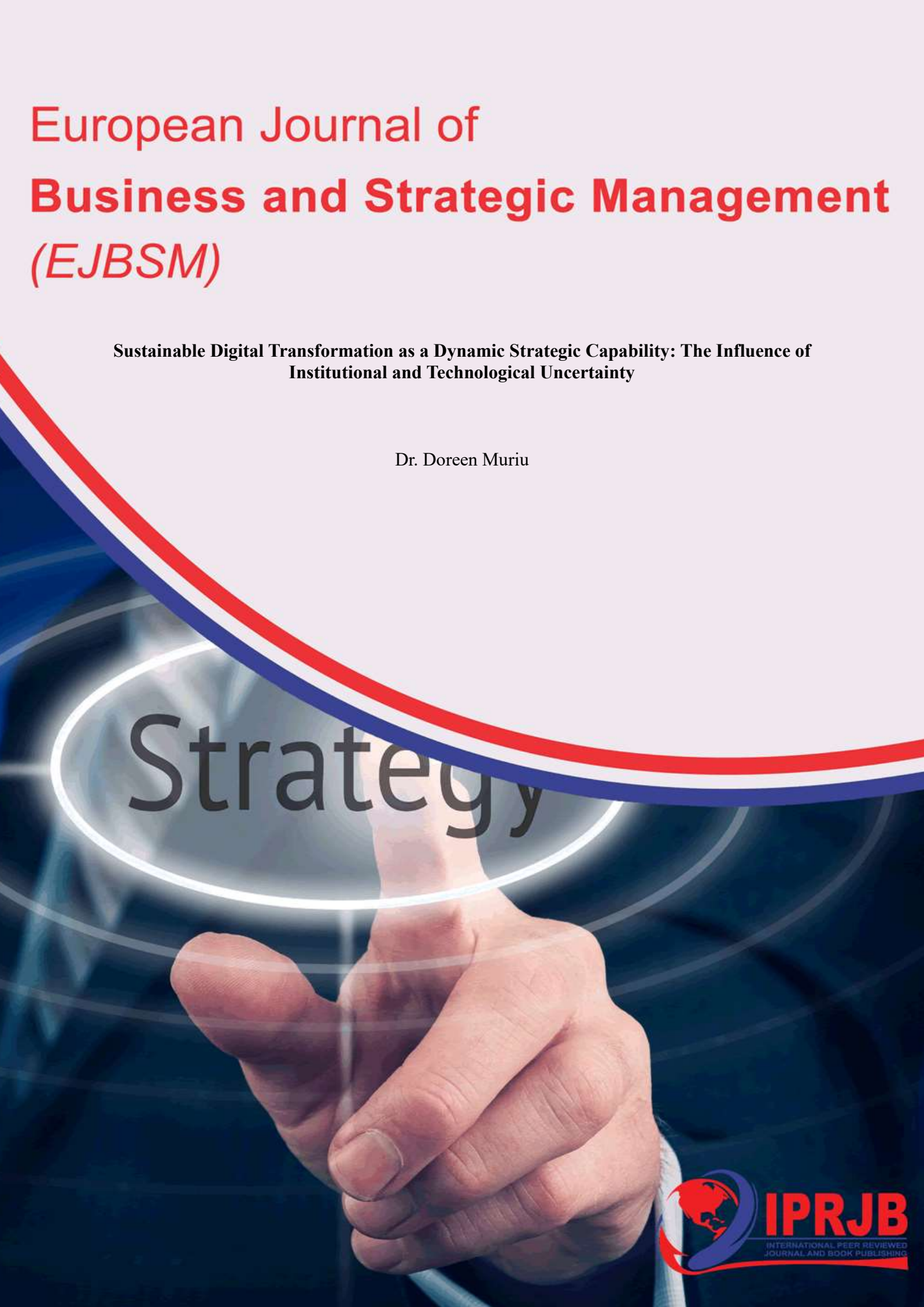


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**Sustainable Digital Transformation as a Dynamic Strategic Capability: The Influence of
Institutional and Technological Uncertainty**

Dr. Doreen Muriu



Strategy

Sustainable Digital Transformation as a Dynamic Strategic Capability: The Influence of Institutional and Technological Uncertainty



^{1*}Dr. Doreen Muriu
United States International University-Africa

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Abstract

Purpose: This study examines sustainable digital transformation (SDT) as a dynamic strategic capability for Kenyan organizations operating under institutional pressure and technological uncertainty. It investigates the influence of institutional pressures and technological uncertainty on SDT capability, its relationship with strategic adaptability, and the moderating roles of leadership support and organizational learning culture.

Methodology: This study utilized PRISMA-inspired systematic scoping review. Data sources included major academic databases such as Scopus, Web of Science, and Taylor & Francis Online, which were treated as the primary repositories for high-quality peer-reviewed scholarly literature. In addition, Google Scholar was used as a supplementary search engine to identify additional relevant studies, including grey literature such as conference papers, theses, working papers, and institutional reports that may not be indexed in Scopus or Web of Science. The peer reviewed literature considered was from 2014-2026

Findings: Institutional pressures including coercive, mimetic, and normative, significantly drive the development of SDT capabilities by compelling organizations to adopt green digital infrastructure, ESG reporting systems, and compliance technologies. However, technological uncertainty creates strategic paralysis, skill obsolescence, sunk-cost dilemmas, and e-waste challenges, often resulting in the “digitalization paradox.” SDT capability positively enhances strategic adaptability by enabling sensing, seizing, and reconfiguring processes. Additionally, leadership support and organizational learning culture are critical moderators that strengthen the conversion of external pressures into robust capabilities and mitigate uncertainty barriers.

Unique Contribution to Theory, Practice and Policy: Based on the study findings, Kenyan organizations should move beyond superficial digital adoption by embedding sustainability into core strategies, supported by visible leadership commitment and strong learning cultures. In addition, policymakers should prioritize integrated green-digital standards, skills development programs, and incentives for capability building to support Kenya’s twin digital and green transitions. Practically, this framework offers practical pathways for achieving genuine sustainability performance and strategic resilience in emerging economies.

Keywords: Sustainable Digital Transformation, Dynamic Capabilities, Institutional Pressure, Strategic Capability, Technological Uncertainty

JEL Codes: O33, O32, L21, Q01

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INTRODUCTION

The contemporary business environment is increasingly shaped by rapid technological advancement, sustainability pressures, climate governance expectations, and growing stakeholder demands for organizational accountability and resilience (Akinsola, 2025). Sustainable digital transformation refers to the strategic integration of digital technologies, sustainability objectives, governance systems, and organizational adaptability mechanisms to support long-term organizational competitiveness, resilience, and responsible value creation (Putri et al., 2025). This concept extends beyond traditional digital transformation by emphasizing not only operational efficiency but also environmental responsibility, governance alignment, and institutional sustainability outcomes.

The sustainable digital transformation can be effectively explained through the dynamic capabilities theory, as developed by Teece et al. (1997) and later refined by Teece (2007; 2018). Dynamic capabilities refer to an organization's ability to sense opportunities and threats, seize opportunities, and reconfigure internal and external resources in response to rapidly changing environments. Relatedly, organizations must continuously adapt digital technologies, processes, and governance structures in order to align operational performance with sustainability objectives such as carbon reduction, resource efficiency, and ESG compliance. Therefore, sustainable digital transformation is not a one-off technological adoption process, but an ongoing capability-building and strategic renewal process driven by organizational agility.

Additionally, the Technology–Organization–Environment framework provides complementary insight by explaining how technological readiness, organizational characteristics, and external environmental pressures influence the adoption of digital and sustainability-oriented innovations (Tornatzky & Fleischer, 1990). Within this framework, environmental pressures such as regulatory requirements, climate policies, and stakeholder expectations play a critical role in shaping the pace and direction of sustainable digital transformation, while organizational readiness determines the extent to which firms can effectively implement these changes. According to Barney (1991), the resource-based view theory further explanatory power by emphasizing that organizational performance and competitive advantage depend on the availability and effective deployment of valuable, rare, inimitable, and non-substitutable (VRIN) resources. In the context of sustainable digital transformation, such resources include advanced digital infrastructure, data analytics capabilities, skilled human capital, and sustainability-oriented technologies.

Globally, organizations continue investing heavily in digital technologies such as artificial intelligence (AI), cloud computing, automation systems, blockchain, data analytics, and digital platforms to improve operational efficiency, innovation capability, customer experience, and strategic responsiveness (Zhang et al., 2026). Consequently, digital transformation has become a central organizational strategy for sustaining competitiveness within highly dynamic and uncertain environments. According to a 2026 report by Statista, global spending on digital transformation is projected to reach approximately \$2.8 trillion in 2025 and \$3.9 trillion by 2027, reflecting a compound annual growth rate exceeding 16%.

At the same time, organizations are facing increasing pressure from governments, investors, regulators, customers, and society to integrate sustainability principles into corporate strategy and operational systems. Kim and Yang (2024) and Akinsola (2025) note that environmental concerns, governance expectations, ESG frameworks, climate risk management, and

sustainable value creation have significantly reshaped organizational priorities across industries. As a result, organizations are progressively expected not only to pursue digital transformation but also to ensure that technological advancement contributes to long-term sustainability and resilience. Notably, 48% of organizations now identify ESG goals as a central priority for their technology teams (KPMG, 2025).

However, despite substantial investments in digital technologies, many organizations struggle to achieve expected sustainability outcomes. Sun et al. (2026) describe this as the “digitalization paradox,” where increased digitalization does not always translate into improved environmental or organizational performance. This paradox highlights the importance of organizational dynamic capabilities in determining whether digital transformation generates sustainable value or unintended environmental trade-offs.

For instance, organizations such as Amazon demonstrate the potential of integrating digital technologies with sustainability objectives through AI-powered logistics and warehouse robotics, achieving efficiency gains while reducing environmental impact (Matereja, 2025). Nevertheless, such outcomes are not universal, reinforcing the argument that sustainable digital transformation outcomes depend not only on technology adoption but also on the strength of organizational dynamic capabilities, institutional conditions, and resource endowments.

Global Perspective of Sustainable Digital Transformation

Developed economies, particularly the United States, the United Kingdom, and countries within the European Union, have established themselves as frontrunners in sustainable digital transformation. However, the integration of digitalization and sustainability remains inherently complex, revealing why sustainable digital transformation is difficult to achieve in practice. This complexity is reflected in what recent literature describes as a structural tension between digital expansion and environmental performance, where organizations must continuously balance productivity gains with sustainability constraints under conditions of increasing technological dependence (Bocean et al., 2023).

This tension is evident in the United States, where firms such as Microsoft and Google are making substantial investments in AI-enabled sustainability systems. Microsoft’s commitment to becoming carbon-negative by 2030, alongside its deployment of renewable-powered data centers and AI-driven climate analytics, illustrates the challenge of aligning rapid digital expansion with environmental responsibility (Beatty, 2026). Similarly, Google’s DeepMind system has achieved reductions in data center cooling energy consumption of approximately 15% (Prophetstor, 2025), yet the continuous expansion of digital infrastructure globally offsets some of these gains, reinforcing the persistent imbalance between efficiency improvements and overall environmental impact.

Beyond technological complexity, sustainable digital transformation is strongly shaped by institutional pressures arising from regulatory frameworks, ESG mandates, market expectations, and global climate commitments. In Europe, these pressures are particularly pronounced. Germany’s Industrie 4.0 initiative integrates digital manufacturing systems with sustainability objectives such as circular economy models and energy-efficient smart factories (Barnstedt, 2021). Similarly, Denmark and Finland demonstrate how national digital strategies are embedded within broader climate governance systems that directly link digital infrastructure development to carbon neutrality targets (Kehoe, 2025; European Union, 2025). These cases indicate that institutional environments do not merely enable sustainable digital

transformation but actively structure its priorities, implementation pathways, and performance expectations.

Frameworks such as the European Green Deal, the Digital Decade Policy Programme, and the Net-Zero Industry Act further intensify these institutional pressures by embedding ESG compliance, energy efficiency requirements, and sustainability reporting obligations into digital transformation agendas. In the United Kingdom, firms such as BT Group and Rolls-Royce are aligning digital governance systems with net-zero commitments and ESG reporting requirements (BT Group, 2025; Shahzad et al., 2024). This reflects a broader shift in which SDT adoption is increasingly driven by coercive, normative, and regulatory expectations rather than purely efficiency-based motivations.

Despite these institutional drivers, sustainable digital transformation is further complicated by technological uncertainty associated with emerging digital technologies. Advanced systems such as artificial intelligence, blockchain, and cloud computing continue to evolve rapidly, making it difficult for organizations to accurately assess their long-term environmental implications. This uncertainty limits the predictability of sustainability outcomes and complicates long-term strategic planning for digital investments.

This challenge contributes to the persistent digital–green trade-off, where digital expansion may unintentionally increase environmental burdens through higher energy consumption, data processing demands, and infrastructure scaling effects (Herman, 2025). For example, while Germany’s Industrie 4.0 initiative enhances industrial efficiency through smart manufacturing systems and digital twins (Barnstedt, 2021), its overall sustainability outcomes depend heavily on how effectively these technologies are managed, scaled, and integrated into broader environmental strategies. This reinforces the difficulty of achieving stable and predictable sustainability gains from digital transformation alone.

Given these complexities, sustainable digital transformation is increasingly interpreted as a continuous capability-building process shaped by dynamic environmental conditions. Organizations must continuously adapt digital systems, governance structures, and sustainability practices in response to shifting institutional demands and technological uncertainties. This emphasizes the importance of organizational agility and ongoing resource reconfiguration in achieving sustainable outcomes under changing global pressures.

Asian economies further reinforce this capability-oriented interpretation. Singapore’s Smart Nation initiative integrates AI, smart grids, and data-driven urban systems to enhance both efficiency and environmental performance (Cavada et al., 2019). Similarly, China and South Korea are advancing large-scale green industrial digitalization through AI, 5G, and industrial IoT aligned with carbon neutrality targets (Liu et al., 2023), while India’s Digital India programme integrates sustainability objectives into smart cities and renewable energy systems (Saini & Kharb, 2025). Collectively, these cases demonstrate that sustainable digital transformation is increasingly treated as a national-level adaptive capability, enabling continuous alignment between technological development, economic competitiveness, and sustainability goals.

Sustainable Digital Transformation in Sub-Saharan Africa

Across Sub-Saharan Africa, organizations are increasingly pursuing digital transformation to improve operational efficiency, financial inclusion, governance, and service delivery. Yet, implementation remains shaped by persistent structural constraints such as weak infrastructure,

energy instability, institutional inefficiencies, and socio-economic inequalities. These conditions frame sustainable digital transformation as a continuous process of organizational adaptation under resource scarcity and uncertainty.

From a capability perspective, transformation outcomes depend on organizations' ability to adapt, integrate, and reconfigure resources in response to volatile conditions, consistent with dynamic capabilities theory (Teece, 2007; Teece, 2018). The Technology–Organization–Environment (TOE) framework and Resource-Based View further highlight how environmental pressures and resource disparities influence these outcomes.

Institutional Response Strategies differ markedly across the region. South Africa exemplifies a more structured response, leveraging relatively stronger institutions and infrastructure to align digital transformation with ESG frameworks and renewable digital infrastructure. In contrast, Nigeria's approach is driven by rapid private-sector innovation, particularly in fintech, where digital expansion is gradually being linked to sustainability goals such as green finance and SME support. Ghana, Rwanda, Uganda, and Tanzania demonstrate hybrid strategies that combine national policy initiatives with innovation ecosystem development, emphasizing inclusive growth, smart agriculture, and green ICT practices, though constrained by infrastructure and governance limitations. These varied institutional response strategies ranging from institution-led structured integration to innovation-driven adaptation under resource scarcity, underscore why sustainable digital transformation remains uneven across Sub-Saharan Africa. Stronger institutional and resource foundations enable more coherent alignment between digital and sustainability objectives, while greater volatility compels more flexible, survival-oriented responses.

Kenyan Organizational Context

Kenya has positioned itself as one of East Africa's leading digital innovation hubs. However, Kenyan organizations remain learning organizations struggling to transition from operational digitalization to building strategic dynamic capabilities for sustainable digital transformation. While digital technologies are increasingly adopted to improve efficiency and service delivery, most organizations continue to face significant difficulties in integrating sustainability as a core strategic capability amid resource constraints, institutional pressures, and technological uncertainty.

Safaricom, for example, has expanded its digital ecosystem through M-Pesa and other platforms while attempting to embed sustainability initiatives such as solarisation of base stations, net-zero commitments, and tree planting. Nevertheless, these efforts illustrate the considerable challenge of moving beyond incremental operational improvements toward deep strategic integration of digital and sustainability objectives. Similarly, Kenya Commercial Bank (KCB) has introduced green financing products and increased its sustainable loan portfolio. Yet, the relatively modest allocation (currently around 15%) and ongoing difficulties in scaling these initiatives reflect the broader struggle to reconfigure resources and capabilities under conditions of technological uncertainty and institutional volatility. In the public sector, the Kenya Revenue Authority (KRA) and the eCitizen platform have advanced digital governance and reduced paper-based processes. However, these developments remain largely operational and have yet to demonstrate mature dynamic capabilities for sustainability-oriented transformation.

Thus, Kenyan organizations exemplify the difficulties of sustainable digital transformation in Sub-Saharan Africa. They are actively experimenting and learning, but the gap between operational digitalization and the development of strategic dynamic capabilities remains wide. This transition is hindered by persistent infrastructure limitations, digital governance weaknesses, and the challenge of responding effectively to competing institutional and environmental pressures.

Research Problem

Organizations are increasingly integrating digital technologies with sustainability objectives, developing sustainable digital transformation as a dynamic strategic capability to respond effectively to institutional pressures and technological uncertainty (Abdelwahed et al., 2025; Putri et al., 2025). However, despite notable investments, many Kenyan organizations continue to struggle with this integration. They remain largely learning organizations, still transitioning from operational-level digitalization to building true strategic dynamic capabilities. Evidence from leading firms reveals that many digital transformation initiatives fail to deliver expected sustainability and performance outcomes, often due to the “digitalization paradox” (Sun et al., 2026), where increased digital investment does not automatically translate into strategic or sustainability gains.

This struggle is particularly acute in Kenya’s complex environment, characterized by strong institutional pressures, high technological uncertainty, infrastructure limitations, and resource constraints. The inability to fully develop sustainable digital transformation as a dynamic capability undermines organizational adaptability, creates competitive disadvantages, and limits contributions to national sustainable development goals.

While previous studies on digital transformation in Kenya (e.g., Kikundu et al., 2025; Murimi & Kungu, 2025; Kobusingye et al., 2025) have provided useful insights, they exhibit notable limitations. Many remain narrow in sectoral focus, methodologically constrained to cross-sectional designs or self-reported data, conceptually fragmented by treating digitalization and sustainability as separate phenomena, and geographically biased toward Nairobi. The current study addresses these gaps by conceptualizing sustainable digital transformation as a dynamic strategic capability. It examines the influence of institutional pressure and technological uncertainty on this capability, its relationship with strategic adaptability, and the moderating roles of leadership support and organizational learning culture.

Research Objectives

General Objective

To examine sustainable digital transformation as a dynamic strategic capability under institutional and technological uncertainty.

Specific Objectives

1. To examine the influence of institutional pressure on sustainable digital transformation capability.
2. To assess the effect of technological uncertainty on sustainable digital transformation capability.
3. To evaluate the relationship between sustainable digital transformation capability and strategic adaptability.

4. To examine the moderating influence of leadership support and organizational learning culture on sustainable digital transformation capability.

LITERATURE REVIEW

Theoretical Review

Dynamic Capability Theory

Dynamic Capabilities Theory (DCT) was originally developed by Teece et al. (1997) as an extension of the Resource-Based View to address its limitations in explaining firm performance in rapidly changing environments. The theory was later refined by Teece (2007, 2018), who emphasized the firm's capacity for continuous sensing, seizing, and reconfiguring of resources and capabilities to sustain competitive advantage under conditions of technological disruption, market volatility, and institutional change. Unlike static resource-based perspectives, DCT focuses on how organizations renew and adapt their capabilities over time in turbulent contexts.

Core to the theory are three interrelated processes: sensing (identifying opportunities and threats in the external environment), seizing (mobilizing resources to capture value from those opportunities), and reconfiguring (transforming organizational assets, structures, and processes to maintain alignment with changing conditions) (Teece et al., 1997; Teece, 2007). Subsequent scholars have enriched the framework: Eisenhardt and Martin (2000) highlighted dynamic capabilities as identifiable processes in high-velocity markets, Helfat et al. (2007) introduced the capability lifecycle concept, and Zahra et al. (2006) underscored the entrepreneurial dimension of capability development under uncertainty.

Despite its prominence, DCT has faced significant criticism. Scholars argue that the concept remains vague and difficult to operationalize (Winter, 2003), risks tautology (Arend & Bromiley, 2009), and lacks clear boundaries and consistent definitions (Zahra et al., 2006). Importantly, questions persist about the theory's applicability in resource-constrained settings and emerging economies characterized by institutional voids (Peteraf et al., 2013).

The Kenyan context offers a compelling theoretical site for examining the relevance and boundary conditions of Dynamic Capability Theory. In environments marked by institutional voids, infrastructure deficits, technological uncertainty, and competing institutional pressures, the ability of organizations to develop and deploy dynamic capabilities for sustainable digital transformation is severely tested. Rather than assuming the universal applicability of sensing-seizing-reconfiguring processes, this study uses the Kenyan setting to interrogate whether and how dynamic capabilities emerge and function effectively when organizations must simultaneously navigate weak institutional support, resource scarcity, and rapid digital change. This makes Kenya a valuable context for extending DCT into emerging economy conditions.

Technology-Organization-Environment

The Technology-Organization-Environment (TOE) framework is a widely recognized organizational-level theory that explains the adoption and implementation of technological innovations. Developed by Tornatzky and Fleischer (1990), the framework posits that technological, organizational, and environmental contexts collectively influence an organization's decision to adopt, implement, and assimilate new technologies. It adopts a contingency perspective, arguing that successful technology adoption depends on the alignment among these three contextual elements (Oliveira & Martins, 2011).

The framework has been extensively applied and extended in information systems and digital transformation research, often in combination with theories such as Diffusion of Innovations (DOI) and the Technology Acceptance Model (TAM) (Hoang et al., 2024; Küçükoğlu, 2025). However, despite its popularity, TOE has faced significant criticism for functioning primarily as a taxonomy or “list of contextual variables” rather than a robust causal theory (Wang et al., 2010). Critics further note that the framework remains relatively static, with limited attention to dynamic processes, post-adoption behaviors, capability development, and the complex interactions among the three contexts over time (Awa et al., 2017).

This study addresses these limitations by integrating the TOE framework with Dynamic Capabilities Theory (DCT). The integration adds causal depth and process-oriented explanations to the traditionally taxonomic structure of TOE. Institutional pressure is examined within the environmental context, technological uncertainty within the technological context, and organizational factors (leadership support and organizational learning culture) as moderators that influence capability development. Sustainable digital transformation is positioned as the dynamic strategic capability that emerges from the interaction of these elements through sensing, seizing, and reconfiguring processes. This theoretical integration provides a more robust explanation of how Kenyan organizations can transform external pressures and technological volatility into sustainable competitive advantage in an emerging economy context.

Resource-Based View (RBV) Theory

The Resource-Based View (RBV) is a strategic management theory that explains sustained competitive advantage through a firm’s unique bundle of internal resources and capabilities rather than external market positioning (Wernerfelt, 1984). It shifts the analytical focus inward, arguing that heterogeneous and immobile resources drive superior performance when they meet specific criteria. Barney (1991) later expanded the framework to the VRIO model by adding the “Organized to exploit” dimension.

RBV rests on two fundamental assumptions: resource heterogeneity, whereby firms possess different bundles of resources and capabilities, and resource immobility, which implies that strategic resources are not easily transferred or replicated across firms (Barney, 1991; Wernerfelt, 1984). The theory distinguishes between tangible resources, such as physical and financial assets, and intangible resources, including human, organizational, and technological capabilities. Sustainable competitive advantage arises only when resources are valuable, enabling firms to exploit opportunities or neutralize threats; rare; imperfectly imitable due to unique historical conditions, causal ambiguity, or social complexity; and non-substitutable (Barney, 1991). Peteraf (1993) further strengthened RBV by emphasizing ex post limits to competition as a necessary condition for sustaining competitive advantage.

Beyond Wernerfelt (1984) and Barney (1991), key contributors include Prahalad and Hamel (1990), who introduced the concept of core competencies; Teece et al. (1997), who extended RBV by linking it to Dynamic Capabilities Theory in rapidly changing environments; Eisenhardt and Martin (2000), who emphasized capability development processes in high-velocity markets; and Sirmon et al. (2011), who advanced the concept of resource orchestration to explain how managers structure, bundle, and leverage organizational resources.

However, critics argue that RBV is tautological because resources are considered valuable if they generate competitive advantage, while competitive advantage itself is used to demonstrate

resource value (Priem & Butler, 2001). The theory has also been criticized for its static orientation, which assumes relatively stable resource endowments and pays insufficient attention to environmental dynamism, technological change, and the processes through which resources are continuously renewed and reconfigured (Kraaijenbrink et al., 2010). Furthermore, RBV offers limited managerial guidance on how strategic resources are developed or acquired and underemphasizes the influence of product markets and entrepreneurial actions (Foss et al., 2008).

By integrating RBV with Dynamic Capabilities Theory (DCT), this study addresses the static nature of resource endowments by focusing on the active orchestration, renewal, and reconfiguration of organizational resources in response to changing technological and environmental conditions. While RBV explains why valuable, rare, inimitable, and well-organized resources form the foundation of competitive advantage, DCT explains how organizations continuously sense opportunities, seize them, and transform their resource base to sustain that advantage over time.

In this study, RBV conceptualizes sustainable digital transformation capability as a higher-order strategic resource that underpins organizational competitiveness. Kenyan organizations such as Safaricom and KCB can achieve strategic adaptability and sustained competitive advantage by developing valuable, rare, inimitable, and well-organized digital-green resources, including integrated ESG platforms, green data infrastructure, and a sustainability-oriented digital culture. Combined with Dynamic Capabilities Theory, RBV explains not only why these strategic resources matter but also how leadership support and organizational learning culture enable their continuous orchestration, renewal, and deployment to convert institutional pressures and technological uncertainty into superior organizational performance.

Contingency Theory

Contingency theory is a major organizational and leadership theory asserting that there is no single best way to organize, lead, or manage an organization. Instead, the optimal approach is contingent upon internal and external situational factors (Donaldson, 2001). The theory emerged as a reaction against universalistic “one-size-fits-all” management theories such as scientific management and bureaucratic models. Fiedler (1967) proposed that leadership effectiveness depends on the interaction between a leader’s style, measured by the Least Preferred Co-worker scale) and situational favorableness, leader-member relations, task structure, and position power (Fiedler, 1967).

According to the theory, organizations are open systems that must adapt to their environment, and there is no universally superior management style or structure; and organizational effectiveness results from a proper “fit” between contextual variables and organizational responses (Burns & Stalker, 1961; Lawrence & Lorsch, 1967).

Among the proponents, Burns and Stalker (1961), introduced the mechanistic-organic continuum. Lawrence and Lorsch (1967) further emphasized differentiation and integration in uncertain environments while Thompson (1967) focused on technology and task interdependence. Later, Donaldson (2001) provided a comprehensive synthesis in *The Contingency Theory of Organizations*.

Despite the contribution of the theory, critics argue that the theory is overly deterministic and static, failing to adequately explain how organizations exercise strategic choice or change contingencies themselves (Child, 1972). Others contend it lacks predictive power and clear

operationalization of variables (Schoonhoven, 1981; Shenkar & Ellis, 2022). In this study, the theory is used to explain how Kenyan organizations can achieve sustainable digital transformation capability. It posits that the effectiveness of sustainable digital transformation as a strategic capability is contingent upon the interaction between external contingencies (institutional pressure and technological uncertainty) and internal enablers (leadership support and organizational learning culture). The theory justifies why organizations facing similar pressures may achieve different levels of strategic adaptability depending on the fit between their digital sustainability initiatives and the prevailing contextual conditions in Kenya's emerging economy.

Empirical Review

Institutional Pressure and Sustainable Digital Transformation Capability

Institutional pressure is a multidimensional construct comprising coercive pressure, normative pressure, and mimetic pressure (DiMaggio & Powell, 1983). In the context of sustainable digital transformation (SDT), these pressures influence how organizations adopt and institutionalize digital and sustainability-related innovations.

Coercive pressure refers to formal and informal pressures exerted by regulatory authorities, governments, and powerful stakeholders such as investors and funding agencies. Empirical studies demonstrate that coercive pressure is a strong driver of digital sustainability adoption. For instance, Kuo et al. (2022) found that coercive regulatory pressures significantly influenced shipping firms in Taiwan to adopt digital platforms for environmental compliance and monitoring. Similarly, Mansour and Bouchachia (2026) established that in developing economies, government regulations and compliance requirements accelerate the adoption of digital governance systems and sustainability reporting tools. These findings suggest that coercive pressure primarily drives compliance-oriented digital transformation behaviors.

Normative pressure arises from professional standards, industry norms, and expectations from regulatory bodies, professional associations, and global institutions. Abdelwahed et al. (2025) found that normative pressures from industry standards and global sustainability frameworks significantly encourage organizations to integrate sustainability practices into their digital transformation strategies. Their study across emerging economies shows that firms adopt sustainable digital transformation practices to align with ESG expectations and maintain organizational legitimacy. Consequently, normative pressure influences digital transformation through legitimacy-seeking behaviour rather than direct regulatory enforcement.

Mimetic pressure occurs when organizations imitate successful peers or industry leaders, particularly under conditions of uncertainty. Abdelwahed et al. (2025) further found that firms in emerging economies frequently replicate the digital sustainability practices of leading organizations when faced with uncertainty regarding transformation strategies. Such imitation enables organizations to reduce perceived risks by benchmarking against proven industry practices and strengthens the diffusion of sustainable digital transformation initiatives.

Empirical literature consistently demonstrates that these three institutional pressures collectively stimulate sustainable digital transformation initiatives. Kuo et al. (2022) show that coercive pressure often triggers initial adoption, while Abdelwahed et al. (2025) demonstrate that normative and mimetic pressures reinforce the diffusion and institutional legitimacy of digital sustainability practices. Similarly, Mansour and Bouchachia (2026) report that

institutional pressures collectively shape the adoption of digital governance systems in developing economies.

However, emerging evidence suggests that institutional pressures do not necessarily translate into genuine sustainable digital transformation capability. Sun et al. (2026) argue that although external pressures encourage organizations to adopt sustainability-oriented digital initiatives, many organizations respond through symbolic compliance by implementing visible digital and sustainability practices primarily to satisfy regulatory or stakeholder expectations without fundamentally transforming their underlying capabilities. Such responses may improve organizational legitimacy but fail to develop the internal competencies, learning processes, resource integration mechanisms, and leadership commitment required for sustained digital transformation.

This distinction highlights an important gap between institutional compliance and capability development. While institutional pressures can motivate organizations to initiate digital transformation, the development of sustainable digital transformation capability depends on the organization's ability to internalize these pressures through effective resource orchestration, organizational learning, and leadership support. Consequently, institutional pressure is expected to influence sustainable digital transformation capability indirectly as organizations that merely pursue symbolic compliance are unlikely to achieve enduring digital transformation outcomes.

Technological Uncertainty and Sustainable Digital Transformation Capability

Technological uncertainty consistently emerges as a major challenge to sustainable digital transformation. Sun et al. (2026) and Zhang et al. (2026) found that unpredictable technological trajectories lead to capital stagnation and "wait-and-see" strategies among firms, particularly in emerging markets. Kwiotkowska (2022) further revealed that rapid hardware and software obsolescence creates sunk-cost dilemmas and increases electronic waste generation, thereby undermining circular economy objectives. Similarly, Hoang et al. (2025) and Alzoraiki et al. (2024) demonstrated that technological uncertainty contributes to competency obsolescence and skill mismatches, significantly slowing the development of green digital innovation capabilities. Kim and Yang (2024) added that firms experiencing high technological uncertainty often struggle to translate digital investments into measurable sustainability outcomes, highlighting the "digitalization paradox," whereby substantial investments in digital technologies fail to generate proportional strategic or sustainability benefits.

However, emerging empirical evidence presents a contrasting perspective by suggesting that technological uncertainty can also serve as a catalyst for innovation and capability development. Rather than discouraging digital transformation, uncertain technological environments may compel organizations to experiment with new technologies, accelerate organizational learning, and develop adaptive capabilities to remain competitive. For example, Wamba et al. (2024) found that firms operating in highly dynamic digital environments were more likely to invest in exploratory innovation and digital capability development, enabling them to respond more effectively to technological disruptions. Similarly, Verhoef et al. (2021) argue that digital transformation is inherently characterized by uncertainty, but organizations with strong sensing, learning, and reconfiguration capabilities often leverage this uncertainty as an opportunity to innovate rather than as a constraint. These findings suggest that technological uncertainty can stimulate innovation when organizations possess sufficient strategic flexibility and dynamic capabilities.

The contrasting empirical findings indicate that the impact of technological uncertainty is contingent upon an organization's internal capabilities. Organizations with limited resources, weak leadership support, and inadequate organizational learning are more likely to adopt risk-averse strategies that delay sustainable digital transformation. Conversely, organizations with strong dynamic capabilities may view uncertainty as an opportunity for experimentation, innovation, and continuous capability renewal. This suggests that technological uncertainty does not exert a uniformly negative influence on sustainable digital transformation capability; rather, its effects depend on how organizations sense, seize, and respond to technological change.

Sustainable Digital Transformation Capability and Strategic Adaptability

Several empirical studies have established a positive relationship between sustainable digital transformation capability and strategic adaptability. Kim and Yang (2024) found that global companies with mature SDT capabilities exhibited stronger dynamic responses to business environment uncertainty, leading to improved customer value and market performance. Hoang et al. (2025) confirmed that digital capabilities significantly enhance competitive advantage among SMEs in emerging markets facing technological volatility. Abdelwahed et al. (2025) and Putri et al. (2025) further showed that organizations possessing strong digital governance, sustainability integration, and digital resilience capabilities demonstrate superior strategic flexibility and adaptability. However, the strength of this relationship appears contingent on contextual factors, with several studies noting weaker effects in environments characterized by resource constraints and institutional voids (Ohiomah, 2026).

Moderating Roles of Leadership Support and Organizational Learning Culture

Various scholars have emphasized the critical role of leadership support and organizational learning culture in enhancing sustainable digital transformation capability. Siddique and Sulehri (2026) found that leadership agility significantly moderates the relationship between digital transformation and sustainable performance in Pakistan's textile industry, indicating that the impact of digital initiatives becomes stronger when leadership is flexible, responsive, and strategically engaged. Similarly, Abdelwahed et al. (2025) and Kobusingye et al. (2025) report that organizations with strong leadership commitment and supportive learning environments are better able to convert digital investments into sustained strategic capabilities, particularly under conditions of uncertainty.

Leadership support is conceptualized as a moderating factor because it determines the extent to which organizations can effectively respond to institutional pressure and technological uncertainty. Strong leadership enhances decision-making speed, resource allocation, and strategic alignment, thereby strengthening the impact of external pressures on sustainable digital transformation capability. Conversely, weak leadership may limit the translation of external pressures into meaningful capability development.

Similarly, organizational learning culture is conceptualized as a moderator because it reflects the extent to which organizations encourage knowledge sharing, experimentation, adaptability, and continuous learning. In dynamic and uncertain environments, such as those characterized by rapid technological change and evolving sustainability demands, a strong learning culture enhances the organization's ability to absorb and apply new digital knowledge, thereby strengthening the effect of institutional and technological pressures on capability development (Abdelwahed et al., 2025). Studies in emerging economy contexts consistently demonstrate

that these two factors play a critical role in determining whether organizations successfully translate digital transformation initiatives into sustainable strategic capabilities (Abdelwahed et al., 2025; Kobusingye et al., 2025). They are therefore appropriate moderating variables for this study as they reflect key internal organizational conditions that shape capability development under institutional and technological uncertainty.

Conceptual Framework

The conceptual framework integrates Institutional Theory, the Resource-Based View (RBV), Dynamic Capabilities Theory (DCT), and the Technology–Organization–Environment (TOE) framework to explain how organizations develop sustainable digital transformation capability and achieve strategic adaptability. The framework proposes that external environmental conditions influence strategic adaptability indirectly through sustainable digital transformation capability, while leadership support and organizational learning culture determine the strength of these relationships.

The mediating logic of the framework is grounded in Dynamic Capabilities Theory. Institutional pressure and technological uncertainty are not expected to influence strategic adaptability directly. Instead, their effects are transmitted through sustainable digital transformation capability. This implies that external pressures alone do not guarantee organizational adaptability; rather, organizations must transform these pressures into internal capabilities that enable the sensing of environmental changes, the seizing of emerging opportunities, and the continuous reconfiguration of organizational resources. Sustainable digital transformation capability therefore serves as the mechanism through which external environmental conditions are translated into long-term strategic adaptability.

The relationship between institutional pressure, technological uncertainty, and sustainable digital transformation capability reflects the theoretical integration of Institutional Theory, RBV, and the TOE framework. Institutional Theory explains why organizations experience coercive, normative, and mimetic pressures to adopt sustainable digital practices, while the TOE framework explains how technological conditions shape organizational responses to these pressures. RBV complements these perspectives by explaining why organizations possessing superior strategic resources are better able to convert external pressures into meaningful capability development rather than merely complying with institutional expectations. Collectively, these theories explain why organizations exposed to similar external environments may exhibit different levels of sustainable digital transformation capability.

The framework further proposes that leadership support and organizational learning culture influence the moderating intensity of the relationships between institutional pressure, technological uncertainty, and sustainable digital transformation capability. Rather than directly determining capability development, these organizational factors strengthen or weaken the extent to which external pressures are translated into sustainable digital transformation capability. Strong leadership support enhances strategic commitment, resource mobilization, and implementation effectiveness, thereby increasing the positive influence of institutional pressure and reducing the adverse effects of technological uncertainty. Similarly, a strong organizational learning culture enhances knowledge acquisition, knowledge sharing, and organizational learning, enabling firms to respond more effectively to technological change and institutional demands. Consequently, organizations characterized by high levels of leadership support and organizational learning culture are expected to convert external

pressures into capability development more effectively than organizations where these organizational conditions are weak.

The framework proposes that sustainable digital transformation capability mediates the relationship between external environmental factors and strategic adaptability, whereas leadership support and organizational learning culture moderate the relationships between institutional pressure, technological uncertainty, and sustainable digital transformation capability. This theoretical integration explains not only how external pressures influence strategic adaptability but also the organizational conditions under which these relationships become stronger or weaker.

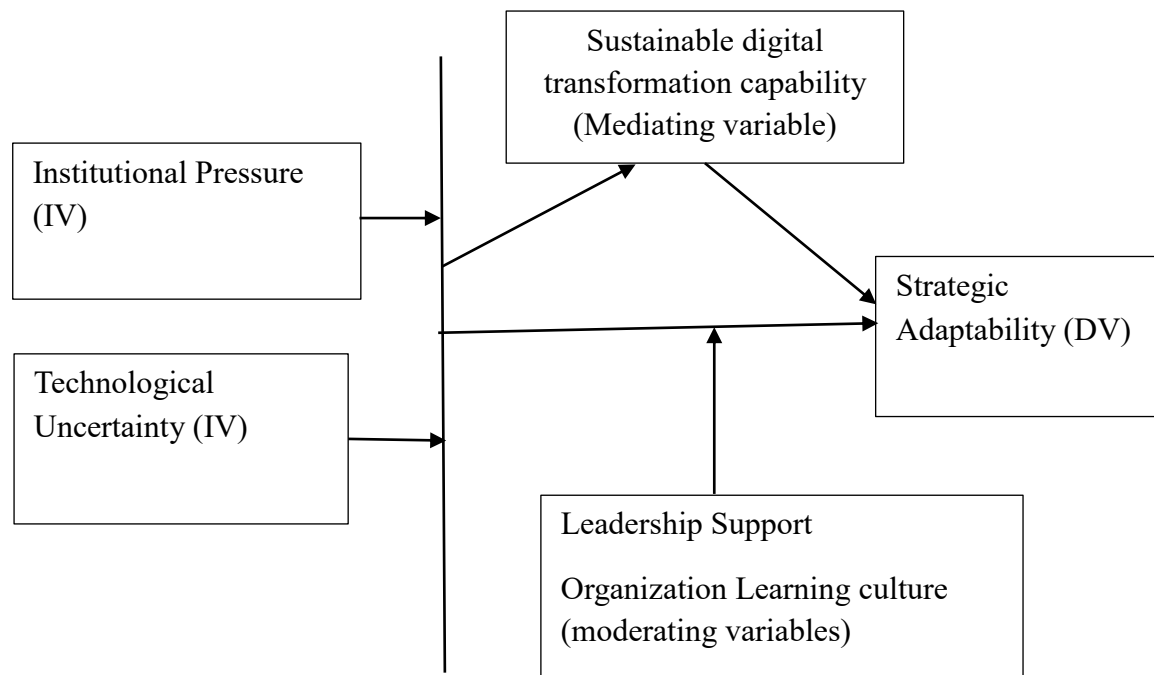


Figure 1: Conceptual Framework

METHODOLOGY

This study adopted a PRISMA-inspired systematic scoping review to examine sustainable digital transformation as a dynamic strategic capability under conditions of institutional pressure and technological uncertainty, with particular emphasis on Kenya and Sub-Saharan Africa. The approach was considered appropriate because sustainable digital transformation is an emerging and interdisciplinary field characterized by fragmented empirical evidence and evolving theoretical interpretations. The scoping logic allows for broad evidence mapping, while the PRISMA structure ensures transparency, rigor, and replicability in study selection (Mishra & Mishra, 2023).

The review process followed four PRISMA-inspired stages: identification, screening, eligibility, and inclusion, consistent with PRISMA 2020 guidelines for transparent reporting of systematic evidence selection (Page et al., 2021). In the identification stage, literature was retrieved from multiple academic and institutional databases. The screening stage involved removal of duplicates and preliminary assessment of titles and abstracts for relevance. The eligibility stage involved full-text review against predefined inclusion criteria. The inclusion stage comprised final selection of studies that met all methodological and conceptual

requirements for synthesis. This structured process ensured transparency and minimized selection bias, consistent with established systematic review standards (Moher et al., 2009).

Data sources included major academic databases such as Scopus, Web of Science, and Taylor & Francis Online, which were treated as the primary repositories for high-quality peer-reviewed scholarly literature. In addition, Google Scholar was used as a supplementary search engine to identify additional relevant studies, including grey literature such as conference papers, theses, working papers, and institutional reports that may not be indexed in Scopus or Web of Science. These academic sources were complemented with institutional and policy databases including the World Bank, United Nations (UN), International Telecommunication Union (ITU), and the Organisation for Economic Co-operation and Development (OECD). National-level sources such as the Kenya National Bureau of Statistics (KNBS) and the ICT Authority were also included to ensure contextual relevance to Kenya and Sub-Saharan Africa. Corporate sustainability and annual reports from organizations such as Safaricom, KCB Group, and the Kenya Revenue Authority (KRA) were also reviewed to provide practical insights into implementation.

The literature search was guided by structured keywords aligned with the study objectives, including “sustainable digital transformation,” “digital transformation capability,” “institutional pressure,” “technological uncertainty,” “dynamic capabilities,” “organizational resilience,” and “strategic adaptability.” These were combined with geographical identifiers such as “Kenya,” “Africa,” and “Sub-Saharan Africa.” The review focused on literature published between 2014 and 2026 to capture contemporary developments in digital transformation and sustainability, while seminal works published prior to 2014 were included to support foundational theoretical frameworks.

Studies were included if they demonstrated relevance to digital transformation in relation to sustainability, governance, or organizational capability development. Eligible studies were required to exhibit theoretical, empirical, or policy relevance and demonstrate methodological rigor. Peer-reviewed journal articles, systematic reviews, conference papers, policy documents, and high-quality institutional reports were included. Studies were excluded if they lacked methodological clarity, were purely opinion-based, focused solely on technical ICT systems without sustainability relevance, or lacked verifiable sources. Data analysis was conducted using an integrative thematic synthesis approach, which allowed for the combination of theoretical, empirical, and policy evidence into coherent analytical themes.

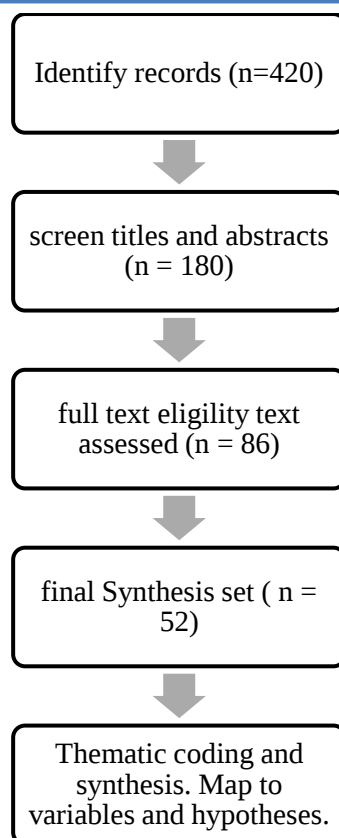


Figure 2: Screening Flow of Literature Analysis

Thematic Findings

The Influence of Institutional Pressure on Sustainable Digital Transformation Capability

The reviewed literature consistently suggests that institutional pressure constitutes one of the most important external drivers influencing organizations' development of sustainable digital transformation capability. Across the studies reviewed, institutional pressure is discussed through coercive, mimetic, normative and stakeholder-related mechanisms that collectively encourage organizations to integrate sustainability objectives into their digital transformation initiatives.

Evidence from the literature indicates that coercive pressure primarily originates from government regulations, legal mandates and mandatory compliance requirements that compel organizations to invest in sustainable digital systems (Kobusigye et al., 2025). Within the Kenyan context, the Climate Change Act, the Data Protection Act, environmental reporting requirements and sector-specific regulatory frameworks issued by institutions such as the Central Bank of Kenya (CBK) appear to encourage organizations to strengthen their environmental data management and digital compliance capabilities (Kikonde et al., 2025). Kyalo (2025) suggests that organizations increasingly adopt automated emissions tracking systems, cloud-based environmental monitoring platforms and digital compliance infrastructures largely in response to these regulatory expectations. Corporate sustainability reports further support this perspective. For example, Safaricom PLC reports continued investments in automated Environmental Management Systems (EMS) and digital

environmental reporting systems aligned with National Environment Management Authority (NEMA) requirements and global ESG expectations. Likewise, the Kenya Revenue Authority (KRA) indicates that implementation of the Electronic Goods Management System (EGMS) has enhanced digital monitoring of environmentally sensitive production processes. Collectively, these studies suggest that coercive pressures may encourage organizations to institutionalize sustainable digital infrastructures while strengthening organizational legitimacy.

The literature also identifies mimetic pressure as another important institutional mechanism influencing sustainable digital transformation capability. Studies reviewed indicate that during periods of technological uncertainty and competitive intensity, organizations often imitate successful digital transformation practices adopted by industry leaders (Otieno et al., 2025). Ohiomah (2026) argues that organizations frequently replicate proven digital innovations to reduce strategic uncertainty while enhancing their competitive legitimacy. Evidence from the Kenyan banking sector appears to support this argument. The reviewed literature highlights KCB Group's implementation of green digital lending platforms and its accreditation by the United Nations Green Climate Fund as an example of industry leadership that has encouraged competing financial institutions to introduce comparable ESG-enabled digital lending systems. Rather than implying direct causality, the reviewed evidence suggests that successful digital innovations among market leaders may serve as important reference points that influence broader industry adoption of sustainable digital technologies.

Another recurring theme emerging from the literature concerns normative pressure. The reviewed studies suggest that professional associations, international organizations, universities and industry networks increasingly promote sustainability-oriented digital competencies through shared ethical standards and professional expectations (Mansour & Bouchachia, 2026). As sustainability becomes an important indicator of responsible corporate governance, organizations appear to experience increasing pressure to strengthen employee digital capabilities, sustainability awareness and organizational innovation culture. Kenya Airways provides an illustrative example within the reviewed literature. According to its 2024 Sustainability Report, the airline has continued investing in advanced flight-planning software and staff training programmes partly in response to standards promoted by the International Air Transport Association (IATA). This example suggests that normative pressures may contribute to continuous organizational learning and capability development necessary for sustainable digital transformation.

The reviewed literature further highlights stakeholder expectations as an additional institutional influence shaping sustainable digital transformation capability. For instance, Freeman et al. (2010) argue that customers, investors, development partners, regulators and supply-chain actors increasingly expect organizations to demonstrate measurable sustainability performance alongside digital innovation. The literature suggests that these expectations influence organizational investment decisions by encouraging expenditure on carbon accounting systems, environmentally responsible digital infrastructure, supply-chain transparency technologies and other green digital innovations. Rather than treating digital transformation solely as a technological upgrade, organizations appear increasingly motivated to integrate sustainability considerations into their digital strategies because continued market access, investment opportunities and stakeholder legitimacy are closely linked to environmental performance.

Effect of Technological Uncertainty on Sustainable Digital Transformation Capability

Several reviewed studies indicate that technological uncertainty may contribute to strategic hesitation regarding long-term investments in sustainable digital infrastructure (Sun et al., 2026). Where future technological standards remain unpredictable, organizations appear reluctant to commit substantial financial resources to digital platforms that may become obsolete before expected returns are realized. Otieno et al. (2025) suggest that many Kenyan organizations continue adopting cautious investment approaches because digital transformation initiatives are frequently perceived as carrying significant technological and financial risks. The experience of agricultural exporters such as Sasini PLC illustrates this concern. According to the reviewed literature, uncertainty surrounding proprietary agronomy software and emerging digital platforms has reportedly delayed implementation of advanced environmental monitoring systems. These examples suggest that technological uncertainty may reduce the pace at which organizations develop sustainable digital transformation capabilities.

The reviewed studies further indicate that rapid technological change may contribute to asset depreciation, sunk-cost dilemmas and electronic waste. Kwiotkowska (2022) argues that investments in localized digital infrastructure can quickly lose value as cloud computing and newer digital architectures replace earlier technologies. He suggests that organizations consequently face difficult decisions regarding continued utilization of legacy systems versus premature replacement of still-functional infrastructure. Evidence from Kenya's financial sector illustrates this challenge, where financial institutions increasingly replace traditional point-of-sale devices and legacy digital infrastructure with smartphone-based technologies. For instance, according to Otieno et al. (2025), inadequate electronic waste management systems may further complicate sustainable digital transformation by undermining circular economy objectives.

Another recurring theme concerns competency obsolescence and persistent digital skills shortages. Abdelwahed et al. (2025) suggest that sustainable digital transformation requires organizations to possess expertise spanning both advanced digital technologies and sustainability management. However, rapid technological evolution continually alters required competencies, making previously acquired skills obsolete within relatively short periods (Hoang et al., 2025). Otieno et al. (2025) report that many Kenyan organizations identify digital skills shortages as a major constraint affecting successful transformation initiatives. Examples involving BasiGo and Roam suggest that continuous employee retraining has become necessary to keep pace with developments in electric mobility technologies, battery systems and digital fleet management. The reviewed literature therefore indicates that technological uncertainty may significantly increase organizational investment in continuous learning while simultaneously slowing capability development.

The literature additionally suggests that technological uncertainty creates challenges associated with sustainability data measurement and reporting. Several reviewed studies indicate that the absence of universally accepted environmental reporting standards, particularly for Scope 3 emissions, creates inconsistencies in digital sustainability reporting systems (Sun et al., 2026; Kim & Yang, 2024). Organizations consequently appear to experience difficulties maintaining reliable environmental performance data while simultaneously adapting to evolving reporting frameworks. Safaricom PLC's continuous updates to its carbon accounting systems illustrate this challenge. Rather than presenting definitive conclusions, the reviewed evidence suggests

that evolving sustainability metrics may increase reporting complexity and potentially weaken organizations' confidence in their sustainable digital transformation initiatives.

Relationship between Sustainable Digital Transformation Capability and Strategic Adaptability

A prominent theme emerging from the reviewed literature is the positive relationship between sustainable digital capability and strategic adaptability. Rather than viewing digital transformation as a discrete technological initiative, recent scholarship increasingly conceptualizes sustainable digital transformation capability as an evolving organizational capability that enables continuous adaptation while simultaneously supporting long-term environmental and economic sustainability (Warner & Wäger, 2019; El Hilali et al., 2020).

The reviewed literature predominantly explains this relationship through the perspective of dynamic capabilities theory. One of the most consistent observations emerging from the reviewed studies concerns the role of SDT capability in strengthening organizational sensing capability. According to Teece (2007), sensing refers to the organizational ability to identify emerging opportunities, detect environmental threats and recognize changes in technologies, customer preferences and institutional requirements before competitors. In this context, several scholars argue that sustainable digital technologies, including big data analytics, artificial intelligence, cloud computing, Internet of Things (IoT) applications and predictive analytics, significantly improve organizations' environmental scanning capabilities by generating continuous streams of strategic information (Warner & Wäger, 2019; El Hilali et al., 2020). The two studies further suggest that organizations increasingly utilize these technologies to monitor environmental performance, regulatory developments, stakeholder expectations and operational efficiency simultaneously. Within the Kenyan context, Otieno et al. (2025) and Kikundu et al. (2025) suggest that expanding digital infrastructure and increasing adoption of digital sustainability platforms have enhanced organizations' ability to detect regulatory changes, monitor environmental performance and anticipate evolving market demands. Therefore, the reviewed evidence indicates that sustainable digital transformation capability may strengthen sensing capability by enabling organizations to generate more timely and comprehensive strategic intelligence.

Beyond sensing, the literature also suggests that sustainable digital transformation capability enhances organizations' ability to seize emerging opportunities. Kim and Yang (2024) argue that organizations possessing mature sustainable digital transformation capabilities tend to demonstrate greater flexibility when redesigning products, services and operational processes in response to changing market conditions. Likewise, Elbolok et al. (2025) contend that digital technologies facilitate quicker strategic decision-making by improving information accessibility, accelerating innovation processes and enhancing collaboration across organizational functions. Evidence synthesized from Kenyan studies similarly suggests that organizations investing in green digital technologies increasingly redesign business processes to improve environmental performance while simultaneously responding to customer expectations and regulatory requirements (Murimi & Kungu, 2025). Rather than implying direct causality, the reviewed literature generally indicates that sustainable digital transformation capability appears to support organizations' ability to convert emerging opportunities into practical strategic initiatives.

Literature indicates that long-term competitiveness depends upon an organization's ability to continuously realign internal resources, organizational routines and operational structures as

environmental conditions evolve (Teece, 2014)). Across the reviewed literature, sustainable digital transformation capability is frequently associated with this continuous resource renewal process. Warner and Wäger (2019) suggest that organizations increasingly regard digital transformation as an ongoing capability development journey rather than a single technological implementation project. Similarly, several reviewed studies indicate that organizations adopting sustainable digital transformation continuously update digital infrastructure, modernize legacy systems, redesign organizational processes and integrate emerging sustainability practices to remain competitive. Within Kenya, Otieno et al. (2025) suggest that organizations facing rapid technological evolution have increasingly revised operational models and governance structures to accommodate emerging digital innovations and sustainability requirements. The synthesis of the reviewed studies therefore indicates that sustainable digital transformation capability may enhance organizations' capacity to continuously reconfigure strategic resources in response to changing environmental conditions.

The reviewed literature also consistently associates sustainable digital transformation capability with increased organizational agility. Although organizational agility is conceptually distinct from strategic adaptability, several scholars consider agility an important mechanism through which adaptability is achieved. Warner and Wäger (2019) argue that digital transformation enables organizations to process information more rapidly, decentralize decision-making and respond more effectively to unexpected market disruptions. Similarly, Teece, Peteraf and Leih (2016) suggest that organizations possessing strong dynamic capabilities generally exhibit greater responsiveness because they can rapidly interpret environmental signals and implement strategic adjustments before competitive advantages erode. Across the studies reviewed, sustainable digital transformation capability appears to strengthen organizational agility by enabling faster communication, integrated decision support systems and improved coordination across organizational units. Consequently, the literature generally suggests that organizations with stronger SDT capabilities are more likely to demonstrate higher levels of strategic adaptability during periods of technological and institutional uncertainty.

Recent scholarship increasingly positions resilience as an outcome of dynamic capabilities because organizations capable of continuous learning and resource reconfiguration are generally better able to withstand external shocks (Duchek, 2020). Sustainable digital transformation capability contributes to resilience by enhancing operational visibility, improving business continuity and facilitating adaptive responses during crises. Several studies argue that digital technologies integrated with sustainability principles improve organizational preparedness by enabling continuous monitoring of environmental performance, supply chain risks and resource utilization. Within the Kenyan context, reviewed evidence indicates that organizations investing in sustainable digital infrastructure have increasingly utilized digital platforms to strengthen continuity planning while simultaneously improving environmental performance (Kikonde et al., 2025).

The literature further emphasizes the importance of organizational learning as an underlying mechanism linking sustainable digital transformation capability with strategic adaptability. For instance, the dynamic capabilities theory recognizes learning as a central process through which organizations continuously renew strategic capabilities (Teece, 2018). The reviewed studies suggest that learning-oriented organizations tend to interpret environmental signals more effectively, refine digital strategies more rapidly and continuously improve organizational routines (Duchek, 2020). Rather than viewing sustainable digital transformation

capability as a static technological resource, the reviewed literature increasingly conceptualizes it as an evolving capability strengthened through continuous organizational learning, capability development and strategic experimentation.

Within the Kenyan context, the reviewed literature suggests that the relationship between sustainable digital transformation capability and strategic adaptability has become increasingly relevant as organizations simultaneously navigate accelerated digitalization, expanding digital infrastructure, evolving sustainability regulations and increasing stakeholder expectations. In particular, Otieno et al. (2025) and Kikonde et al. (2025) argue that organizations capable of integrating sustainability into digital transformation initiatives appear better positioned to redesign business models, strengthen operational flexibility and respond proactively to institutional and technological changes than organizations pursuing isolated digital investments. Although much of the existing evidence remains descriptive and context-specific, the collective findings consistently point toward sustainable digital transformation capability as an important strategic mechanism through which organizations enhance long-term adaptability.

The Moderating Influence of Leadership Support and Organizational Learning Culture on Sustainable Digital Transformation Capability

Some scholars urge that leadership support and organizational learning culture play critical moderating roles in determining the extent to which external pressures and technological uncertainty are translated into sustainable digital transformation capability (Kuo et al., 2022). Rather than acting as direct drivers of transformation outcomes, Kuo et al. (2022) indicate that internal organizational conditions influence how effectively external institutional and technological forces are converted into meaningful capability development. Elbolok et al. further (2025) argue that while institutional pressures and technological developments provide the impetus for change, the actual development of sustainable digital transformation capability depends significantly on internal organizational enablers. Accordingly, leadership support and organizational learning culture are frequently highlighted as key moderating conditions that strengthen or weaken this conversion process.

Evidence from the literature suggests that leadership support functions as a critical moderating factor by shaping strategic direction, resource allocation, and organizational prioritization of sustainability-oriented digital initiatives. For example, Kuo et al. (2022) indicate that the development of sustainable digital transformation capability requires substantial investment, cross-functional coordination, and tolerance for long-term returns. In the absence of strong leadership engagement, institutional pressures may result in symbolic or compliance-oriented adoption rather than substantive capability development. Similarly, Murimi and Kungu (2025) report that leadership commitment significantly influences the depth of digital sustainability implementation, particularly when executive management actively integrates sustainability goals into performance systems and investment decisions. In the Kenyan context, Safaricom PLC is frequently cited in the literature as an example where strong leadership commitment to net-zero targets has supported investments in digital environmental monitoring systems, renewable energy infrastructure, and cloud-based operational platforms (Safaricom Plc, 2024). These studies collectively suggest that leadership support enhances the likelihood that external pressures translate into structured capability development rather than superficial compliance.

The reviewed studies further indicate that organizational learning culture moderates the relationship between external pressures and sustainable digital transformation capability by

strengthening absorptive capacity and reducing resistance to change. For instance, Elbolok et al. (2025) suggest that organizations with strong learning-oriented cultures are better able to assimilate complex digital and sustainability-related knowledge, thereby improving implementation outcomes. In contexts such as Kenya, where specialized competencies in both digital technologies and sustainability management remain limited, a strong learning culture is frequently associated with improved adaptability and knowledge diffusion (Kyalo, 2025). He points to the fact that employees in learning-oriented organizations are more likely to perceive digital transformation tools as opportunities for development rather than threats, which enhances adoption effectiveness.

The reviewed literature also suggests that when leadership support and organizational learning culture operate jointly, they strengthen organizational resilience against technological uncertainty. For instance, Kikonde et al. (2025) argue that leadership support and organizational learning culture reduce resistance to change, minimize strategic inertia, and enhance organizational adaptability in volatile environments. Empirical illustration from Kenya's e-mobility sector, particularly firms such as BasiGo and Roam, suggest that strong leadership commitment combined with continuous organizational learning enables firms to adapt rapidly to evolving battery technologies and digital fleet management systems (Kyalo, 2025). The literature therefore indicates that such alignment allows firms to continuously refine their digital sustainability models even under high technological uncertainty, transforming uncertainty into a manageable condition rather than a constraint.

Conclusion

This study examined sustainable digital transformation as a dynamic strategic capability for organizations operating under institutional pressure and technological uncertainty in Kenya. The findings reveal that while institutional pressures and technological developments drive digital initiatives, their translation into genuine sustainable digital transformation capability is significantly moderated by leadership support and organizational learning culture. Sustainable digital transformation capability acts as a critical mediator that enables firms to sense opportunities, seize green market advantages, and reconfigure resources effectively. However, many Kenyan organizations still struggle with the "digitalization paradox," where heavy investments fail to deliver expected sustainability and performance outcomes due to weak internal enablers. Thus, sustainable digital transformation must evolve beyond technology adoption into a dynamic strategic capability.

Contribution of the Study

Theoretical Contribution

This study contributes theoretically by advancing Dynamic Capabilities Theory as the central lens for explaining sustainable digital transformation, particularly in emerging economies. It extends the theory by demonstrating how sensing, seizing, and reconfiguring processes operate under simultaneous institutional pressure and technological uncertainty. By integrating supporting insights from the Technology–Organization–Environment framework and Resource-Based View, the study develops a more comprehensive explanation of how external pressures and internal resource conditions shape capability development. It further refines understanding of sustainable digital transformation as a dynamic, capability-driven process, offering a context-specific extension of theory within Sub-Saharan Africa and Kenya. Finally, it enriches Contingency Theory by demonstrating that the success of sustainable digital

transformation depends on the fit between external contingencies and internal enablers; leadership support and organizational learning culture. This multi-theoretic framework addresses the “digitalization paradox” and advances literature on twin digital-green transitions in Sub-Saharan Africa.

Practical Contribution

For Kenyan organizations such as Safaricom PLC, KCB Group, Equity Bank, and BasiGo, the study provides actionable insights on building genuine sustainable digital transformation capability beyond superficial adoption. It highlights the critical importance of strong leadership commitment, continuous organizational learning, and the integration of sustainability into core digital strategies. Managers therefore gain a clearer understanding of how to overcome sunk-cost biases, skill obsolescence, and greenwashing risks while leveraging digital tools for strategic adaptability and resilience.

Policy Contribution

The study offers valuable implications for policymakers, regulators such as the Central Bank of Kenya, ICT Authority, and NEMA, and development partners. It underscores the need for actionable policies that go beyond infrastructure rollout to include leadership development programs, digital skills enhancement, green technology standards, and incentives for organizational learning cultures. The framework can therefore act as an informer to the Kenya’s Digital Superhighway and National Sustainability Agenda by emphasizing capability-building mechanisms necessary for achieving meaningful twin; green and digital transitions.

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