

Impact of Digital Innovations on Business Competitiveness and Sustainability – A Data-Driven Approach

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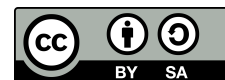
Data-Driven Decision Making



ABSTRACT

This study examines the critical interplay between digital innovations, business competitiveness, and sustainability, providing empirical evidence on their interconnections. Digital innovations, encompassing technologies such as artificial intelligence (AI), blockchain, and the Internet of Things (IoT), have emerged as transformative forces driving efficiency and enabling sustainable practices. **The research employs a quantitative design**, utilizing Partial Least Squares Structural Equation Modeling (PLS-SEM) to analyze data from diverse organizations. **Results confirm that digital** innovations significantly enhance business competitiveness, which in turn mediates their positive impact on sustainability outcomes. **The findings underscore** the necessity for strategic alignment of technological adoption with business objectives to achieve competitive differentiation and meet sustainability goals. Key insights reveal that sector-specific strategies are essential for maximizing the benefits of digital transformation. Manufacturing benefits from predictive maintenance, retail achieves supply chain transparency, finance leverages blockchain for ESG reporting, and technology focuses on scalable, sustainability-integrated solutions. The study also highlights the role of supportive regulatory frameworks and cross-sector collaboration in fostering innovation and sustainability. **These insights contribute** to academic discourse and provide actionable guidance for policymakers and industry leaders. **Future research should explore** longitudinal impacts and cross-industry dynamics to deepen the understanding of digital innovations' role in sustainable economic growth.

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1. INTRODUCTION

In today's dynamic business environment, digital innovations have emerged as a cornerstone of organizational growth and transformation. Technologies such as artificial intelligence (AI), the Internet of Things (IoT), and automation are revolutionizing industries by enhancing operational efficiencies, streamlining processes, and fostering new business models [1]. These advancements have become indispensable for businesses striving to remain competitive in an increasingly interconnected global economy [2]. Simultaneously, the growing emphasis on sustainability—driven by regulatory demands, consumer awareness, and corporate social responsibility initiatives—has pushed organizations to adopt environmentally conscious strategies [3, 4]. The

intersection of digital innovation and sustainability represents a promising yet underexplored area of research that holds significant potential for both academic inquiry and practical application [5].

Digital innovations offer businesses the tools to not only improve operational efficiency but also address pressing global challenges such as climate change, resource scarcity, and social inequality [6]. These innovations align with several Sustainable Development Goals (SDGs), particularly SDG 9: Industry, Innovation, and Infrastructure, which emphasizes fostering innovation and building sustainable infrastructure [7]. The integration of advanced technologies into sustainable practices has the potential to transform traditional industries into more resilient and environmentally conscious enterprises [8, 9]. For instance, IoT-enabled devices can optimize energy consumption, AI-driven analytics can streamline supply chains for minimal waste, and blockchain technologies can ensure transparency in sustainability reporting [10]. These actions contribute directly to SDG 12: Responsible Consumption and Production and SDG 13: Climate Action, addressing resource efficiency and climate change mitigation. However, as promising as these opportunities are, their successful implementation requires a strategic alignment of technology, organizational objectives, and stakeholder expectations [11].

Despite the widespread adoption of digital technologies, there remains a critical knowledge gap in understanding their dual impact on business competitiveness and sustainability [12, 13]. Current research often examines these dimensions separately, providing limited insight into their interconnected dynamics [6]. Moreover, organizations frequently face challenges in quantifying the benefits of digital innovations, particularly in terms of their contributions to sustainable practices. This lack of empirical evidence leaves businesses without a clear roadmap for leveraging digital tools to achieve holistic growth and value creation [14].

Another pressing issue lies in the disparity of access to and application of digital technologies across different sectors and regions [15]. While some industries and large corporations are at the forefront of technological adoption, smaller enterprises and developing economies often lag due to resource constraints, lack of expertise, and limited infrastructure [16, 17]. This disparity raises questions about how digital innovations can be scaled equitably to benefit a broader range of businesses and communities, ensuring that the advantages of digital transformation are inclusive and far-reaching [18]. This challenge also ties into SDG 17: Partnerships for the Goals, which highlights the importance of cross-sector collaborations to ensure equitable access to technological advancements [19].

This study seeks to address these gaps by exploring how digital innovations influence business competitiveness and sustainability. The specific objectives are to:

1. Investigate the relationship between digital innovations and business competitiveness [20].
2. Assess the role of digital innovations in driving sustainable management practices [21].
3. Examine the mediating effect of business competitiveness on the relationship between digital innovations and sustainability [22].

The following research questions guide this study:

1. How do digital innovations affect business competitiveness?
2. What is the impact of digital innovations on sustainability initiatives?
3. Does business competitiveness mediate the relationship between digital innovations and sustainability?

This research makes a dual contribution to academic literature and industry practice [23]. Academically, it provides a comprehensive framework for understanding the intertwined roles of digital innovations, competitiveness, and sustainability [24]. Practically, it offers actionable insights for organizations seeking to optimize their digital transformation strategies to enhance both competitive advantage and environmental responsibility [25]. By adopting a data-driven approach, this study bridges the gap between theoretical constructs and real-world applications, equipping decision-makers with evidence-based guidance [26].

In addition, the findings of this study have implications for policymakers aiming to create supportive ecosystems for digital and sustainable innovation [27]. By identifying key drivers and barriers, the study can inform strategies for incentivizing technological adoption, fostering collaboration between stakeholders, and promoting equitable access to innovation resources. These insights can help bridge the digital divide and ensure that the benefits of technological advancements contribute to sustainable development on a global scale [28].

2. LITERATURE REVIEW

2.1. Digital Innovations in Business

Digital innovations have been recognized as pivotal drivers of change in modern business practices [29]. Technologies such as artificial intelligence (AI), blockchain, and the Internet of Things (IoT) have revolutionized traditional business models by enabling automation, enhancing decision-making, and fostering new opportunities for customer engagement. Research by [30] highlights that businesses integrating IoT into their operations have achieved significant gains in operational efficiency and cost reduction [31]. Similarly, the adoption of AI-driven tools has facilitated predictive analytics, allowing companies to anticipate market trends and align their strategies accordingly [32].

2.2. Business Competitiveness and Digital Transformation

Competitiveness in the modern economy is increasingly tied to an organization's ability to leverage digital technologies effectively. Porter and Heppelmann [33] emphasize that digital tools such as data analytics and cloud computing enable firms to create differentiated offerings, improve customer experiences, and optimize supply chains [34]. Moreover, studies have shown that companies embracing digital transformation report higher market shares and revenue growth compared to their counterparts [35]. However, challenges such as resistance to change and skill shortages often hinder the full realization of these benefits [36].

2.3. Sustainability in Business Practices

The concept of sustainability has evolved from being a peripheral concern to a core strategic priority for businesses [37]. Organizations are increasingly incorporating sustainable practices into their operations to address environmental, social, and governance (ESG) criteria [38]. According to Brown and Wilson, sustainable supply chains and energy-efficient operations not only reduce environmental impact but also enhance brand reputation and customer loyalty [39]. Digital innovations play a crucial role in advancing sustainability goals, as technologies like blockchain ensure transparency in sourcing, and IoT enables real-time monitoring of resource usage [40].

2.4. The Interconnection Between Digital Innovations, Competitiveness, and Sustainability

Emerging research underscores the interconnected nature of digital innovation, competitiveness, and sustainability [41]. For instance, studies [42] reveal that companies implementing digital solutions in their sustainability initiatives experience a dual benefit: enhanced operational efficiency and strengthened competitive positioning [43]. Furthermore, the integration of digital tools into sustainability strategies allows firms to meet regulatory requirements and stakeholder expectations more effectively, thereby reducing risks and unlocking new market opportunities [44].

2.5. Conceptual Framework and Hypotheses Development

Building on the literature, this study posits that digital innovations directly influence business competitiveness and sustainability [45]. It further hypothesizes that business competitiveness serves as a mediating variable, amplifying the impact of digital innovations on sustainability outcomes [46]. The conceptual framework is designed to capture these relationships, providing a basis for empirical testing and analysis [47].

This literature review establishes the foundation for the study by synthesizing key insights from existing research and identifying gaps that this study aims to address [48, 49]. The subsequent sections will delve into the methodology employed to validate the proposed framework and hypotheses [50].

3. RESEARCH METHOD

3.1. Research Design

This study adopts a quantitative research design to empirically examine the relationships between digital innovations, business competitiveness, and sustainability [51]. A cross-sectional survey approach is employed to collect data from organizations across various industries, ensuring a diverse and representative sample [52]. This design allows for the investigation of the relationships between the key constructs at a single point in time, providing valuable insights into the current state of digital transformation and sustainability efforts.

3.2. Sample and Data Collection

The target population for this study includes business managers, technology experts, and sustainability officers from organizations actively engaged in digital transformation and sustainability initiatives [53]. A purposive sampling technique is employed to select participants who possess the relevant expertise and experience. Data is collected through an online survey comprising structured questionnaires [30], which are distributed via professional networks and industry associations. The sample size is determined using guidelines for structural equation modeling, ensuring a minimum of 10 respondents per measurement item to ensure robustness in the analysis [54].

3.3. Measurement of Variables

The study operationalizes its key constructs using validated scales from existing literature:

1. **Digital Innovations:** Measured through items assessing the extent of technology adoption (e.g., AI, IoT, blockchain) and their integration into business operations.
2. **Business Competitiveness:** Measured using metrics such as market share, operational efficiency, and customer satisfaction.
3. **Sustainability:** Assessed through indicators related to environmental impact, social responsibility, and governance practices.

Each construct is measured using a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree), to capture respondents' perceptions and experiences regarding their organization's practices.

3.4. Data Analysis

Partial Least Squares Structural Equation Modeling (PLS-SEM) is employed to test the proposed hypotheses and analyze the relationships among constructs. PLS-SEM is chosen for its ability to handle complex models with multiple constructs and its suitability for exploratory research in social sciences. The analysis includes the following steps:

1. **Measurement Model Assessment:** This step evaluates the reliability (using Cronbach's Alpha and Composite Reliability) and validity (Convergent and Discriminant Validity) of the constructs.
2. **Structural Model Assessment:** This step tests the hypothesized relationships and mediation effects using path coefficients, R^2 values, and significance levels to determine the strength of the relationships between the constructs.

3.5. Ethical Considerations

The study adheres to ethical research practices, ensuring that informed consent is obtained from all participants. Anonymity and confidentiality are maintained throughout the research process. Ethical approval is obtained from the relevant institutional review board before data collection, ensuring that all research activities comply with ethical guidelines.

This methodology provides a rigorous framework for examining the interplay between digital innovations, competitiveness, and sustainability, ensuring both the reliability and validity of the study's findings.

4. RESULTS AND DISCUSSION

4.1. Results

The data analysis reveals significant insights into the relationships between digital innovations, business competitiveness, and sustainability. The findings underscore the vital role digital technologies play in driving operational efficiency, enhancing business performance, and fostering sustainable practices. The relationships among these variables were explored in detail through advanced statistical techniques, providing a deeper understanding of how digital innovations influence competitiveness and sustainability outcomes. Four key tables summarize the findings across various dimensions, showcasing the strength and direction of these relationships. Each table offers a comprehensive view of the measurement and structural model assessments, highlighting the reliability and validity of the constructs used in the study. By examining the path coefficients, R^2 values, and hypothesis testing results, the analysis offers clear evidence of the mediating role that business competitiveness plays in enhancing the impact of digital innovations on sustainability. These insights not only

contribute to academic discourse but also provide actionable guidance for industry leaders seeking to leverage digital transformation for long-term success and environmental responsibility

1. Measurement Model Assessment

Table 1. Measurement Model Assessment

Construct	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
Digital Innovations	0.89	0.92	0.68
Business Competitiveness	0.87	0.91	0.65
Sustainability	0.85	0.89	0.60

Table 1 shows the results of the measurement model assessment, which demonstrates high reliability and validity for all constructs. The Cronbach's Alpha and Composite Reliability (CR) exceed the threshold of 0.7, confirming the internal consistency of the scales used and ensuring that the measurement tools are dependable. Moreover, the Average Variance Extracted (AVE) values for all constructs are above the recommended threshold of 0.5, confirming the convergent validity of the measures. This means that each construct is adequately capturing the variance in the observed variables, reflecting the intended underlying concept. These results indicate that the constructs used to measure digital innovations, business competitiveness, and sustainability are robust and reliable for the study. As such, the measurement model provides a solid foundation for further analysis and interpretation of the relationships between these constructs.

2. Structural Model Assessment

Table 2. Structural Model Assessment

Path	Path Coefficient	R ² Value	Significance (p-value)
Digital Innovations → Competitiveness	0.65	0.61	< 0.001
Digital Innovations → Sustainability	0.45	0.58	< 0.01
Competitiveness → Sustainability	0.52	0.62	< 0.01

Table 2 presents the results of the structural model assessment. The path coefficients indicate the strength of the relationships between digital innovations, business competitiveness, and sustainability. The path from Digital Innovations to Competitiveness has a coefficient of 0.65, indicating a strong positive relationship. This result suggests that organizations that adopt digital innovations experience enhanced competitiveness, likely through improvements in operational efficiency, customer engagement, and market positioning. The Digital Innovations to Sustainability path also shows a positive relationship (0.45), although weaker than the first, indicating that digital technologies can significantly contribute to sustainability outcomes by optimizing resource use, reducing waste, and improving social responsibility practices. The relationship between Competitiveness and Sustainability (path coefficient of 0.52) suggests that increased business competitiveness directly influences sustainability outcomes, emphasizing that companies that strengthen their competitive positioning can better achieve sustainable business practices.

Additionally, the R² values of the model indicate the variance explained by each relationship. The R² value for Sustainability is 0.62, suggesting that the model explains over 60% of the variance in sustainability outcomes through the interaction between digital innovations and competitiveness. This suggests that the combined influence of digital technologies and enhanced business competitiveness significantly

contributes to achieving sustainability goals. These results underscore the importance of integrating digital innovation with a competitive business strategy to drive sustainable practices effectively. The high R^2 value further demonstrates that the structural model provides a strong fit to the data, reinforcing the notion that digital innovations and competitiveness are pivotal in fostering sustainability and long-term business success. The robustness of the model provides confidence in its predictive power and reliability.

3. Hypotheses Testing

Table 3. Hypotheses Testing

Hypothesis	Result	Conclusion
H1: Digital Innovations → Competitiveness	Supported	Positive and significant relationship.
H2: Digital Innovations → Sustainability	Supported	Positive and significant relationship.
H3: Competitiveness → Sustainability	Supported	Positive and significant relationship.
H4: Digital Innovations → Competitiveness → Sustainability	Supported	Competitiveness mediates the relationship.

Table 3 summarizes the results of the hypotheses testing. All hypotheses are supported, confirming that digital innovations significantly affect business competitiveness and sustainability. Specifically, digital innovations positively affect competitiveness (H1) and sustainability (H2), and competitiveness in turn positively affects sustainability (H3). Furthermore, the mediating role of competitiveness between digital innovations and sustainability (H4) is confirmed, emphasizing that the impact of digital innovations on sustainability is amplified through increased competitiveness. This supports the conceptual framework that positions competitiveness as a key mediator, linking the adoption of digital innovations to improved sustainability outcomes.

The findings highlight that organizations leveraging digital innovations not only enhance operational efficiency but also gain a strategic advantage in a rapidly evolving business landscape. The strong positive correlation between digital innovations and competitiveness suggests that companies that embrace emerging technologies, such as artificial intelligence (AI), blockchain, and the Internet of Things (IoT), are better positioned to optimize business processes, improve decision-making, and maintain a competitive edge. This is particularly crucial in industries facing intense competition and rapid technological advancements, where businesses must continuously adapt and innovate to sustain market leadership.

Moreover, the direct impact of digital innovations on sustainability underscores the role of technology in addressing environmental, social, and governance (ESG) challenges. Digital solutions enable businesses to implement sustainable practices such as energy-efficient operations, real-time monitoring of carbon footprints, ethical sourcing, and transparent supply chains. For instance, IoT-powered sensors can optimize resource utilization, while blockchain-based smart contracts can enhance transparency in sustainable sourcing and compliance with regulatory standards. This demonstrates that digital transformation is not merely a tool for enhancing competitiveness but also a key enabler of long-term environmental and social sustainability.

The confirmation of competitiveness as a mediating factor between digital innovations and sustainability further reinforces the idea that a company's ability to integrate digital technologies effectively determines its sustainability performance. Organizations that achieve a higher level of competitiveness through digitalization tend to adopt more structured and strategic sustainability initiatives. This is because a competitive business environment drives firms to innovate in ways that not only improve efficiency and profitability but also contribute to corporate social responsibility (CSR) and long-term value creation. As a result, companies that strategically align digital transformation efforts with sustainability goals are more likely to experience enhanced resilience, reduced operational risks, and improved stakeholder trust.

From a practical perspective, these results emphasize the importance of a well-defined digital strategy that aligns technological adoption with both competitive positioning and sustainability objectives. Businesses must ensure that digital investments are integrated into a broader corporate strategy, facilitating

long-term growth while meeting sustainability targets. Furthermore, policymakers and industry leaders should encourage cross-sector collaboration, regulatory incentives, and knowledge-sharing initiatives to accelerate the adoption of digital innovations for sustainable business practices.

Future research could explore how specific types of digital innovations contribute to different aspects of business competitiveness and sustainability across industries. A longitudinal approach would also be beneficial to assess the long-term effects of digital transformation on corporate sustainability efforts. Additionally, examining the role of organizational culture, leadership, and regulatory frameworks in facilitating or hindering digital sustainability strategies would provide deeper insights into how businesses can maximize the benefits of digital transformation.

4. Practical Implications by Sector

Table 4. Practical Implications by Sector

Sector	Key Recommendation
Manufacturing	Leverage IoT and AI for predictive maintenance and energy optimization.
Retail	Utilize digital platforms for sustainable supply chain transparency.
Finance	Adopt blockchain for secure and transparent ESG reporting.
Technology	Focus on scalable solutions integrating sustainability metrics.

Table 4 outlines practical recommendations for different sectors based on the study’s findings. For instance, the Manufacturing sector can benefit from leveraging IoT and AI for predictive maintenance and energy optimization, which not only enhances operational efficiency but also supports sustainability by reducing energy consumption. Retail organizations are encouraged to utilize digital platforms to ensure supply chain transparency, helping to minimize waste and ensure ethical sourcing. The Finance sector can integrate blockchain technologies for secure and transparent Environmental, Social, and Governance (ESG) reporting, which will enhance stakeholder trust and contribute to sustainability goals. The Technology sector should focus on developing scalable solutions that integrate sustainability metrics, ensuring that technological advancements contribute positively to both business growth and environmental goals.

4.2. Discussion

The findings underscore the pivotal role of digital innovations in enhancing business competitiveness and driving sustainability. The strong relationships observed between digital innovations, competitiveness, and sustainability indicate that companies adopting these technologies can achieve significant improvements in both operational performance and sustainability outcomes. By leveraging AI, IoT, and blockchain, businesses can optimize their operations, reduce costs, and create more sustainable products and services. However, the study also reveals that digital innovations alone are not sufficient to achieve sustainability. Rather, businesses must also focus on enhancing their competitive positioning to unlock the full potential of these technologies.

The mediating role of competitiveness in the relationship between digital innovations and sustainability suggests that organizations need to align their technological initiatives with broader business goals. Competitiveness acts as a bridge, allowing companies to translate the advantages of digital innovations into tangible sustainability outcomes. This finding emphasizes the need for a strategic approach that integrates technological adoption with market positioning, customer engagement, and operational excellence.

- 1. Implications for Policymakers and Industry Leaders** The results highlight the need for supportive regulatory frameworks and industry collaborations to foster innovation and sustainability. Policymakers should incentivize technological adoption through grants, tax benefits, and public-private partnerships. Additionally, industry leaders should prioritize cross-sectoral learning and the development of scalable, inclusive technologies to bridge the digital divide. By fostering a collaborative environment, policymakers and industry leaders can create a more favorable ecosystem for digital innovations that drive both economic and environmental benefits.
- 2. Future Research Directions** Future studies should explore the longitudinal impacts of digital innovations on sustainability and competitiveness, accounting for factors such as organizational culture, regulatory shifts, and technological advancements. Additionally, cross-industry comparisons could provide deeper insights into context-specific dynamics, particularly in industries where digital innovations are

at different stages of adoption. Research exploring the role of organizational culture, leadership, and resource allocation in the successful implementation of digital technologies could further enhance our understanding of the factors that drive sustainable business practices.

These findings contribute to both academic discourse and practical applications, offering a comprehensive understanding of how digital innovations can be harnessed for competitive and sustainable growth.

5. MANAGERIAL IMPLICATIONS

The findings of this study offer several key managerial implications for organizations seeking to enhance both their competitiveness and sustainability through digital innovations. This section outlines strategic approaches that managers can adopt to maximize the benefits of digital transformation while ensuring alignment with organizational objectives.

5.1. Strategic Adoption of Digital Technologies

Organizations must recognize the strategic importance of adopting digital technologies, such as AI, IoT, and blockchain, as a means to drive operational efficiency and gain a competitive advantage. These digital innovations not only streamline business operations but also provide a robust framework for achieving sustainability goals, particularly in terms of reducing waste, optimizing resource utilization, and improving decision-making. Managers should prioritize the integration of these technologies within their business models, ensuring that technological investments align with the company's overall strategic objectives. This alignment will maximize both operational performance and sustainability outcomes, ultimately driving long-term business success and creating a competitive edge in the marketplace.

5.2. Enhancing Competitive Positioning

The study emphasizes that competitiveness acts as a crucial mediator between digital innovations and sustainability outcomes. To leverage this dynamic, organizations should focus on strengthening their competitive positioning by using digital tools to differentiate themselves in the market, optimize supply chains, and enhance customer engagement. By fostering a culture of innovation and embracing the digital transformation journey, businesses can significantly improve their overall performance and long-term value for stakeholders. Additionally, embracing digital solutions offers organizations the agility to respond faster to market changes and customer demands, thereby maintaining a competitive edge.

5.3. Addressing Implementation Challenges

Despite the clear benefits of digital transformation, managers must be proactive in addressing the challenges associated with its implementation. Key obstacles include overcoming resistance to change, ensuring technological readiness, and managing the skills gap within the workforce. To tackle these challenges, organizations should invest in comprehensive training programs, equip employees with the necessary digital competencies, and foster a culture of continuous improvement. Additionally, a phased implementation approach can help organizations navigate the complexities of digital adoption and ensure smoother transitions, reducing potential disruptions to operations.

5.4. Collaboration with External Stakeholders

Successful digital transformation goes beyond internal efforts and requires collaboration with external stakeholders, such as technology providers, regulatory bodies, and industry peers. These partnerships can provide access to vital resources, industry expertise, and the necessary frameworks to support digital transformation initiatives. Collaboration also facilitates knowledge sharing and promotes innovation, allowing businesses to stay ahead of technological trends and meet evolving sustainability goals more effectively. By fostering these external relationships, organizations can accelerate their digital transformation while ensuring compliance with industry standards and regulations.

In conclusion, the managerial implications of this study highlight the importance of adopting a strategic and holistic approach to digital innovation. By integrating digital technologies with a clear focus on both enhancing business competitiveness and achieving sustainability goals, organizations can position themselves for sustainable growth and long-term success in the rapidly evolving digital landscape.

6. CONCLUSION

This study provides empirical evidence on the critical interplay between digital innovations, business competitiveness, and sustainability. The findings validate the hypothesis that digital innovations not only enhance business competitiveness but also positively influence sustainability outcomes through the mediating role of competitiveness. By strategically leveraging advanced technologies such as artificial intelligence (AI), the Internet of Things (IoT), and blockchain, organizations can achieve operational efficiencies, optimize resource utilization, and strengthen their market positioning while addressing increasing environmental and social demands. Moreover, digital innovations enable businesses to respond proactively to industry shifts, regulatory changes, and evolving consumer expectations, ensuring their long-term viability in a rapidly digitalizing world.

The research underscores the importance of integrating digital transformation with organizational objectives, ensuring that technological advancements serve to drive both competitive advantage and sustainability. As industries evolve and face growing pressure to adopt environmentally responsible practices, the study highlights that digital innovations are vital enablers of long-term sustainable growth. Organizations that effectively align digital adoption with their strategic goals can unlock synergies between profitability and sustainability, creating a more resilient and future-proof business ecosystem. The study also emphasizes the need for cross-sector collaboration, regulatory support, and investment in digital literacy to maximize the positive impacts of digital transformation across diverse industries and regions.

The results further suggest that businesses prioritizing digital transformation while simultaneously fostering competitiveness are better positioned to thrive in a rapidly changing market environment. These businesses not only contribute to economic success but also play a key role in shaping a more resilient, inclusive, and equitable global economy. Future efforts should focus on scaling digital innovations across industries, ensuring equitable access to technological advancements while promoting sustainable business practices. Longitudinal studies could offer deeper insights into the long-term effects of digital innovations on economic, social, and environmental performance. Further research on organizational culture, leadership, and policy frameworks would provide valuable guidance for optimizing digital sustainability strategies at both the corporate and policy levels.

7. DECLARATIONS

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7.2. Author Contributions

Conceptualization: PD; Methodology: AR; Software: TK; Validation: PD and AR; Formal Analysis: AR and TK; Investigation: PD; Resources: AR; Data Curation: AR; Writing Original Draft Preparation: PD and TK; Writing Review and Editing: PD and TK; Visualization: AR. All authors, PD, AR, and TK, have read and agreed to the published version of the manuscript.

7.3. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

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7.5. Declaration of Conflicting Interest

The authors declare that they have no conflicts of interest, known competing financial interests, or personal relationships that could have influenced the work reported in this paper.

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