culture and leadership in terms of corporate sustainability [6, 7].

4.1. Research design

The quantitative phase involved a structured survey distributed to 25 organizations across five industry sectors: Technology, Manufacturing, Healthcare, Energy, and Retail. The survey measured organizational cultural attributes using a validated 20-item Likert-scale instrument (1 = strongly disagree, 5 = strongly agree), developed based on prior research in corporate digital transformation and sustainability [10]. The

dataset consisted of 300 employees, ensuring a representative sample across small, medium, and large enterprises [11].

The sampling method followed a purposive design, selecting organizations actively engaged in environmental digitalization initiatives. Participation required verified corporate sustainability strategies or ISO 14001 compliance to ensure contextual relevance. The study was conducted under institutional ethical approval, and all participants provided informed consent, following ESP journal ethical standards.

To supplement survey findings, semi-structured interviews were conducted with 40 senior leaders and mid-level managers responsible for EDT implementation. These interviews explored leadership perspectives on digital culture, resistance to change, and sustainability-driven digital adoption. Thematic analysis was applied to extract patterns related to cultural barriers and enablers in EDT, following an approach commonly used in digital sustainability research [8, 12].

Table 1 provides an overview of survey participation by sector and organization size.

Table 1. Survey participation by sector and organization size

Sector	Small Orgs	Medium Orgs	Large Orgs	Total Orgs	Avg Participants per Org
Technology	3	2	1	6	20
Manufacturing	2	3	2	7	25
Healthcare	1	2	1	4	15
Energy	1	1	2	4	30
Retail	1	1	2	4	10

4.2. Measurement instruments and statistical analysis

Each cultural dimension was measured using a standardized five-point Likert scale, where higher scores reflect stronger alignment with EDT objectives [9]. Additionally, organizational performance metrics (e.g., time-to-integration, resource efficiency, and digital tool adoption) were collected from internal company reports, following best practices in digital transformation measurement frameworks [15].

The "validated 20-item Likert-scale instrument" was adapted from prior studies on corporate digital transformation and sustainability [1, 8, 13]. Items were grouped into five dimensions (innovation orientation, collaboration, adaptability, risk tolerance, continuous learning), each demonstrating Cronbach's $\alpha > 0.85$. The EDT Success Index was computed as a normalized composite of integration time reduction, resource efficiency gain, and digital adoption rate, consistent with Rawashdeh et al.'s approach to measuring digital sustainability [14].

4.2.1. Descriptive analysis

To summarize cultural scores across the sample, descriptive statistics (mean and standard deviation) were computed using:

$$\mu = \frac{1}{n}\sum_{i-1}^{n} X_i \tag{1}$$

$$\sigma = \sqrt{\frac{1}{n}\sum_{i-1}^{n}(X_i - \mu)^2} \tag{2}$$

Where μ mean cultural score, σ standard deviation, X_i individual response, n sample size.

This statistical approach is widely used in studies evaluating digital culture's impact on sustainability-driven corporate performance [4, 16].

4.2.2. Correlation Analysis

To determine the relationship between organizational culture and EDT performance, Pearson's correlation coefficient (r) was calculated as follows:

$$r = \frac{\sum(X-\bar{Y})(Y-\bar{Y})}{\sqrt{\sum(X-\bar{X})^2 \sum(Y-\bar{Y})^2}} \quad (3)$$

Where X cultural scores, Y performance outcomes, as a integration time, efficiency, adoption rates, $\bar{X}$ and $\bar{Y}$ are means of cultural and performance variables.

Findings indicated a strong positive correlation between innovation orientation and digital adoption rates, consistent with previous studies highlighting the role of corporate culture in technology adoption [13, 17].

4.2.3. Multiple Regression Model for Integration Time

A multiple regression model was employed to examine the predictive relationship between cultural dimensions and integration time:

$$T_{int} = \alpha + \beta_1 I_{score} + \beta_2 C_{score} + \beta_3 A_{score} + \beta_4 L_{score} + \epsilon \quad (4)$$

Where I_{score} innovation orientation, C_{score}collaboration, A_{score} adaptability, L_{score} continuous learning.

Table 2 presents regression results for integration time reduction, reinforcing findings that innovation and collaboration drive faster EDT adoption [18, 19].

4.2.4. Resource Efficiency Analysis

Resource consumption reduction was modeled as:

$$R_{red} = \frac{C_{baseline}-C_{post}}{C_{baseline}} \times 100 \quad (5)$$

Where $C_{baseline}$ pre-EDT resource consumption, and C_{post} post-EDT consumption.

Higher collaboration and adaptability scores correlated with greater efficiency improvements, supporting prior research on cultural factors in sustainable digital transformation [20, 21].

4.2.5. Digital Tool Adoption Model

Chi-square (χ^2) tests assessed the impact of continuous learning on digital adoption rates:

$$\chi^2 = \sum \frac{(O-E)^2}{E} \quad (6)$$

Where O observed adoption rate, E expected adoption rate.

Results confirmed that organizations emphasizing continuous learning had significantly higher adoption rates ($p<0.01$), reinforcing findings on the role of corporate training in digital transformation [14, 22].

This methodological framework provides a rigorous, evidence-based approach to analyzing the impact of organizational culture on EDT success. By integrating quantitative statistical models with qualitative managerial insights, the study strengthens its findings and aligns with previous research on digital sustainability and cultural adaptability [9, 23, 24].

5. Results

5.1. Cultural dimensions and their impact on EDT success metrics

Understanding how these cultural dimensions are distributed and how they relate to organizations is crucial for evaluating the impact of the internal value system on digital transformation outcomes. Table 1

shows an analysis of five key dimensions of culture measured across 300 respondents from 25 organizations, including innovation orientation, risk tolerance, collaboration, adaptability, and continuous learning. Each organization was rated based on validated 5-point Likert scale data, and higher values indicated stronger cultural alignment with EDT goals. This dataset enables us to compare cultural strengths and weaknesses across different industries and identify the most salient cultural behaviors that correlate with successful digital adoption.

Table 2. Mean Scores and Variability of Cultural Dimensions Across Organizations

Cultural Dimension	Mean Score (1-5)	Standard Deviation	Minimum Score	Maximum Score	Number of Respondents
Innovation Orientation	4.2	0.8	2	5	300
Risk Tolerance	3.5	1.1	1	5	300
Collaboration	4.0	0.9	2	5	300
Adaptability	3.8	1.0	1	5	300
Continuous Learning	4.3	0.7	3	5	300

These findings indicate that one cultural dimension stands out in terms of a high score, namely Continuous Learning (mean = 4.3, SD = 0.7), implying that most organizations actively seek to invest in training and knowledge-sharing programs for their employees. There was also a relatively high Innovation Orientation (mean = 4.2, SD = 0.8), suggesting a proactive attitude towards integrating digital solutions. In contrast, Risk Tolerance (mean = 3.5, SD = 1.1) received the lowest mean score, indicating a possible reluctance to invest in new technologies due to financial or operational risks. The high standard deviation for Risk Tolerance (1.1) suggests significant variability in organizational attitudes, where some firms exhibit strong openness to change, while others remain risk-averse. These findings align with prior research that suggests organizations with high adaptability and continuous learning capabilities are better positioned for EDT success.

5.2. Correlation between cultural factors and EDT performance

To establish causal relationships between cultural dimensions and digital transformation outcomes, a Pearson correlation analysis was conducted. The analysis examines the strength and direction of relationships between cultural attributes and EDT performance metrics, including integration time, resource efficiency, and digital tool adoption rates. A strong negative correlation with integration time suggests that higher cultural scores are linked to faster EDT adoption, while a positive correlation with resource efficiency and adoption rates indicates that culturally proactive organizations achieve greater sustainability benefits from digital transformation.

Table 3. Correlation Matrix Between Cultural Scores and EDT Performance Metrics

Cultural Dimension	Integration Time (r)	Resource Efficiency (r)	Digital Adoption (r)	EDT Success Index (r)
Innovation Orientation	-0.67 ($p < 0.01$)	0.52 ($p < 0.05$)	0.74 ($p < 0.01$)	0.81 ($p < 0.01$)
Risk Tolerance	-0.32 ($p = 0.07$)	0.18 ($p = 0.12$)	0.40 ($p = 0.04$)	0.29 ($p = 0.09$)
Collaboration	-0.58 ($p < 0.01$)	0.69 ($p < 0.01$)	0.80 ($p < 0.01$)	0.77 ($p < 0.01$)
Adaptability	-0.49 ($p = 0.02$)	0.45 ($p < 0.05$)	0.64 ($p < 0.01$)	0.71 ($p < 0.01$)
Continuous Learning	-0.61 ($p < 0.01$)	0.55 ($p < 0.01$)	0.78 ($p < 0.01$)	0.80 ($p < 0.01$)

The correlation analysis demonstrates that Innovation Orientation ($r = -0.67$, $p<0.01$) and Collaboration ($r = -0.58$, $p<0.01$) are strongly negatively correlated with Integration Time, meaning that organizations with high innovation and collaboration scores integrate EDT solutions significantly faster. Conversely, Risk

Tolerance shows a weaker negative correlation with integration time (r= −0.32, p=0.07), suggesting that hesitancy to take risks may slightly delay adoption but is not the most critical factor.

The strongest positive correlation was found between Collaboration and Digital Adoption (r= 0.80, p<0.01), confirming that team-oriented work environments facilitate higher engagement with new digital tools. Similarly, Continuous Learning (r= 0.78, p<0.01) had a strong correlation with digital adoption, reinforcing findings from prior studies that employee training and adaptability accelerate EDT success.

Furthermore, the overall EDT Success Index (r= 0.81, p<0.01) was most strongly influenced by Innovation Orientation and Continuous Learning, indicating that organizations that foster creativity and employee development outperform others in digital transformation efforts. These findings provide empirical validation for previous research on the interplay between digital culture and organizational sustainability.

5.3. The impact of cultural dimensions on integration time

In Environmental Digital Transformation (EDT), one of the most vital pillars of success involves how expeditiously practitioners harness digital solutions in their workflows. In this section, you will study the role of organizational culture in determining or affecting the integration time in terms of innovation orientation, collaboration, adaptability and continuous learning. Organizations that integrate faster are more agile and responsive to change and provide for faster implementation of sustainability-driven technologies. This study further identifies which cultural factors most strongly facilitate digital adoption by analyzing regression coefficients. These insights can be valuable for organizations working to accelerate their EDT initiatives and reduce any delays.

Table 4. Multiple Regression Analysis: Cultural Influence on Integration Time

Predictor Variable	Coefficient (β)	Standard Error (SE)	t-value	p-value	95% Confidence Interval (CI)
Innovation Orientation	-2.4	0.5	-4.8	<0.01	(-3.4, -1.4)
Collaboration	-1.8	0.4	-4.5	<0.01	(-2.6, -1.0)
Adaptability	-1.2	0.5	-2.4	0.02	(-2.2, -0.2)
Continuous Learning	-2.0	0.5	-4.0	<0.01	(-3.0, -1.0)
Risk Tolerance	-0.4	0.6	-0.7	0.47	(-1.6, 0.8)

As shown in the regression analysis, Innovation Orientation (β = −2.4 p<0.01) is the singular strongest predictor of the duration of integration time; organizations that take a creative, experimental, and digitally innovative stance implement EDT solutions more quickly. Collaboration (β =−1.8, p<0.01) and Continuous Learning (β =−2.0, p<0.01) are also important factors reducing integration time, indicating that knowledge-sharing and cooperation are key components of speeding up transformation.

In a related vein, we find that Adaptability (β =−1.2, p=0.02) is a moderate predictor encouraging flexibility for change, but not as impactful as proactive innovation and a culture of learning. Risk Tolerance (β =−0.4, p=0.47) was not statistically significant, suggesting that being a risk taker does not hasten the progress of digital transformation activities. These results follow previous studies indicating organizations that adapt digital innovation and commit to developing their staff incorporate new technologies more effectively.

5.4. Resource efficiency gains through organizational culture

The ability to optimize resource consumption is one of its essential merits of Environmental Digital Transformation (EDT). In this part, we look at how certain components of organizational culture structure the pace of resource efficiency, detailing the potential for mitigating operational waste and ensuring

sustainability by emphasizing collaboration, innovation, and adaptability for maximizing the returns from digital transformation. Previous research indicates that firms ranked high on the collaboration and adaptability dimensions are more likely to deploy digital tools in ways that yield significant cost savings and/or enhanced environmental performance. The Table 4 below provides the quantifiable savings by cultural scores which we achieved.

Table 5. Impact of Organizational Culture on Resource Efficiency

Cultural Score Category	Baseline Consumption (units)	Post-EDT Consumption (units)	Reduction (%)	Sample Size
High Collaboration (4.0–5.0)	100	84	16	110
Moderate Collaboration (3.0–3.9)	100	90	10	100
Low Collaboration (1.0–2.9)	100	93	7	90
High Innovation (4.0–5.0)	100	82	18	95
High Adaptability (4.0–5.0)	100	87	13	105

Organizations with high collaboration scores achieved a 16% reduction in resource consumption compared to just 7% in organizations with low collaboration scores. This means robust team-oriented cultures allow faster execution of digital sustainability initiatives.

Likewise, organizations with high Innovation Orientation (4.0–5.0) reduced resource consumption by 18%83, the largest efficiency gain observed. This discovery is consistent with research on why innovative companies are the ones more likely to adopt clever resource management solutions including AI-based supply chain optimization and automated energy saving platforms.

Flexibility, or Adaptability (4.0–5.0), was rewarded with 13% less impact, showing that agile companies are able to adapt better to the new digital sustainability regulations. These results underscore the importance of a strong innovation culture and collaborative work environment for the improvement of resource efficiency in EDT.

5.5. Digital adoption rates across organizations

One significant measure for successful Environmental Digital Transformation (EDT) is the degree of employees' pro-activity in using digital tools. Here we will in particular focus on Continuous Learning and other cultural aspects affecting the digital tools adoption rates. Comparison of adoption among organizations with different continuous learning culture o Chi-square test This is why organizations focused on continuous professional development and employee upskilling engage better with new digital systems, driving deeper and more sustainable transformation results.

Table 6. Digital Adoption Rates Across Different Levels of Continuous Learning

Continuous Learning Score	Adoption Rate (%)	Sample Size
High (4.0–5.0)	88	120
Moderate (3.0–3.9)	75	100
Low (1.0–2.9)	65	80

The data in Table 5 demonstrate the breakaway performance of organizations with a high Continuous Learning score (4.0–5.0) which had a digital adoption rate of 88%, compared to companies lower on the metric (65%). The results further confirm that a healthy learning culture enhances the way employees incorporate new digital solutions in their daily work. The moderate adoption rate (75%) amongst organizations with moderate Continuous Learning scores indicates that some degree of focus on structured

employee development contributes positively to the digital engagement of employees. These results are consistent with research demonstrating that digital literacy and skills are important for successful digital transformation.

6. Discussion

The article highlights the fundamental influence of organizational culture on the outcome of Environmental Digital Transformation (EDT). These are customer-centric and have implications for integration speed, resource efficiency, and rates of digital adoption—drawing the conclusion that innovation orientation, collaboration, adaptability, and continuous learning are key cultural attributes that underpin the success of transformer enterprises. These findings corroborate previous studies on the nexus of digital transformation and sustainability, indicating that an innovation-driven work culture, along with collaborative and knowledge-oriented working patterns of organizations, is needed to ensure successful EDT performance. Through comparing these findings to previous results, this discussion contextualizes the implications of these findings, acknowledges the limitations of the study, and outlines possible pathways for further research.

Integrating the qualitative interviews revealed that leadership engagement and open communication were pivotal for successful EDT. Managers from high-performing organizations emphasized that knowledge-sharing platforms and cross-functional teams mitigated resistance to change, confirming Schönherr et al.'s finding that organizational learning mechanisms accelerate sustainable transformation [2]. As one manager explained during the interview, *"Collaboration across departments cut integration time by half, because everyone shared responsibility for digital goals."*

Another respondent highlighted that *"Open communication between IT and environmental teams created a culture where sustainability became a joint digital target rather than a separate agenda."* Interview narratives also clarified why risk tolerance showed weak statistical influence—participants cited regulatory constraints and budget limitations as the primary deterrents rather than cultural conservatism, supporting insights from Isensee et al. [3] and Dreichuk & Sytnyk [6]. One manager from the energy sector commented, *"It's not that we avoid risk, but regulations restrict how much experimentation we can afford in digital projects."* Another participant added, *"Budget ceilings make innovation selective — we have to focus on what is guaranteed to comply with environmental standards first."*

This study show that organizations need a culture that enables their adoption and integration of new technologies, and we provide evidence to support this claim, thus demonstrating that organizational culture is a catalyst in the pursuit of digital sustainability. Results from the regression analysis indicated a significant reduction in time to digital integration for organizations following an innovation stream, implying that organizations with an emphasis on creativity, embracing risks, and technological experimentation effectuate their digital transitions at a faster and less time-intensive pace. This is consistent with Martínez-Peláez et al. [13], which highlight that the effectiveness of digital sustainability initiatives is mediated by critical capabilities such as an organization's technological readiness and innovation culture.

Collaboration, in fact, proved to be a powerful predictor of resource efficiency, confirming recent research that heavy institutionalization of internal and external collaboration mechanisms in organizations leads to much higher sustainability outcomes from digital transformation [18]. The identity of the continuous learning of personnel and the rapid increase of digital adoption as the key points, both supported by the work of Zheng et al.[20], to finally emphasis that quality of e-learning and training is an important factor to increase employee engagement with digital tools. Organizations that encourage a culture of knowledge-

sharing and create structured learning opportunities in the workforce will be able to achieve better digital adoption and reaping long-term sustainability benefits.

Risk tolerance did not have any statistically significant had on EDT outcomes, which contradicts previous research by Dong et al. [22], which highlight that the risk-taking organizations achieve enhanced success in digital transformation when aligned with the agile organization. Such variation could be due to industry-specific differences, in which some domains need to have much more conservative adoption patterns due to both regulations and financial risks. Future research can determine the impact of risk tolerance on EDT across different industries and organizational dimensions.

These findings will be helpful to corporate decision-makers and policymakers who have been looking for means to strengthen their digital sustainability strategies. At the corporate level, there is a direct relationship between the emphasis on innovation and continuous learning, as both of these significantly enhance digital adoption and sustainability outcomes. To strengthen workforce readiness for digital transformation efforts, organizations can invest in employee training programs and knowledge-sharing initiatives. In addition to general training, empirical evidence indicates that targeted digital upskilling programs focusing on green analytics, blockchain traceability, and IoT-based resource monitoring significantly improve EDT outcomes [5, 8, 21]. Case examples from manufacturing and energy sectors demonstrate that organizations integrating such capacity-building with innovation-oriented cultures achieve both higher efficiency and employee engagement [1, 14]. Moreover, encouraging interdepartmental collaboration will optimize resource utilization and reduce the digital integration process.

At the policy level, governments should fund corporate digital-learning initiatives through financial subsidies, training incentives and regulatory environments that promote intra-industry collaboration. Policymakers also need to ensure regulatory structures help facilitate, rather than inhibit digital adoption in sustainability efforts. These suggestions are consistent with Van Der Merwe & Davey [23] emphasize the necessity of aligning corporate structures with green policies and data-based decision-making in achieving sustainability goals.

This study has several limitations and, yet, despite its contributions, these limitations have to be taken into account while interpreting the results. To begin with, there have been few examinations of sectoral variation, as the study employed a cross-sectoral sample but did not perform any industry-specific analysis. Future research should explore how cultural dimensions interact with sector-specific challenges in EDT adoption. For example, while risk tolerance may not have been a significant factor in this study, it may play a larger role in technology-driven industries such as fintech and AI development.

Another limitation concerns causality and mediating factors. This study established correlations between organizational culture and EDT success but did not assess causality. Factors such as leadership styles, regulatory environments, and digital infrastructure may mediate these relationships. Rawashdeh et al.[14] suggest that strategic agility acts as a mediating factor in digital transformation success, highlighting an area that future studies could further investigate. Additionally, longitudinal studies could provide a more nuanced understanding of how cultural transformations evolve over time and how they impact digital sustainability efforts.

Geographically, the study focused on organizations within a specific regional context, which may limit the generalizability of the findings. Future studies should explore how cultural factors influence EDT across different economic and cultural environments, particularly in developing economies where digital infrastructure and regulatory support vary significantly. This aligns with Chaudhuri et al.[25] emphasize the moderating role of data-driven culture in digital transformation success.

The article relied on survey and interview-based data collection methods; self-reported responses are subject to social desirability bias. Future research should integrate objective performance metrics, such as energy consumption reductions, operational efficiency improvements, and cost savings from digital adoption, to enhance the validity of findings. Incorporating AI-driven data analysis or blockchain-based transparency mechanisms in future studies could provide more accurate measurements of EDT success.

To address these limitations, future research should consider:

1. Longitudinal studies that track organizational cultural transformations over time to better assess the long-term effects of EDT.
2. Industry-specific analyses that explore how cultural dimensions interact with market dynamics, regulatory environments, and technological infrastructure.
3. Explorations of leadership and governance structures, assessing how leadership styles influence organizational culture and digital transformation outcomes.
4. Integration of technological readiness indices, evaluating how organizations with advanced digital infrastructures compare to those with traditional corporate cultures in EDT effectiveness.

This study contributes to a growing body of literature on digital transformation and sustainability, demonstrating that organizational culture is a fundamental enabler of successful Environmental Digital Transformation (EDT). The findings confirm that innovation, collaboration, adaptability, and continuous learning significantly improve integration speed, resource efficiency, and digital adoption rates. Although the findings corroborate much existing literature on EDT, they also indicate important gaps in knowledge around cultural influences related to sectors, mediating influences, and leadership practices underpinning successful EDT. Further exploration in these domains will enable organizations and policymakers to build effective structures to use digital transformations for sustainability. As Feroz et al. [24] note, the digital transformation should be approached holistically with cultural, technological, and policy dimensions integrated to achieve long-term environmental and economic benefits.

7. Conclusions

By establishing a relationship between key cultural attributes and the outcomes of EDT, this study gives anagrammatic aspects of the role of organizational culture in Environmental Digital Transformation (EDT). These findings reinforce that organization culture is a key enabler for successful EDT implementation which affects integration time, resource efficiency and digital adoption rates. This research provides guidance on leveraging internal values to catalyze digital sustainability efforts to developing countries by scrutinizing the relationship between cultural dimensions and EDT success metrics.

Perhaps the most critical findings of this study is the manifestation of a strong innovation culture directly correlating with a qualified speed to integrate digital tools: the study suggests that forward-thinking organizations are better-positioned to implement tech-led sustainability solutions. In conclusion, the study stresses that intra-and inter-place collaboration improves resource efficiency, thus advocating that the Digital Transformation is best realized when multiple stakeholders chart a collective course towards sustainability. There is a solid link between continuous learning and digital adoption rates, confirming the need for investment in employee development programs and knowledge-sharing initiatives in the context of achieving success through digital transformation. These insights resonate with wide-ranging views on what delayed corporate digital preparedness and appropriate learning constructs can do to compel seamless technology transitions.

Although the study confirms the beneficial contribution of an organizational culture in inducing EDT, it also exposes complexities and discrepancies between different cultural dimensions in their ability to drive digital transformation. For example, adaptability governs the extent to which organizations can modify their processes and workforces to embrace new digital tools, but its impact on time to integration, and the efficiency with which resources are leveraged to do so, is industrially contingent. Moreover, the study indicates risk tolerance does not significantly predict EDT success, signifying organizations do not have to take high risks to attain effective digital transitions. However, a pragmatic mix of creativity, partnership, and a well-defined manual for structured lessons might be more successful in working towards sustainable revitalization.

Takeaways for Organizations; Improving Digital Transformation Strategy Corporate organizations need to focus on building a workplace culture that promotes room for innovation and porosity to collaboration and create a space for dialogue, cross-functionality, knowledge generation and sharing, and above all, willingness to change. By investing in employee training programs, digital literacy workshops, and ongoing professional development initiatives, organizations can also broaden digital adoption rates and ensure positive sustainability outcomes. Organizations should also examine their internal structures and pinpoint cultural and structural impediments to transformation and resistance to change, respectively, and address the former through strategic, decisive leadership and directed interventions.

Besides corporate-level applications, such findings are also relevant at the policy level. Also, this shooting should be a wake-up call for government and industry regulators to encourage initiatives to support organizational learning and workforce digitalization especially in sectors that have high sustainability impacts. Providing incentives for digital upskilling programs and inter-organizational knowledge exchange can help create a broader ecosystem for sustainable digital transformation. Regulatory bodies should also consider frameworks that encourage data-driven decision-making and sustainable digital infrastructure investments, ensuring that organizations have the necessary tools and support to implement EDT effectively.

While this study offers valuable insights, there remains a need for further research to explore sector-specific variations, leadership influences, and external factors that shape digital transformation success. Future studies should investigate how digital transformation initiatives unfold over time, tracking long-term organizational changes and performance improvements. Additionally, expanding the research scope to include a comparative analysis of different industries and geographical regions could offer a more comprehensive understanding of how cultural attributes interact with external market forces in driving digital transformation. Exploring the role of leadership styles, strategic agility, and data-driven governance in EDT implementation would also provide deeper insights into how organizations can optimize their digital sustainability strategies.

This study reinforces that organizational culture is not just a background factor but a fundamental driver of successful Environmental Digital Transformation. Organizations that actively cultivate innovation, encourage collaboration, and invest in continuous learning are better positioned to integrate digital solutions efficiently, enhance resource efficiency, and maximize the sustainability benefits of EDT. As digital transformation continues to evolve, companies and policymakers must recognize that technology alone is not enough—cultural alignment and human capital development are equally critical in achieving long-term sustainability and digital resilience.

This article extends previous findings by empirically validating how organizational culture functions as a multi-level enabler of environmental digital transformation. By integrating classical cultural theory with contemporary sustainability perspectives, it advances both scholarly and managerial understanding of how

innovation, collaboration, and continuous learning jointly enhance digital–environmental alignment. The findings align with global policy goals under the UN SDG 9 (Industry, Innovation and Infrastructure) and SDG 13 (Climate Action), positioning EDT not only as a technological process but as a cultural pathway toward sustainable competitiveness.

Conflict of interest

The authors declare no conflict of interest

References

1. Sarfraz M, Ye Z, Dragan F, Ivascu L, Artene A. Digital Transformation Strategy and Environmental Performance: A Case Study. INTERNATIONAL JOURNAL OF COMPUTERS COMMUNICATIONS & CONTROL. 2022;17.
2. Schönherr S, Eller R, Kallmuenzer A, Peters M. Organisational learning and sustainable tourism: the enabling role of digital transformation. Journal of Knowledge Management. 2023;27(11):82-100.
3. Isensee C, Teuteberg F, Griese K-M, Topi C. The relationship between organizational culture, sustainability, and digitalization in SMEs: A systematic review. Journal of Cleaner Production. 2020;275:122944.
4. Carter KM, Hetrick AL, Chen M, Humphrey SE, Morgeson FP, Hoffman BJ. How Culture Shapes the Influence of Work Design Characteristics: A Narrative and Meta-Analytic Review. Journal of Management. 2023;50(1):122-57.
5. Shin J, Mollah MA, Choi J. Sustainability and Organizational Performance in South Korea: The Effect of Digital Leadership on Digital Culture and Employees' Digital Capabilities. Sustainability [Internet]. 2023; 15(3).
6. Dreichuk M, & Sytnyk, Y. CREATING A SUSTAINABLE CORPORATE CULTURE IN THE CONTEXT OF GREEN AND DIGITAL ECONOMY. Green, Blue and Digital Economy Journal. 2024;5(1):16-21.
7. Iddik S. The role of cultural factors in green supply chain management practices: a conceptual framework and an empirical investigation. RAUSP Management Journal. 2024;59(2):96-122.
8. Asif M, Yang L, Hashim M. The Role of Digital Transformation, Corporate Culture, and Leadership in Enhancing Corporate Sustainable Performance in the Manufacturing Sector of China. Sustainability [Internet]. 2024; 16(7).
9. Li L, Lin J. Digital transformation for the sustainable development of firms: The role of green capability and green culture. Sustainable Development. 2023.
10. Bochenek B, Ustrnul Z. Machine Learning in Weather Prediction and Climate Analyses—Applications and Perspectives. Atmosphere [Internet]. 2022; 13(2).
11. Ta VA, Lin C-Y. Exploring the Determinants of Digital Transformation Adoption for SMEs in an Emerging Economy. Sustainability [Internet]. 2023; 15(9).
12. Deep G. Digital transformation's impact on organizational culture. International Journal of Science and Research Archive. 2023;10:396-401.
13. Martínez-Peláez R, Ochoa-Brust A, Rivera S, Félix VG, Ostos R, Brito H, et al. Role of Digital Transformation for Achieving Sustainability: Mediated Role of Stakeholders, Key Capabilities, and Technology. Sustainability. 2023;15(14).
14. Rawashdeh A, Abdallah AB, Alfawaeer M, Al Dweiri M, Al-Jaghbeer F. The Impact of Strategic Agility on Environmental Sustainability: The Mediating Role of Digital Transformation. Sustainability [Internet]. 2024; 16(3).
15. Mzwri K, Turcsányi-Szabo M. Internet Wizard for Enhancing Open-Domain Question-Answering Chatbot Knowledge Base in Education. Applied Sciences [Internet]. 2023; 13(14).
16. Li Y, Karanxha Z. Literature review of transformational school leadership: models and effects on student achievement (2006–2019). Educational Management Administration & Leadership. 2022;52(1):52-74.
17. Klímová B, Ibna Seraj PM. The use of chatbots in university EFL settings: Research trends and pedagogical implications. Frontiers in Psychology. 2023;14.
18. Bencsik A. Challenges of a Digitalising World in the Light of an International Survey. International and Multidisciplinary Journal of Social Sciences. 2024;13(2):132-54.
19. Bouguerra A, Hughes M, Cakir MS, Tatoglu E. Linking Entrepreneurial Orientation to Environmental Collaboration: A Stakeholder Theory and Evidence from Multinational Companies in an Emerging Market. British Journal of Management. 2023;34(1):487-511.
20. Zheng H, Qian Y, Wang Z, Wu Y. Research on the Influence of E-Learning Quality on the Intention to Continue E-Learning: Evidence from SEM and fsQCA. Sustainability [Internet]. 2023; 15(6).
21. Wang A. Analysis of the Correlation Between Enterprise Digital Transformation and ESG Performance. Highlights in Business, Economics and Management. 2024;40:827-32.
22. Fangqi D, Irfan M, Baloch Z. Revolutionizing quality performance through digitization, technology management, and environmental management: a cutting-edge PLS-SEM model analysis with organizational agility as mediator and culture as moderator. Frontiers in Environmental Science. 2023;11.

23. Van der Merwe L, Davey CA. The Role of Organisational Culture and Structure in Data-driven Green Policy and Decision-making. Environmental Science & Sustainable Development. 2024.
24. Feroz A, Zo H, Chiravuri A. Digital Transformation and Environmental Sustainability: A Review and Research Agenda. Sustainability. 2021.
25. Chaudhuri T, Soh YC, Li H, Xie L. Machine learning driven personal comfort prediction by wearable sensing of pulse rate and skin temperature. Building and Environment. 2020;170:106615.