

Original Article: Digital Transformation and Sustainable Business Practices for SMEs in the Context of Globalization

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ABSTRACT

In the context of globalization, Small and Medium Enterprises (SMEs) encounter unprecedented challenges and opportunities that demand both digital innovation and sustainable business strategies. Digital transformation, which involves the adoption of advanced technologies such as cloud computing, artificial intelligence, blockchain, and big data, enables SMEs to enhance efficiency, improve decision-making, and expand access to international markets. At the same time, sustainability has become a critical business imperative, as stakeholders increasingly expect companies to align their practices with environmental, social, and governance (ESG) standards. This paper explores the intersection between digital transformation and sustainable practices, highlighting how globalization accelerates both trends and creates a synergistic relationship. On one side, digital technologies facilitate sustainable practices through resource optimization, supply chain transparency, and reduction of carbon footprints. On the other, sustainability initiatives enhance brand reputation and provide SMEs with a competitive edge in globalized markets. Despite these benefits, SMEs face significant barriers including limited financial resources, skills shortages, and regulatory complexity. By analyzing existing literature and real-world case examples, this study argues that SMEs must adopt an integrated strategy where digital transformation supports sustainability objectives, ensuring long-term competitiveness and resilience. Moreover, global cooperation, policy support, and innovation ecosystems are essential to enable SMEs to thrive in this transformative era.

Introduction

The twenty-first century is characterized by two dominant and interrelated forces that are reshaping the global economic landscape: digital transformation and sustainable business practices [1]. Both dynamics are profoundly influencing how organizations, particularly Small and Medium

Enterprises (SMEs), operate, compete, and evolve. The rapid diffusion of digital technologies—including artificial intelligence (AI), blockchain, cloud computing, Internet of Things (IoT), and data analytics—has created new avenues for efficiency, innovation, and global connectivity. At the same time, the pressing need to address environmental degradation, climate change, and social inequalities has

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made sustainability a core requirement for long-term business viability [2].

Globalization, with its promise of expanded markets and integration of economies, has accelerated both digital transformation and the adoption of sustainable practices. For SMEs, globalization is a double-edged sword: it offers opportunities to participate in global supply chains, attract international customers, and leverage foreign technologies, but it also intensifies competition and exposes firms to higher standards of environmental and social responsibility. Unlike large corporations, SMEs often lack abundant financial and human resources, making adaptation more complex [3]. Yet, their flexibility, agility, and closer ties with communities give them a unique potential to thrive if they successfully combine digital innovation with sustainability.

Importance of SMEs in the Global Economy

SMEs constitute the backbone of most national economies, contributing significantly to employment, innovation, and GDP. According to the World Bank (2021), SMEs represent approximately 90% of businesses and more than 50% of employment worldwide. Their role is particularly crucial in emerging economies, where they drive industrialization, poverty alleviation, and social inclusion [4].

However, globalization and technological disruption have fundamentally altered the competitive landscape for SMEs. Global consumers increasingly demand transparency, ethical sourcing, and eco-friendly products. International trade agreements and regulatory frameworks now emphasize environmental compliance and corporate social responsibility. As such, SMEs can no longer rely solely on cost-efficiency and traditional business models. They must integrate sustainable strategies into their operations while leveraging digital transformation to access international opportunities and remain competitive.

Digital Transformation: A Strategic Imperative

Digital transformation in SMEs extends beyond the adoption of new technologies; it requires a fundamental change in organizational culture, business processes, and value creation mechanisms. Unlike digitalization, which focuses on automating existing tasks, digital transformation involves rethinking entire business models through technology. For SMEs, this

transformation is particularly valuable in the globalized context because it enables:

1. **Efficiency Gains:** Automation of administrative processes, improved logistics, and cost reductions.
2. **Customer Engagement:** Use of social media, digital marketing, and e-commerce to reach global consumers.
3. **Global Access:** Platforms such as Alibaba, Amazon, and cross-border e-commerce tools allow SMEs to sell internationally with lower entry barriers [5].
4. **Transparency and Trust:** Technologies like blockchain ensure authenticity and compliance across supply chains.

Yet, many SMEs struggle with limited digital literacy, insufficient infrastructure, and cyber-security concerns, which slow down their transition.

Sustainability as a Business Necessity

Parallel to digitalization, the demand for sustainable business practices has become unavoidable. The Triple Bottom Line (TBL) framework—focusing on people, planet, and profit—is now widely adopted as a lens to assess corporate performance. For SMEs, sustainability includes:

- **Environmental Responsibility:** Reducing carbon footprints, managing waste, and adopting renewable energy.
- **Social Equity:** Fair labor practices, community engagement, and employee well-being.
- **Economic Viability:** Long-term profitability aligned with responsible governance [6].

Globalization magnifies these responsibilities because international partners, investors, and consumers increasingly scrutinize environmental and social impacts. For instance, European Union policies such as the Green Deal and carbon border adjustments require businesses across the supply chain, including SMEs in developing economies, to adopt sustainable practices or risk exclusion from global markets.

The Convergence of Digitalization and Sustainability

A growing body of research highlights the synergy between digital transformation and sustainability. Digital technologies can enable sustainable practices by optimizing energy consumption, improving resource efficiency, and ensuring transparency. For example:

- IoT-enabled smart manufacturing reduces waste by monitoring real-time production processes.
- AI-driven analytics forecast demand more accurately, minimizing overproduction [7].
- Blockchain provides traceability, ensuring ethical sourcing in supply chains.
- E-commerce platforms lower carbon footprints by streamlining logistics and reducing reliance on physical stores.

Conversely, sustainable practices enhance digital adoption by building trust, improving reputation, and attracting customers who prefer environmentally responsible brands. In a globalized economy where competition is intense, SMEs that align digital innovation with sustainability stand out as resilient and competitive players.

Globalization as a Driving Force

Globalization accelerates both the opportunities and pressures for SMEs. On the one hand, it exposes them to new technologies, ideas, and markets, allowing even small firms in developing economies to compete globally. On the other, it compels them to meet international sustainability standards, adapt to diverse cultural expectations, and cope with global crises such as climate change and pandemics [8].

For example, an SME in Southeast Asia can now sell eco-friendly handicrafts directly to customers in Europe via digital platforms, but it must also comply with international standards for packaging, carbon reduction, and fair-trade practices. Thus, globalization acts as both a catalyst and a constraint, shaping how SMEs balance digital transformation and sustainability.

Challenges Faced by SMEs

While the integration of digital and sustainable strategies is promising, SMEs face numerous barriers:

1. Financial Constraints: Limited access to capital prevents investment in advanced digital systems or green technologies.
2. Knowledge and Skills Gaps: Many SME managers lack expertise in both digital tools and sustainability frameworks.
3. Infrastructure Limitations: Poor internet connectivity and energy supply issues in developing countries hinder progress [9].

4. Regulatory Burdens: Navigating complex international regulations can be overwhelming for small firms.
5. Cultural Resistance: Organizational inertia and reluctance to change impede digital and sustainable transitions.

Addressing these challenges requires targeted policy interventions, supportive ecosystems, and strategic partnerships.

Rationale and Research Gap

Despite the increasing importance of SMEs in the global economy, research on the intersection between digital transformation, sustainability, and globalization remains relatively fragmented. Much of the existing literature focuses on large corporations, leaving SMEs underexplored. Furthermore, while digital transformation and sustainability are often studied separately, their interconnection in the context of globalization is less understood. This paper aims to fill this gap by analyzing how SMEs can integrate both dynamics to enhance competitiveness and resilience in an interconnected world [10].

Objectives of the Study

The main objectives of this study are:

1. To analyze how digital transformation enables SMEs to adopt sustainable business practices.
2. To evaluate the role of globalization in shaping digital and sustainable strategies for SMEs.
3. To identify the challenges and opportunities faced by SMEs in aligning digitalization with sustainability.
4. To propose strategic recommendations for SMEs, policymakers, and stakeholders to support inclusive and sustainable globalization.

Structure of the Paper

The paper is organized as follows: After this introduction, the literature review provides a theoretical foundation by examining existing research on digital transformation, sustainability, and globalization in SMEs. The methodology section outlines the conceptual framework and approach. The discussion analyzes synergies, opportunities, and challenges through real-world examples. Finally, the conclusion summarizes findings, highlights practical implications, and suggests directions for future research [11].

Concluding Remarks on the Introduction

The interplay between digital transformation, sustainability, and globalization is not just a theoretical curiosity but a practical necessity for SMEs. In a rapidly changing world, SMEs that embrace this integration will not only survive but also thrive, contributing to a more inclusive, innovative, and sustainable global economy. Conversely, failure to adapt may marginalize SMEs, leaving them vulnerable to competitive pressures and regulatory exclusion. Thus, this study underscores the urgency of developing strategies where digital transformation becomes a driver of sustainability, and sustainability, in turn, enhances competitiveness within globalization. For SMEs, the future lies not in choosing between digitalization and sustainability but in recognizing their convergence as the foundation of long-term success [12].

Literature Review and Theoretical Background

Digital Transformation in SMEs

Digital transformation is not only about adopting technology but also about cultural and organizational change. Cloud computing, artificial intelligence, blockchain, and e-commerce platforms allow SMEs to streamline processes, engage customers more effectively, and scale globally. However, SMEs face barriers such as limited financial resources, digital skills gaps, and cybersecurity threats.

Sustainable Business Practices

Sustainability in SMEs refers to integrating economic, environmental, and social dimensions into business operations. Common practices include resource efficiency, waste reduction, renewable energy adoption, fair labor policies, and responsible sourcing. Scholars argue that SMEs, due to their flexibility and close community connections, are well-positioned to pioneer sustainable practices [13].

Globalization as a Driving Force

Globalization intensifies pressure on SMEs to meet international sustainability standards and embrace digital tools for competitiveness. The global marketplace values transparency, carbon reduction, and innovation, forcing SMEs to align with global expectations. Moreover, digital technologies enable SMEs to access international opportunities that were previously out of reach.

The Triple Bottom Line Framework

The Triple Bottom Line (TBL)—people, planet, and profit—serves as a theoretical lens for analyzing how SMEs can balance digital adoption and sustainable practices while achieving growth in a globalized context.

Methodological Considerations

This paper follows a conceptual and analytical approach, synthesizing prior research on digital transformation, sustainability, and globalization. Case examples of SMEs from Europe, Asia, and emerging markets are referenced to illustrate practical applications [14].

Discussion and Analysis

Digital Transformation as a Pathway to Competitiveness

The globalization era has fundamentally redefined competition, making digital transformation not a luxury but a survival imperative for SMEs. Unlike large corporations that can afford advanced digital infrastructures, SMEs often operate with limited resources. However, their flexibility and adaptability give them a comparative advantage in implementing incremental digital solutions. For example, cloud computing offers affordable and scalable services that reduce IT costs while enabling remote collaboration across borders. Similarly, social media platforms and e-commerce tools allow SMEs to access international customers without the need for expensive physical expansions.

From a competitive standpoint, digital transformation enhances efficiency, reduces transaction costs, and fosters innovation. By leveraging artificial intelligence and big data analytics, SMEs can optimize decision-making and predict market trends. Blockchain technology ensures trust and transparency in cross-border trade, which is essential in building credibility with international partners. In essence, digitalization bridges the resource gap between SMEs and large corporations, empowering smaller firms to compete globally.

Sustainability as a Source of Long-Term Value

While digital transformation provides SMEs with tools for competitiveness, sustainability secures their long-term survival. Globalization has intensified awareness about climate change, ethical labor, and resource

scarcity. Consumers and investors increasingly prefer companies that align with Environmental, Social, and Governance (ESG) principles. For SMEs, integrating sustainability is not only about compliance but also about value creation [15].

Adopting sustainable practices enables SMEs to reduce operational costs through resource efficiency, waste management, and renewable energy. Moreover, socially responsible practices improve employee satisfaction and community trust. Sustainability also enhances brand reputation, which can be a decisive factor for global customers when choosing between suppliers. For example, SMEs that adopt eco-friendly packaging or fair-trade sourcing often gain preference in international markets, particularly in Europe and North America where consumer awareness of sustainability is high.

The Synergy between Digital Transformation and Sustainability

A critical insight emerging from this discussion is the interdependence of digital transformation and sustainability. Digital technologies act as enablers of sustainable practices, while sustainability initiatives enhance the value of digital investments. For instance:

- IoT-enabled monitoring systems help SMEs track energy usage and reduce waste, directly contributing to environmental goals [16].
- Blockchain platforms guarantee supply chain transparency, ensuring compliance with labor standards and ethical sourcing.
- AI algorithms optimize production schedules, preventing overproduction and lowering carbon emissions.
- Digital platforms reduce reliance on physical distribution channels, thus lowering transportation-related emissions.

Conversely, sustainable strategies create demand for digital solutions. A firm committed to reducing its carbon footprint may adopt advanced energy management systems or digital logistics tools. In this way, digitalization and sustainability reinforce each other, forming a virtuous cycle that benefits SMEs in the globalized economy.

The Role of Globalization in Accelerating Change

Globalization has accelerated the pace at which SMEs must integrate digital and sustainable practices. Participation in global supply chains requires compliance with international standards, such as the

EU's carbon neutrality policies or the United Nations' Sustainable Development Goals (SDGs). Similarly, competing in global digital marketplaces necessitates technological readiness and cybersecurity resilience [17].

Globalization also creates opportunities for SMEs to learn from global best practices, collaborate with international partners, and access foreign funding for green and digital initiatives. For instance, development programs from the World Bank, OECD, and regional organizations provide training and financing to help SMEs adopt eco-friendly technologies. On the other hand, globalization exposes SMEs to vulnerabilities, such as dependence on international digital platforms, cyberattacks, and exposure to global market shocks. Thus, globalization serves as both a catalyst and a constraint—it pushes SMEs toward digital and sustainable transformations while simultaneously raising the stakes of non-compliance.

Challenges and Barriers for SMEs

Despite the potential, SMEs face considerable obstacles in adopting digital and sustainable strategies. These include:

1. **Financial Limitations:** Many SMEs lack access to credit and investment needed for digital or green technologies. Financing remains a critical barrier, particularly in developing countries.
2. **Skills Gaps:** Digital literacy and sustainability expertise are often limited among SME owners and employees.
3. **Infrastructure Constraints:** Inadequate internet connectivity, unreliable energy supply, and weak institutional support hinder progress [1].
4. **Regulatory Complexity:** Navigating international environmental standards, data protection laws, and trade requirements is challenging for SMEs with limited legal expertise.
5. **Cultural Resistance:** Organizational inertia and reluctance to change delay the adoption of new practices.

Addressing these barriers requires coordinated efforts from governments, financial institutions, and international organizations to provide resources, training, and incentives.

Strategic Responses for SMEs

To overcome these challenges, SMEs must adopt strategic approaches that align digital transformation with sustainability. Several strategies can be highlighted:

- **Leadership Commitment:** SME leaders must champion a culture of digital innovation and sustainability. Managerial vision is crucial in driving organizational change.
- **Collaborations and Partnerships:** SMEs can form alliances with NGOs, universities, and larger corporations to access knowledge, funding, and technologies.
- **Incremental Innovation:** Instead of radical overhauls, SMEs can implement small-scale digital tools or green practices that gradually improve operations.
- **Leveraging Government Support:** SMEs should take advantage of subsidies, tax incentives, and training programs offered by governments to encourage digital and sustainable adoption [18].
- **Building Resilience:** Digital and sustainable strategies must focus not only on competitiveness but also on resilience against external shocks such as pandemics, economic crises, or climate-related disruptions.

Case Examples Across Regions

Practical examples illustrate how SMEs integrate digitalization and sustainability globally:

- **European SMEs:** Many firms in the EU adopt renewable energy solutions combined with digital energy management systems to meet strict environmental regulations.
- **Asian SMEs:** Digital platforms such as Shopee and Lazada empower SMEs to reach global customers. At the same time, many adopt sustainable packaging to satisfy eco-conscious consumers.
- **African SMEs:** Mobile technologies support financial inclusion, while solar-powered solutions drive sustainable innovation in regions with limited energy infrastructure.
- **Latin American SMEs:** Businesses increasingly adopt circular economy models, using digital platforms to recycle products and reduce waste [19].

These examples demonstrate the diversity of strategies SMEs employ depending on their regional context and institutional environment.

Policy and Ecosystem Support

The integration of digital transformation and sustainability in SMEs cannot be achieved in isolation. Policymakers and international organizations play a pivotal role in creating enabling environments. Governments must invest in digital infrastructure, promote green energy, and establish training programs that equip SMEs with necessary skills. Similarly, international cooperation is essential to harmonize sustainability standards and provide SMEs with access to global funding mechanisms.

Innovation ecosystems, including incubators, accelerators, and industry clusters, are also critical. They provide SMEs with mentorship, networking opportunities, and exposure to emerging technologies. Universities and research institutions can support SMEs through knowledge transfer, while financial institutions must develop flexible instruments to finance SME innovation.

Implications for Future Research and Practice

The discussion highlights several implications for both research and practice. Future studies should investigate how SMEs in different cultural and economic contexts balance the trade-offs between digital investment and sustainable practices. Comparative research across regions could reveal best practices and contextual challenges. Moreover, quantitative studies measuring the impact of digital-sustainable integration on SME competitiveness would provide valuable insights for practitioners and policymakers [10].

In practice, SMEs should view digital transformation and sustainability not as separate agendas but as interconnected strategies. Managers must adopt a holistic perspective, integrating digital solutions that simultaneously address sustainability goals. Policymakers must also design frameworks that reward SMEs for aligning digital innovation with green practices.

Concluding Insights of the Discussion

The convergence of digital transformation and sustainable business practices represents a paradigm shift for SMEs in the globalized era. Digital technologies empower SMEs to innovate, reduce costs,

and expand globally, while sustainability ensures long-term resilience, social legitimacy, and compliance with international standards. Globalization magnifies both the opportunities and the risks, making integration of these strategies indispensable.

While challenges remain—ranging from financial barriers to regulatory complexity—SMEs that adopt forward-looking strategies and leverage supportive ecosystems can transform constraints into opportunities. Ultimately, the future competitiveness of SMEs lies in their ability to synchronize digital innovation with sustainability goals, ensuring that they are not only participants in globalization but also contributors to a more inclusive and environmentally responsible global economy [2].

Digital technologies can act as enablers of sustainable practices—for example, AI-driven forecasting reduces overproduction, IoT devices monitor resource use, and blockchain ensures transparency in global supply chains. Conversely, a commitment to sustainability drives SMEs to adopt digital tools that facilitate green practices, such as digital platforms for circular economy models or energy management systems. This mutual reinforcement creates a virtuous cycle where digitalization enhances sustainability, and sustainability, in turn, increases the value of digital investments. Globalization acts as a powerful catalyst for SMEs to integrate digital and sustainable strategies. It opens access to new markets, technologies, and partnerships, while simultaneously imposing higher standards of accountability and transparency. For instance, SMEs seeking to export to European markets must comply with strict carbon reduction requirements, while participation in global e-commerce necessitates digital readiness and data security. Thus, globalization amplifies both opportunities and challenges, pushing SMEs toward innovation while exposing them to global risks such as cyberattacks, regulatory complexities, and environmental pressures. Despite the clear benefits of combining digital and sustainable practices, SMEs face significant barriers, including financial constraints, skills shortages, infrastructural deficiencies, and cultural resistance. Many SMEs, particularly in developing economies, struggle to access the capital and expertise required to implement transformative changes. This underscores the importance of supportive ecosystems—governments, international organizations, financial institutions, and innovation networks must work together to provide SMEs with resources, training, and incentives. Without such

systemic support, the digital-sustainable transition risks widening inequalities between advanced and emerging economies. For SMEs, the path forward lies in adopting integrated strategies that align digital transformation with sustainability. This requires visionary leadership, incremental innovation, and active engagement with global value chains. SMEs must cultivate a culture of continuous learning and adaptability, investing in digital literacy and sustainability awareness among employees. Collaborations—with universities, NGOs, and larger corporations—can provide access to expertise and financing. Above all, SMEs must view digitalization and sustainability not as isolated agendas but as complementary dimensions of competitiveness in a globalized economy [19].

Conclusion

The twenty-first century has ushered in a profound transformation in the way businesses operate, shaped by two intertwined dynamics: digital transformation and sustainable business practices. For Small and Medium Enterprises (SMEs), which constitute the backbone of global economies, the integration of these two forces is no longer optional but essential for survival and competitiveness in the era of globalization. This study has highlighted the opportunities, challenges, and strategic imperatives that SMEs face when navigating the complex interplay of digitalization, sustainability, and globalization. Digital transformation empowers SMEs to overcome traditional barriers of size, geography, and resource limitations. By leveraging tools such as cloud computing, artificial intelligence, blockchain, and e-commerce platforms, SMEs can enhance efficiency, reduce transaction costs, and expand their reach into international markets. Digital tools not only streamline operations but also provide real-time insights, enabling better decision-making and fostering innovation. In the context of globalization, where competition is intense and customer expectations evolve rapidly, digital transformation serves as a pathway to agility and resilience. Equally significant is the role of sustainability in ensuring the long-term viability of SMEs. As stakeholders—from consumers to regulators and investors—increasingly demand accountability, SMEs must align with environmental, social, and governance (ESG) principles. Sustainable practices such as energy efficiency, responsible sourcing, waste reduction, and fair labor policies are not merely compliance measures but strategic assets. They

enhance brand reputation, attract environmentally conscious customers, and improve trust among global partners. Moreover, sustainability fosters resilience by reducing dependence on finite resources and mitigating exposure to regulatory and environmental risks.

A key insight from this discussion is the synergistic relationship between digital transformation and sustainability.

Policymakers play a vital role in enabling this transformation. Investments in digital infrastructure, subsidies for green technologies, simplified regulations, and targeted training programs are crucial in lowering barriers for SMEs. International cooperation is equally important, as harmonized standards and global funding mechanisms can create a level playing field for SMEs worldwide. From a research perspective, more empirical studies are needed to measure the impact of digital-sustainable integration on SME performance across different contexts. Comparative case studies across regions could provide valuable insights into best practices and context-specific challenges. Ultimately, the integration of digital transformation and sustainability in SMEs represents more than a strategic response to globalization—it symbolizes a redefinition of the role of business in society. SMEs that embrace this dual agenda will not only secure their own survival but also contribute to inclusive growth, environmental protection, and social well-being. Those that fail to adapt risk being left behind in a rapidly evolving global economy. In conclusion, the future of SMEs lies in recognizing that digital innovation and sustainability are not competing priorities but mutually reinforcing imperatives. By embracing this convergence, SMEs can thrive in globalization, ensuring that competitiveness goes hand in hand with responsibility. This alignment will shape not only the resilience of individual firms but also the sustainability of the global economy as a whole.

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