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Managing Organizations in the Digital Age: Synergy of Technology and Green Management Principles

Gerir organizações na era digital: Sinergia entre tecnologia e princípios de gestão ecológica

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Resumo

A integração de tecnologias digitais e práticas de gestão ecológica aumenta a eficiência administrativa e apoia o desenvolvimento sustentável. Os sistemas ERP e CRM são as ferramentas digitais mais comuns, utilizadas por 63,9% e 57,4% das organizações, respectivamente. As plataformas em nuvem (49%) e a análise de big data (44,8%) são amplamente implementadas, enquanto a adoção de IA (25,3%), IoT (28,3%) e blockchain (9,6%) permanece moderada. Na gestão ambiental, a eficiência energética (54,4%) e a redução de resíduos (46%) são iniciativas fundamentais. Apenas 27,7% das organizações integram totalmente as metas ambientais à estratégia, enquanto 30,2% as negligenciam. O estudo mostra que as práticas digitais e ecológicas estão cada vez mais presentes, mas enfrentam barreiras técnicas e institucionais. O reforço das competências digitais e o alinhamento das metas de sustentabilidade à estratégia são essenciais para uma gestão organizacional integrada e preparada para o futuro.

Palavras-chave: transformação digital, desenvolvimento sustentável das organizações, administração inovadora, soluções digitais ecológicas, liderança

Abstract

The integration of digital technologies and green management practices enhances administrative efficiency and supports sustainable development. ERP and CRM systems are the most common digital tools, used by 63.9% and 57.4% of organizations, respectively. Cloud platforms (49%) and big data analytics (44.8%) are widely implemented, while adoption of AI (25.3%), IoT (28.3%), and blockchain (9.6%) remains moderate. In environmental management, energy efficiency (54.4%) and waste reduction (46%) are key initiatives. Only 27.7% of organizations fully integrate environmental goals into their strategy, while 30.2% neglect them. The study shows that digital and green practices are increasingly present but face technical and institutional barriers. Strengthening digital skills and aligning sustainability goals with strategy are essential for integrated, future-ready organizational management.

Keywords: *digital transformation, sustainable development of organizations, innovative administration, ecological digital solutions, leadership*

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Introduction

In the twenty-first century, organizational administration is undergoing an unprecedented transformation driven by the simultaneous impact of two megatrends: digitalization and environmentalization. Digital transformation, based on the intensive adoption of innovative technologies, radically changes how organizations operate, leading to a rethinking of value-creation mechanisms and the nature of interactions with internal and external stakeholders (Vial, 2019; Hanelt et al., 2021; Nadkarni & Prügl, 2021). At the same time, the emphasis on environmental responsibility and the need to adhere to sustainable development principles require integrating green management into modern management practices (Chowdhary & Bharagava, 2020; Mustapha et al., 2017; Rakovic et al., 2024; Rêgo et al., 2022). Moreover, digital technologies such as the Internet of Things (IoT), cloud computing, big data analytics, and automated control systems are transforming management decision-making tools and opening new avenues for implementing sustainable development principles (Dubey et al., 2021; Mardikaningsih & Wardoyo, 2024).

In this context, digital transformation is no longer just a technical innovation – it becomes a systemic management paradigm that helps organizations become more adaptable, transparent, and environmentally efficient. Incorporating digital technologies into green management processes enables the restructuring of business models, optimizing resource logistics, lowering carbon footprints, and enhancing companies' social responsibility (Kraus et al., 2021; Lanzolla et al., 2020). Successful digital transformation requires not only advanced technological infrastructure but also suitable institutional, managerial, and human resources. According to leading researchers, high-quality human capital, an adaptable organizational culture, managerial ability to execute change, and a clear strategic vision are essential for this process (Verhoef et al., 2021; Paul et al., 2024).

However, the effective implementation of digital transformation faces several limitations, with the main barriers including high initial costs of technological modernization, lack of technical infrastructure, absence of a strategic vision regarding long-term environmental benefits, and low institutional maturity in measuring ESG performance (Rebelo et al., 2016; Sawant et al., 2013). Enterprises that adopt green management concepts tend to perform better in executing environmental strategies. At the same time, neglecting human capital management in digital modernization processes significantly reduces the chances of achieving strategic goals (Dubey et al., 2021).

Thus, integrating digital technologies with the principles of green management appears not only as a response to external regulatory or ethical requirements but also as a vector for building long-term competitiveness in an economy focused on sustainable development (Mardikaningsih & Wardoyo, 2024). In this regard, the authors believe it is necessary to explore the mechanisms, barriers, and prospects for integrating digital and green tools into the administration of organizations, which is highly relevant in the current scientific and practical discourse.

The purpose of the study is to conduct a comprehensive assessment of the level of integration of digital technologies and green management in modern organizations,

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to determine the impact of this integration on the efficiency of administrative processes, and to investigate their impact on the development of sustainable management and dynamic environmental capabilities.

Research objectives of the article:

1. To analyze the level of implementation of digital technologies in the administrative activities of modern organizations in various sectors of the economy.

2. To identify common forms of environmental management and the degree of integration of environmental goals into the strategic documents of organizations.

3. To assess the interaction of digital technologies and environmental initiatives and its impact on improving the environmental performance of organizations.

4. To analyze the role of management style and support from the management in the processes of digital and environmental transformation of organizations.

5. To investigate the level of digital maturity of administrative processes and its correlation with the formation of environmental dynamic capabilities of organizations.

6. To identify the main barriers and challenges to the full integration of digital technologies and green management into organizational practices.

7. To conduct an empirical survey of managers and employees of organizations to collect data on current practices of digital and green administration and assess their effectiveness.

Literature Review

Administrative operations are fundamental to organizational activities, ensuring the functioning and coordination of many business processes essential for meeting strategic goals. They encompass a variety of management functions, including organizing office resources, coordinating labor flows, controlling internal communication, and monitoring performance indicators (Henke & Jacques Bughin, 2016; Onukwulu et al., 2021).

From a systemic perspective, administrative functions are executed through key components: strategic planning, budgeting, human resource management, information administration, and support for interdepartmental communication. These elements form a structural framework that ensures the integration and synchronization of daily operational processes with overall organizational strategies, helping improve resource utilization and optimize management decisions. In the context of digital transformation and the growing importance of sustainable development, administrative operations are gaining additional significance as a platform for implementing innovative digital solutions and green management practices that greatly enhance organizational adaptability and competitiveness (Basiru et al., 2023).

In modern organizational management, a key requirement for achieving strategic efficiency is the deployment of digital information management systems that incorporate digital technologies into internal business processes. Enterprise digitalization is regarded as a systemic transformation aimed at increasing the value,

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competitiveness, and adaptability of an organization using digital tools (Kraus & Kraus, 2021; Westerman et al., 2014).

The core of modern digital management is the development of the so-called "dynamic core capability of digital information management," which results from the synergy of digital strategic shifts and innovative management practices. This ability depends on the enterprise's capacity to respond quickly to environmental challenges, rethink strategies to meet the demands of sustainable development (especially green and low carbon), and create flexible organizational models during digital transformation.

Digital technologies enable businesses to monitor changes in the external environment, identify opportunities and threats, and analyze data, which in turn shapes digital thinking focused on environmental awareness. As a result, businesses can accurately predict the needs of green and low-carbon development and adapt their operations accordingly (Teece, 2007). Digital management systems play a crucial role in implementing green modernization strategies by ensuring the monitoring of internal processes (research, production, sales) and integrating environmental innovations. Of particular importance is the digital support for energy savings, emissions reductions, and greening of production, which provides a foundation for developing environmentally efficient business models (Kraus & Kraus, 2021).

Industry 4.0 digital technologies, such as the Internet of Things, cloud computing, big data analytics, and digital platforms, are significantly transforming organizational architecture by enabling intelligent monitoring, optimizing resource use, and reducing the carbon footprint through more accurate data-driven management decisions (Popovič et al., 2018; Dubey et al., 2019; Gupta et al., 2020a; Gupta et al., 2020b; Tykha et al., 2025). At the same time, many studies highlight the crucial role of human capital in the successful transition to a digital and ecological management model (Dubey et al., 2017; de Sousa Jabbour et al., 2018). It has been shown that the lack of relevant digital skills, soft skills deficits, and resistance to change among employees are key barriers to implementing innovative eco-technologies (Luthra & Mangla, 2018; Cetindamar et al., 2021). In this context, green human resource management (GHRM) is particularly important because it supports the development of an ecological culture, enhances adaptability to digital transformation, and promotes sustainable management ecosystems (Liu et al., 2020).

With the beginning of the Fourth Industrial Revolution, the demand for a transformational kind of managerial thinking, especially in the context of digital transformation, has risen considerably. The current scientific discussion is increasingly highlighting the importance of corporate leaders' quick response to rapid changes in the technological environment, which has become a key factor in organizations' competitiveness (Li et al., 2016).

Digital leadership is conceptualized as a managerial ability to formulate a clear vision of digital transformation, build effective strategies for technology implementation, and integrate digital tools into organizational activities to create added value (Zeike et al., 2019; Mialkovska et al., 2025). This type of leadership involves not only digital competencies but also the ability to shape a digital

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organizational culture and communicate strategic goals through digital communication channels (Sheninger, 2019; Mialkovska et al., 2023).

In the research by Mihardjo et al. (2019), digital leadership is defined as a mix of culture, technological awareness, and management style aimed at creating value in the digital economy. It specifically emphasizes the integration of innovative and transformational leadership elements in the digital space (Roberts, 1999). In this context, the four-dimensional model of digital leadership, which includes digital culture, digital skills, digital ideas, and digital strategy, is particularly relevant (Nicolás-Agustín et al., 2021).

Although there is active discussion of digital and green strategies in the scientific literature, a significant gap remains in analyzing how digital technologies integrate with GHRM practices in sustainable management (Dubey et al., 2021; Cetindamar et al., 2021). Specifically, little empirical research explores how these factors interact and influence the development of environmental dynamic capabilities within supply chains (El-Kassar & Singh, 2019; Bag et al., 2020; Nicolás-Agustín et al., 2021). Therefore, it is essential to develop new conceptual frameworks that unify environmental, digital, and behavioral aspects in modern management systems.

Despite the rapid growth in studies on digital transformation, the current scientific landscape remains mostly conceptual, with a notable lack of large-scale empirical evidence on the real impact of digital technologies on organizations' environmental performance (de Sousa Jabbour et al., 2018; Dubey et al., 2019). Overall, analysis of scientific sources reveals a gap in comprehensive research on integrating digital technologies and green management in modern organizational management, highlighting the need for further interdisciplinary studies.

Research methodology

The realization of the purpose of this study involves the use of the following research methods:

- systematization was used to collect, classify, and structure the data obtained from the surveys to form an orderly basis for further analysis of the results;

- systematic and logical analysis, the method of information synthesis was used to comprehensively study and structure the theoretical foundations of digital transformation and environmental management, as well as to form a holistic view of the interaction of digital technologies and sustainable development in organizations;

- the method of generalization was used to process and integrate the study results, especially to develop general conclusions about the level of digitalization in administrative processes, the importance of environmental focus in top management strategies, and the influence of digital solutions on the development of enterprises' environmental dynamic capabilities.

- the method of comparative analysis was used to identify differences in support levels for transformations by management, depending on the chosen management style or type of organization.

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- the survey method was used to collect data from representatives of the management and management of enterprises in various sectors of the economy, which provided a multidimensional view of the practices of implementing digital and environmental strategies, the specifics of organizational behavior, and the level of readiness for innovative transformations in the modern management environment;

- the survey results were processed using statistical methods, which allowed for the identification of significant trends, relationships, and correlations between the level of digitalization in administrative processes, environmental management orientation, leadership styles, and the adoption of innovative practices in digital and green administration (Sultan & Suhail, 2019).

To identify the key characteristics, practices, and strategies in digital and green administration, an empirical study was conducted using descriptive statistics. Data for the analysis were collected through an online survey of business executives and managers from various sectors of the Ukrainian economy via the MS Forms Pro platform, which ensured the quick collection of reliable, structured information. The survey included 1128 respondents between January 18, 2024, and April 18, 2025, representing organizations in the manufacturing, service, IT, and logistics sectors. The respondents answered questions related to the following aspects: organizational structure, digitalization of administrative processes, availability of environmental management practices, the relationship between digital technologies and green initiatives, organizational culture and management style, digital monitoring in supply chains, and the implementation of innovations in environmental logistics. The questionnaire featured both closed questions with fixed answers and open-ended items allowing participants to provide detailed insights. This approach enabled us to not only quantify answer distributions but also identify behavioral factors influencing the success of digital and environmental innovations. During the survey, respondents were asked questions such as: What digital technologies are used in administrative activities? What is the level of digitalization in organizational processes? What forms of environmental management have been implemented? To what extent do digital technologies and green initiatives interact? What behavioral factors impact the effectiveness of change implementation? Is there a need for new approaches to integrating digital and green administration?

Results

To ensure the survey's representativeness, respondents were categorized by organization type and employee count. The results show that most respondents are from manufacturing companies – 33.5% (n = 378). A notable portion also belongs to the service sector – 25.4% (n = 286) and information technology - 19.1% (n = 215). Respondents from transport and logistics services account for 14.5% (n = 164), while other organization types make up 7.5% (n = 85), indicating good sectoral diversity in the sample. Regarding company size, the largest group is small organizations with up to 50 employees – 36.5% (n = 412). Medium-sized firms (51-250 employees) represent 34.5% (n = 389), and large companies with more than 250 employees comprise 29.0% (n = 327) (see Table 1).

Table 1

Sample structure by type of organization and number of employees

Indicator	Category	Number of respondents	Share, % of respondents
1. Type of organization	Manufacturing sector	378	33,5
	Service sector	286	25,4
	Transportation and logistics services	164	14,5
	Information technologies	215	19,1
	Other	85	7,5
2. Number of employees	Up to 50 people	412	36,5
	51-250 people	389	34,5
	More than 250 people	327	29

Source: author's own calculations

The data confirm a broad representation of organizations of various sizes, enabling generalization of the research findings when studying digital transformation and environmental management practices in enterprises (Raković et al., 2024).

The analysis of results regarding the implementation of digital technologies in enterprise administrative activities shows that the most common among respondents are ERP systems, used by 63.9% of surveyed organizations, highlighting their strategic importance for integrated resource management. CRM platforms, which enhance customer interaction effectiveness, are adopted by 57.4% of organizations. The utilization of cloud computing environments (49.0%) and big data analytics tools (44.8%) is also relatively high, indicating the growing role of digital solutions in supporting management decision-making. Meanwhile, innovative technologies such as the Internet of Things (28.3%), machine learning or artificial intelligence (25.3%), and blockchain (9.6%) are currently adopted less frequently, likely due to the need for highly skilled specialists, significant financial investments, and organizational restructuring to accommodate new technologies.

Analyzing the introduction of environmental management practices in organizations' activities, it was found that the most common measures are energy efficiency programs implemented in 54.4% of the surveyed organizations. This indicates an awareness of the importance of optimizing energy use as a key area for reducing environmental impact. Waste management is carried out by 46.0% of organizations, reflecting a high level of emphasis on waste within their environmental strategy. Environmental management systems are established at 37.9% of organizations, which may suggest a gradual institutionalization of environmental standards. Less common are green procurement (30.3%) and CO_2 emission reduction programs (24.0%), pointing to limited integration of sustainability criteria into procurement policies and decarbonization strategies.

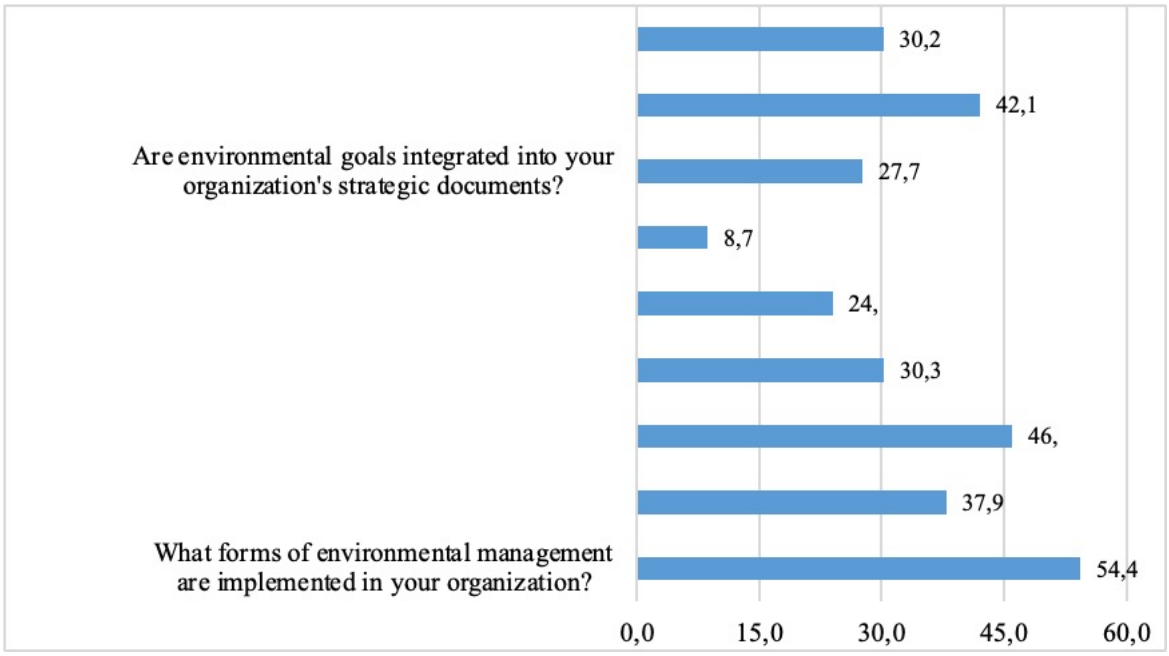
Regarding the integration of environmental goals into strategic planning, 27.7% of organizations reported full integration of the relevant tasks into their strategic documents, while 42.1% of respondents indicated partial integration. At the same time, in 30.2% of cases, environmental goals are not considered at the strategic level at all, which may suggest barriers to implementing sustainable development principles, particularly institutional, financial, and human resource barriers (see Figure 1).

Based on the empirical results from the survey of enterprise management, a comprehensive assessment was carried out on the level of interaction between digital technologies and environmental initiatives in modern organizational management. The data shows that only 22.0% of respondents reported full integration of digital solutions with environmental programs, pointing to a fragmented digital-environmental synergy and limited institutional maturity of these processes within strategic management.

At the same time, 41.8% of the survey participants reported partial interaction between digital and environmental sectors, highlighting the positive role of digital technologies in sustainable development, though mainly at an operational rather than systemic level.

Figure 1

Use of environmental management forms and integration of environmental goals into strategic documents of organizations, %



Source: author's own calculations

Approximately a quarter of respondents (26.7%) reported separate functioning of digital and environmental vectors, indicating a lack of a holistic interdisciplinary approach and a low level of integrative management culture. Particular attention is drawn to the fact that 9.6% of respondents found it difficult to assess the level of interaction, which may reflect insufficient awareness, a lack of relevant monitoring indicators, or a weak strategic orientation in the enterprise's environmental policy.

In the context of the impact of digital technologies on achieving environmental outcomes, 24.5% of organizations reported a significant positive effect, which can be considered an indicator of the effective transformation of business processes through the introduction of IT innovations into environmental management practices. A partial improvement in the relevant indicators was observed in 41.5% of cases, indicating a certain level of digital maturity and a gradual transition from formal to functional inclusion of digital tools in the sustainable management system. At the same time, 22.0% of respondents did not observe a significant impact of digital solutions on environmental outcomes, likely due to low levels of technological modernization or insufficient adaptation of digital practices to the specifics of environmental processes. Another 12.1% of respondents reported a lack of relevant experience or knowledge about the impact of digital technologies in this context, indicating uneven practices and requiring further methodological and educational support for digital and environmental transformation processes in organizations.

Thus, the results demonstrate some progress in the digital transformation of environmental management, but there are significant differences among organizations in the level of integration and the effectiveness of digital technologies in achieving environmental sustainability. This justifies the need for further research to identify barriers and incentives to digital-environmental integration.

Based on the survey results, the majority of respondents indicated a high or moderate level of support for digital and environmental transformations from top management: 40.7% indicated high support, and 33.4% moderate. Thus, in total, 74.1% of respondents reported positive dynamics of support from management. At the same time, 16.8% of respondents reported only limited interest, and 9.1% indicated a complete lack of such support, suggesting barriers to innovation in several organizations.

In the context of the management styles that dominate in the respondents' organizations, there is a predominance of democratic (39.7%) and collaborative/innovative (44.5%) styles, which together account for 84.2%. This indicator indicates a tendency toward open management practices, a focus on teamwork, and support for innovation. On the other hand, only 10.4% of respondents reported an authoritarian management style, which may reflect a gradual shift away from rigidly hierarchical management models towards more flexible, adaptive structures.

The results of the analysis of the level of digital transformation in the context of environmental monitoring and supply chain management indicate that there is only an initial, albeit gradually growing, dynamic of integrating digital solutions into environmental logistics. Only 26.4% of respondents have fully implemented digital mechanisms for monitoring environmental performance across the supply chain, indicating fragmentation and limited consistency in relevant management practices. At the same time, 34.0% of the surveyed companies conduct local monitoring of individual processes or sites, indicating the presence of initiatives but with limited spatial and functional coverage. Another 26.8% of organizations do not implement digital monitoring at all, and 12.8% could not provide a definite answer, indicating a lack of a

well-formed strategy for digital and environmental integration or low awareness among management personnel of such approaches.

The analysis of the types of digital technologies used to achieve environmental results in logistics and supply shows the predominant use of environmental coordination platforms (29.4%) and intelligent logistics systems (24.9%). Analytical tools based on big data are used in 23.7% of cases, which indicates the initial stage of digital analytics in the environmental context. It is noteworthy that 15.6% of enterprises do not implement any digital technologies in their logistics processes at all, indicating significant untapped potential for the eco-modernization of supply with digital means.

The institutional effectiveness of digital-green transformations largely depends on the level of cross-functional coordination. Only 23.2% of the surveyed organizations demonstrated full integration among the relevant functional subsystems (environmental, IT, and logistics), indicating a lack of a systematic, interdisciplinary approach. Partial coordination was observed in 43.1% of enterprises, indicating integration potential. At the same time, 20.3% of respondents reported a complete lack of internal coordination, and 13.4% were unable to assess the level of such coordination, confirming the structural heterogeneity of the institutional environment of digital green governance.

Behavioral aspects that determine the effectiveness of digital and environmental innovations were identified as critical. Respondents attributed the most significant influence to top management leadership (59.7%), employees' perceptions of change (51.5%), and general openness to innovation (48.6%). Organizational culture (38.9%) and the lack of staff competencies (34.0%) also play significant roles, indicating that the effective implementation of digital solutions with an environmental focus largely depends on the organization's socio-cultural context and its level of internal transformation readiness.

It is worth noting that many respondents confirmed the need for new methodological approaches to integrating digital and green practices: 36.1% of companies expressed an urgent need to develop them, and another 34.2% supported a partial update of management tools. Only 17.1% of respondents considered the existing approaches satisfactory, and 12.6% were undecided (see Table 2).

Based on the empirical data obtained, a comprehensive analysis of the level of digitalization of administrative processes, the priority of environmental orientation in top management strategies, and the impact of digital technologies on the formation of environmental dynamic capabilities in the sample of the studied organizations was conducted.

Table 2

The level of integration of digital technologies and their impact on the environmental performance of organizations

Research question	Answer option	Number of respondents	Share, % of respondents
Does your organization digitally monitor environmental performance in supply chains (e.g., monitoring supplier emissions, optimizing logistics through digital systems)?	Across the entire chain	298	26,4 %
	Locally	384	34,0 %
	Not implemented	302	26,8 %
	It is difficult to answer	144	12,8 %
Which of the following digital technologies does your organization use to achieve environmental outcomes in logistics and sourcing (please select all that apply)?	Environmental coordination platforms	332	29,4 %
	Intelligent logistics systems	281	24,9 %
	Big data analytics	267	23,7 %
	Lack of technology	176	15,6 %
	Other	72	6,4 %
How integrated is the cooperation between departments (environmental, IT, logistics) to implement digital green initiatives?	Full cross-functional integration	262	23,2 %
	Partial coordination	486	43,1 %
	There is no coordination	229	20,3 %
	It is difficult to say	151	13,4 %
In your opinion, which behavioral factors have the greatest impact on the effectiveness of digital and environmental innovation in your organization?	Leadership of top management	673	59,7 %
	Perception of changes by employees	581	51,5 %
	Openness to innovation	548	48,6 %
	Organizational culture	439	38,9 %
	Low competencies	384	34,0 %
	Other	94	8,3 %
Does your organization need new methodological approaches to integrate digital and green practices in administration?	Yes, urgently	407	36,1 %
	Yes, partially	386	34,2 %
	No	193	17,1 %
	It is difficult to answer	142	12,6 %

Source: author's own calculations

The study's results showed that most enterprises (34.3%) exhibit a high level of digital integration in their administrative processes, indicating a well-developed IT infrastructure and active adoption of digital solutions in management. Full digital integration, as reported by 22.3% of respondents, reflects a systematic approach to digital transformation of organizational processes. Meanwhile, 26.2% of respondents rated their digitalization level as average, suggesting significant potential for further improvement in digital technologies. Enterprises at the initial (11.9%) and minimal

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(5.2%) levels of digitalization are at early stages of digital transformation or have limited capacity to implement digital tools.

Regarding environmental orientation, most respondents (61.0%) indicated a medium (29.9%) and high (31.1%) priority for sustainable development in their organizations' strategies, reflecting a growing awareness of the importance of environmental factors in corporate governance. 21.2% of respondents identified environmental orientation as a strategic focus, confirming the integration of sustainability principles at the top management level. Meanwhile, 17.8% reported little or no attention to environmental priorities, showing the diversity of approaches to greening within organizations.

The analysis of digitalization's role in shaping environmental dynamic capabilities (such as innovation, adaptability, and environmental flexibility) revealed that over half of the respondents (53.2%) rate the positive impact of digital technologies on environmental development as high or maximum, confirming the significance of digital innovations in supporting enterprises' dynamic environmental adaptability. However, 30.3% reported a moderate impact, indicating organizational and technological barriers that limit the full potential of digital solutions.

Table 3

Assessment of the level of digitalization of administrative processes, priority of environmental orientation, and the impact of digitalization on the formation of environmental dynamic capabilities

	Explanation of the assessment	Level of digitalization of administrative processes		Priority of environmental orientation for top management		Impact of digitalization on environmental dynamic capabilities	
		%	No.	%	No.	%	No.
1	Minimum level of digitalization / Environment is not considered / Digitalization is not promoted	5,20%	59	7,00%	79	5,70%	64
2	Initial level of digitalization / Environment is a low priority / Digitalization has little impact	11,90%	134	10,80%	122	10,70%	121
3	Medium level of digitalization / Environment is considered important but not a priority / Moderate impact	26,20%	296	29,90%	337	30,30%	342
4	High level of digitalization / Environment is a high priority / Significant impact of digitalization	34,30%	387	31,10%	351	33,20%	375
5	Full digital integration / Environment is a strategic dominant / Maximum promotion of digitalization	22,30%	252	21,20%	239	20,00%	226

Source: author's own calculations

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Thus, the results show a positive trend toward digital transformation and the integration of environmental strategies into management, while highlighting the need to develop digital skills systematically and to strengthen environmental awareness, especially in enterprises with medium and low levels of digitalization.

Discussion

Based on the empirical study's results, which capture both the sectoral and typological features of the organizational sample, several theoretical and methodological generalizations and practical implications have been identified. These are essential for developing modern conceptual approaches to integrating digital technologies and environmental management into the paradigm of strategic and operational administration.

Firstly, digital management tools, particularly enterprise resource planning (ERP) and customer relationship management (CRM) systems, currently serve as basic means of transforming administrative functions. Their widespread implementation (63.9% and 57.4%, respectively) reflects established practices of technological integration. At the same time, the low level of digitalization using advanced technologies such as artificial intelligence, blockchain, and the Internet of Things highlights the presence of systemic barriers, mainly of human resource, technological, and financial-institutional origins.

Second, the process of institutionalizing environmentally focused management remains uneven and fragmented. Although energy-saving measures, environmental monitoring systems, and waste management programs are somewhat established, only 27.7% of organizations have incorporated environmental goals into their strategic planning, indicating that environmental considerations are not sufficiently integrated into enterprises' strategic priorities.

Third, the extent of integration between digital technologies and environmental initiatives varies significantly. Only 22.0% of organizations report full synergy between these elements, indicating a low level of their interdependence in practice. Meanwhile, 41.8% of enterprises describe a partial or hybrid form of such integration, which can be seen as a transitional stage toward the development of comprehensive digital-green management frameworks.

Fourthly, management style parameters strongly relate to the success of digital-green transformations. The higher level of management support for transformation efforts (74.1% overall) and the prominence of democratic and innovative styles (84.2%) set the stage for an organizational climate that fosters innovation and sustainability.

The results of the empirical study support several conceptual views outlined in the modern interdisciplinary scientific discussion on the link between digital innovations and environmentally focused management. Technologies such as big data analytics, cloud computing, and digital platforms, according to Popovič et al. (2018), Dubey et al. (2019), Gupta et al. (2020a, 2020b), and Tykha et al. (2025), help improve intelligent monitoring, optimize resource use, and lower carbon footprints. Our empirical findings confirm this trend but also highlight important obstacles to the

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broad adoption of advanced digital technologies due to institutional and human resource challenges.

Authors concur with Dubey et al. (2017) and Jabbour and de Sousa Jabbour (2016) on the important role of human capital in the digital-green transformation process. Our research shows that behavioral factors, such as openness to innovation, leadership style, and organizational culture, are key determinants of successful implementation of innovative solutions. This also supports the views of Luthra & Mangla (2018) and Cetindamar et al. (2021), who identify the lack of digital and soft skills as significant barriers to environmental innovation.

In this context, the authors fully agree with Liu et al. (2020), who emphasize the importance of developing the Green HRM concept to integrate environmental values into the human resource management system. The separation of GHRM practices in most surveyed organizations and their lack of coordination with digital initiatives confirms the gap in cross-functional integration outlined by Dubey et al. (2021) and Nicolás-Agustín et al. (2021).

To summarize the above, an effective digital-green transformation of organizational management requires a deeply interdisciplinary approach that integrates technocentric (digital) and ecologically oriented (sustainable development) paradigms into a unified management framework. Such an approach involves a radical overhaul of management models, the adoption of cross-cutting digital and environmental skills, and the institutionalization of cross-functional coordination mechanisms. In the long term, this will not only enhance organizations' adaptability and innovation capacity but also help develop sustainable development models in response to increasing environmental instability.

Therefore, it is important to note that the current operational conditions of organizations call for a review of existing management models, as they no longer align with the fast-paced changes of digital transformation and environmental sustainability challenges. The study highlights the importance and necessity of adopting an integrated management approach that combines digital technologies with green principles. This approach should leverage the synergy between innovative technical solutions and human factors, especially through developing digital skills, environmental awareness, and transformational leadership.

Conclusion

The results of this study highlight the importance of an integrated approach to modern organization management by combining digital technologies and green practices. Empirical evidence indicates that merging digital solutions with environmental efforts not only boosts the efficiency of administrative processes but also fosters an environmentally responsible business environment. It is especially important to recognize that institutional support, management leadership, and organizational culture are key factors for successful digital-green transformations. Analyzing adaptation practices across organizations of different sizes shows that digital maturity is positively linked to the development of environmental dynamic capabilities, and incorporating IT tools into strategic environmental planning greatly enhances

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sustainability metrics. However, barriers related to technical, human, and financial resources, as well as limited cross-functional coordination, need more attention when developing policies for digital and environmental transformation.

The practical significance of the study is that its results can provide a foundation for developing comprehensive management strategies that integrate technological innovation with environmental responsibility. The conclusions offered can help improve administrative models, particularly in areas such as digital monitoring of environmental indicators, green supply chain development, and the creation of an adaptive organizational culture.

Further research in organizational management should focus on a deeper exploration of the synergy between technological innovations and environmental dynamics. Promising areas for scientific analysis include examining the institutional readiness of enterprises for these transformations, studying behavioral factors that influence management decisions, and evaluating the effectiveness of interdisciplinary collaboration in implementing digital green strategies across various economic sectors.

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