International Journal of Social Science and Human Research

ISSN (print): 2644-0679, ISSN (online): 2644-0695

Volume 07 Issue 08 August 2024

DOI: 10.47191/ijsshr/v7-i08-09**,** Impact factor- 7.876

Page No: 5892-5906

Digital Transformation and Business Model Innovation: Moderating Role of Digital Leadership

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ABSTRACT

Purpose: The manufacturing sector in Ghana has become increasingly important to the country's economic growth, driven by digital transformation and innovation. This research aims to explore the complexities of digital transformation within Ghanaian manufacturing companies, with a specific focus on the moderating role of digital leadership.

Design/Methodology/Approach: This conceptual paper presents a framework that integrates socio-technical systems theory and the upper echelon theory. This framework offers a detailed understanding of how digital transformation, digital leadership, organizational adaptation, and business model innovation interact within the Ghanaian manufacturing sector.

Findings: The Ghanaian manufacturing sector, a significant contributor to the country's GDP, has seen substantial growth, largely due to small and medium-sized enterprises (SMEs). However, many industries within the sector face challenges in embracing the digital age, including inadequate technological infrastructure and limited access to funding. The Ghanaian government has responded with policies to enhance digital capabilities and innovation, positioning the country for digital readiness.

Originality: This paper contributes to the field by providing practical strategies for leadership development and decision-making within manufacturing organizations. It also advances theoretical perspectives and offers empirical insights specific to the Ghanaian context. Overall, this paper serves as a valuable resource for manufacturing leaders, policymakers, and researchers navigating digital transformation, innovation, and leadership in Ghana's manufacturing sector, with broader implications for emerging economies globally.

KEYWORDS: Digital transformation, digital leadership, business model innovation, digitalization, digital technologies.

INTRODUCTION

Digital transformation is radically impacting our economy and society from the early 1990s to the present (Splunk, (2020). Digital transformation helps an organization keep up with emerging customer demands and survive in the face of future challenges (Autio et al., 2018; Vial, 2019). Firms that embrace digital transformation can access new market opportunities, gain new knowledge regarding their customers, and improve the new product development process more effectively (Imran et al., 2021; Parida et al.,2019; Vial, 2019). Digital transformation involves integrating advanced digital technologies and organizational practices to achieve significant business improvements, including enhanced products and services, a competitive edge, improved customer experiences, innovation in business models, and the implementation of new business processes (Autio et al., 2018; Ivancic et al., 2019; Niemi et al., 2021; Singh & Hess, 2017; Vial, 2019). This concept has seen broad adoption, particularly in developed nations (Vaska et al., 2021), and our understanding of digital practices has significantly expanded over the past decade (Sony & Naik, 2020; Vial, 2019; Warner & Wager, 2019). However, prior literature fails to provide a comprehensive understanding of how digital transformation leads to improvement in business model innovation, especially in the manufacturing sector in developing and emerging economies (Vaska, et al., 2021)**.** Emerging economies in general are ignored when it comes to research on digital transformation and business model innovation, despite the presence of several digital firms and multinational companies (Vaska et al., 2021). Ghezzi and Cavallo (2020) assert that the generalizability and relevance of research findings hinge on the uniqueness of the context being studied. Therefore, they argue that replicating research in emerging economies is essential to address the issue of generalizability associated with a single geographic region.Meanwhile, most recent studies on digital transformation and business model innovation have focused on the technological aspect (Vaska et al., 2021) to the neglect of other important digital transformation dimensions, such as digital leadership (Imran et al., 2021). The literature on digital transformation covers a range of topics, including disruptive technologies, shared platforms, ecosystems, and new enabling technologies like Big Data, the Internet of Things (IoT), Industry 4.0, Cloud computing, and digital fabrication (Vaska et al., 2021). Matt et al. (2015) have highlighted the need for empirical research to explore various aspects of digital transformation, such as technology, changes in value creation, structural changes, and financial

aspects, in order to identify commonalities or differences in organizations' digital transformation strategies. Vaska et al. (2021) suggest that new enabling technologies enable firms to conduct business in novel ways, leading to the adoption of innovative approaches in value creation, delivery, and capture.

However, the impact of digital transformation on business model innovation when moderated by digital leadership is an area that has received less attention in academic research and business literature (Cortellazzo et al. 2019; Lanzolla et al., 2021). Digital leadership refers to the ability of leaders to effectively lead and manage digital transformation efforts. This involves understanding the potential of new digital technologies and business models, developing a digital strategy that aligns with organizational goals, and providing the necessary support and resources to successfully implement and manage these changes (Mwita & Jonathan, 2019; Foss & Stieglitz, 2014; Karippur & Balaramachandran, 2022). According to Sow & Aborbie, (2018), an organization with strong digital leadership is likely to be better positioned to embrace digital transformation and innovation and to do so more effectively. Leaders who are digitally savvy can inspire and guide their teams towards a shared vision, ensuring that everyone is aligned and working towards the same goal (Yopan et al., 2022). In contrast, organizations with weaker digital leadership may struggle to fully embrace digital transformation and innovation (Florek-Paszkowska et al., 2021). This can lead to resistance from employees, inadequate allocation of resources, and ultimately, an inability to fully realize the potential benefits of digital transformation and innovation (Saiyed, 2019). Therefore, there is a need for a research to explore the impact of DT on BMI when moderated by digital leadership. Such research could provide valuable insights into the importance of effective leadership in driving successful digital transformation and innovation, and help organizations to develop strategies that optimize their digital leadership capabilities to achieve their goals. The prevailing gaps in the literature on digital transformation and business model innovation have necessitated this study on digital transformation and business model innovation in emerging economies with a focus on Ghana. The study specifically investigates the impact of digital transformation on business model innovation, with digital leadership as the moderating variable in Ghana's manufacturing companies. Digital transformation in this study is assessed by six dimensions (management capabilities, employee empowerment, organizational culture, organizational structure, employee skills and competencies, and technological capabilities), while business model Innovation is assessed by four dimensions (value creation, value delivery, value capture and value proposition).

Ghana's Manufacturing Sector and Digital Transformation

Ghana's manufacturing sector has undergone substantial growth in recent years, contributing significantly to the nation's economic progress (Ghana Statistical Service, 2020). Representing about 6% of Ghana's GDP and engaging around 10% of the labor force, the sector played a pivotal role in 2020 by contributing approximately 16.3% to GDP and providing employment for around 280,000 individuals (Ministry of Finance, 2020; Ghana Investment Promotion Centre, 2022). The manufacturing landscape in Ghana encompasses a diverse array of activities spanning from food processing and design to textiles, pharmaceuticals, and machinery (Association of Ghana Industries, 2023). Factors such as favorable government policies, growing domestic demand, and foreign investments have propelled the sector's expansion. However, this growth has been historically led by small and medium-sized enterprises (SMEs) (Ghana Investment Promotion Centre, 2019). Key players in Ghana's manufacturing sector encompass a range of industries, including aluminum smelting, oil refining, chemicals, cement production, metal processing, pharmaceutical manufacturing, wood processing, textiles, and garment manufacturing. The manufacturing sector holds the potential to drive significant economic development in Ghana by diversifying production, expanding exports, creating employment opportunities, raising income levels, and boosting export revenues (Ministry of Finance, 2020; Ghana Investment Promotion Centre, 2022). Notable industries that are expected to contribute to Ghana's manufacturing growth include cocoa processing, agro-processing, textiles, garments, and pharmaceuticals (Ghana Statistical Service, 2020; Ghana Investment Promotion Centre, 2022). Several noteworthy initiatives are underway or in progress, with the potential to profoundly impact Ghana's manufacturing sector. These include the development of value chains for local raw materials, the imminent implementation of the Ghana Conformity Assessment Programme (GCAP) to ensure imported goods meet specified standards, and the removal of minimum capital requirements for foreign investors entering the manufacturing sector. These initiatives aim to enhance the sector's competitiveness and attractiveness for both domestic and foreign investors, further bolstering Ghana's industrial capabilities (Ghana Investment Promotion Centre, 2022).Despite its progress, certain industries in Ghana, including design, architecture, advertising, textiles, and fashion, grapple with challenges as they strive to embrace the digital age. A primary concern is the lack of adequate technological infrastructure and skills necessary for the shift to digital platforms (Karanasios & Senyo, 2022). Many firms in these industries still rely on traditional production and distribution methods, leaving them at a competitive disadvantage compared to digitally transformed counterparts from other nations (Dutta & Lanvin, 2022). Additionally, limited access to funding and capital hampers the ability of these SMEs to invest in digital transformation, thereby hindering their growth and market expansion (Ministry of Finance, 2020; United Nations Industrial Development Organization, 2020).

Furthermore, the absence of collaboration and networking among sector firms has exacerbated these challenges (Ghana Statistical Service, 2020). The lack of a coordinated approach to digital transformation and business model innovation isolates many firms, compelling them to navigate the complexities of the digital era alone (Karanasios & Senyo, 2022). This isolation also curtails the sharing of valuable knowledge and best practices that could otherwise facilitate innovation and enhance competitiveness (Ministry

of Finance, 2020). Consequently, these challenges have led to reduced productivity, limited innovation, and a diminished competitive edge on the global stage. To combat these issues, the Ghanaian government has implemented policies and initiatives aimed at bolstering the nation's digital infrastructure, fostering digital literacy, and promoting innovation to invigorate the manufacturing sector's growth (Ghana Investment Promotion Centre, 2022). As reflected by its ranking of 103 out of 131 countries in the Network Readiness Index in 2022, Ghana's strides in enhancing its digital capabilities continue to evolve (Dutta & Lanvin, 2022).

For instance, while the 2022 digital technology readiness ranking of Ghana show that digital technology is not adequate for Ghanaian businesses, it tends to rank higher in terms of access to the available technologies, and the content of the technology (Dutta & Lanvin, 2022). Although this may not fully reflect the conditions amongst all Ghana's design, architecture, advertising, textile, and fashion industries, it suggests the available digital technologies and infrastructure in Ghana is supportive of business growth (Karanasios & Senyo, 2022). This is a result of the several digital technology initiatives being undertaken by the government boost the growth of businesses in Ghana (Ghana Investment Promotion Centre, 2019). Overall, Ghana is rapidly advancing in digital transformation, with several sectors of the manufacturing sector, including the design, advertising, architecture, textile, and fashion industries, implementing digital technologies in their operations and activities (Karanasios & Senyo, 2022). However, how these digital transformation initiatives currently impacting the business model innovation of the manufacturing companies, especially those in the design, advertising, architecture, textile, and fashion sector, to best knowledge of the researcher, is not known. This paper therefore attempts to explore the complexities of digital transformation within Ghanaian manufacturing companies, with a specific focus on the moderating role of digital leadership.

THEORETICAL REVIEW AND HYPOTHESES DEVELOPMENT

Socio-Technical Systems Theory

The socio-technical systems theory emphasizes the interplay between social and technical elements within organizations (Baxter & Sommerville, 2011). This theory suggests that changes in the technical aspects (such as technology and processes) should be aligned with changes in the social aspects (such as organizational culture, employee roles, and empowerment) to achieve optimal performance and innovation (Imran et al., 2021; Baxter & Sommerville, 2011). In the context of the conceptual framework, this theory offers insights into the moderating role of digital leadership in the relationship between digital transformation (management capabilities, employee empowerment, etc.) and business model innovation (Davis et al., 2014; Baxter & Sommerville, 2011; Imran et al., 2021).

The theory proposes that successful digital transformation requires a balanced approach that considers not only technological changes but also the social dynamics within the organization (Trist & Bamforth, 1951). For instance, as organizations enhance technological capabilities (such as adopting new software systems) (Mumford, 2006), they must ensure that employees possess the necessary skills and competencies to effectively utilize these technologies (Davis et al., 2014; Baxter & Sommerville, 2011; Imran et al., 2021). Additionally, changes in organizational structure or culture should complement technological advancements to create a harmonious environment for innovation (Gilchrist, 2016). In the context of the research, digital leadership serves as the guiding force that ensures the alignment between technological changes (e.g., enhanced management capabilities and the adoption of digital tools) and corresponding changes in the social dynamics of the organization (Gilchrist, 2016). Digital leaders are responsible for fostering the right organizational culture that embraces digital transformation, empowering employees with the necessary skills and competencies to effectively utilize new technologies, and facilitating a smooth transition process (Davis et al., 2014; Baxter & Sommerville, 2011; Imran et al., 2021).

Therefore, the socio-technical systems theory provides the theoretical foundation for understanding how digital leadership moderates the interplay between technology and social elements during digital transformation, ultimately influencing the outcomes of business model innovation within Ghanaian manufacturing companies. It emphasizes the significance of balanced and integrated approaches to achieve optimal performance and innovation, underscoring the critical role of digital leadership in navigating this intricate interplay successfully.

Upper Echelon Theory

The upper echelon theory focuses on the influence of top executives' characteristics, values, experiences, and cognitive biases on organizational decisions and strategies (López-Muñoz & Escribá-Esteve, 2017;Bassyouny et al., 2020). This theory suggests that top management's characteristics shape the organization's strategic choices and responses to external challenges (Plöckinger et al., 2016;Lee et al., 2016). In the conceptual framework, the Upper Echelon Theory offers insights into the role of management capabilities – digital leadership in driving digital transformation and subsequently influencing business model innovation (Ali et al., 2022;Neely et al., 2020). Top level executives' decisions regarding digital transformation initiatives, driven by their skills, experiences and digital leadership can significantly impact the digital innovation as well as their business model innovation (Abatecola & Cristofaro, 2020). For instance, executives who possess a strong understanding of technology trends may be more inclined to adopt innovative technologies (Shahab et al., 2020). The decisions made by top-level executives regarding digital

transformation initiatives have profound implications for the outcomes of digital innovation and business model innovation within manufacturing companies. The skills and experiences of these executives play a pivotal role in shaping the organization's approach to digital transformation. Executives with a strong understanding of technology trends are more likely to drive the adoption of innovative technologies (Plöckinger et al., 2016;Lee et al., 2016). This aligns with the concept of digital leadership, where leaders possessing the requisite knowledge and digital acumen are better equipped to guide their organizations through the complexities of digital transformation.

In the context of the study on the impact of digital transformation on business model innovation in manufacturing companies in Ghana with the moderating role of digital leadership, this theory highlights that digital leaders, often found in top-level executive positions, have the capacity to influence and shape the direction of digital transformation initiatives (Plöckinger et al., 2016;Lee et al., 2016). Their skills and experiences empower them to make informed decisions regarding the adoption of innovative technologies and the alignment of digital strategies with business models (Ali et al., 2022;Neely et al., 2020). Digital leaders can, therefore, moderate the impact of top-level executives' decisions on digital transformation outcomes. Their leadership qualities, including the ability to inspire, innovate, and create a digital vision, are instrumental in guiding the organization towards successful digital innovation and business model transformation.

Hypothesis Development

Digital Transformation

In today's dynamic business landscape, digital transformation is not just an option; it's a necessity for organizational survival and growth. Its impact spans customer engagement, operational efficiency, strategic decision-making, and organizational culture (Zaki, 2019). Organizations that embrace digital transformation stand to reap the rewards of improved customer relationships, streamlined operations, innovative practices, and a culture that thrives in a digitally connected world (Schwertner, 2017). While challenges exist, the potential benefits make the journey toward digital transformation a strategic imperative for organizations across industries (Brunetti et al., 2020;Kraus et al., 2021). The scholarly discourse surrounding digital transformation underscores its multifaceted nature, encompassing various dimensions of organizational change driven by the adoption of digital technologies (Priyono & Darmawan, 2021). Verhoef et al. (2021) define it as the automation of goods and services or the introduction of digital business models that ingeniously capture value. Vaska et al. (2021) defined digital transformation as a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies. This interpretation underscores the technological advancement aspect of digital transformation, emphasizing the integration of digital technologies to revolutionize value creation (Sabai & Theresa, 2018). In contrast, present digital transformation as a metamorphosis in an organization's architecture, processes, and business paradigms catalyzed by the embrace of digital technologies (Zhang et al., 2021). This perspective underscores the broader systemic impact that digital technologies can have on the fundamental underpinnings of an organization.

However, the most encompassing definition is offered by Hinings et al. (2018), wherein digital transformation represents a constellation of digital innovations that collectively trigger novel changes across actors, structures, practices, values, and beliefs. This comprehensive viewpoint recognizes that digital transformation involves not only technological evolution but also the reconfiguration of cultural, structural, and strategic elements. It acknowledges that digital transformation goes beyond surface-level changes, impacting the very essence of how organizations operate within their ecosystems. Hinings et al. (2018) definition of digital transformation acknowledges digital transformation as a multifaceted phenomenon, involving dimensions like management capabilities, employee empowerment, organizational culture, structural dynamics, employee skill sets, competencies, and technological proficiencies. According to Trushkina et al. (2020), these dimensions reflect the myriad aspects and accentuate how digital transformation permeates various facets of an organization, culminating in a comprehensive understanding of the intricate relationship between digital transformation and its impact on organizational performance.

The definition proposed by Hinings et al. (2018) stands out as the most comprehensive and insightful interpretation of digital transformation due to its holistic perspective that encompasses multiple dimensions of organizational change. This definition recognizes that digital transformation is not a singular, technology-centric phenomenon but a complex interplay of various components that collectively reshape the organizational landscape. Hinings et al. (2018) proposition of digital transformation offers a richer understanding of digital transformation. First, the definition underscores the multifaceted nature of digital transformation(Metzler & Muntermann, 2021). It emphasizes that digital innovation is not confined to technology adoption alone, but it triggers a series of interconnected changes across various organizational aspects (Trischler & Li-Ying, 2022). This holistic understanding is crucial because it acknowledges that the impact of digital transformation extends far beyond technology implementation(Brunetti et al., 2020). It includes shifts in how actors within the organization function, how structures are reconfigured, how practices are altered, and even how values and beliefs evolve in response to the digital evolution. By considering these interconnected dimensions, this definition paints a more accurate and nuanced picture of the transformative potential of digital technologies(Wu et al., 2021).

One of the critical strengths of Hinings et al. (2018) definition of digital transformation is its acknowledgment of the cultural and strategic shifts that digital transformation engenders. This goes beyond mere technological upgrades and addresses how digital

innovations can lead to changes in the core cultural fabric of an organization (Horváth & Szabó, 2019). Digital transformation often demands shifts in mindsets, beliefs, and practices (Trushkina et al., 2020). Additionally, it prompts organizations to reevaluate their strategic positioning and adapt to new market dynamics (Warner & Wäger, 2019). By acknowledging the broader cultural and strategic implications, this definition captures the depth of transformation that goes beyond structural and technological changes (Frick et al., 2021). Hinings et al. (2018) definition of digital transformation is also notable of its recognition of the ecosystem-wide impact of digital transformation. Organizations do not operate in isolation; they exist within complex ecosystems that include industries, fields, and broader societal contexts (Leyer et al., 2019). By noting that digital transformation can alter existing rules of the game within these ecosystems (Vaska, Massaro, Bagarotto, & Massaro, 2021), the definition acknowledges the potential for disruption and reconfiguration that goes beyond the boundaries of a single organization (Straub et al., 2021). This realization is crucial for understanding how digital transformation can ripple through industries and reshape the competitive landscape (Hund et al., 2021).

By highlighting that digital transformation affects the very essence of how organizations operate, Hinings et al. (2018) definition of digital transformation brings attention to the depth of organizational impact. It is not just about adopting new technologies; it is about redefining how business is conducted, how decisions are made, and how value is created and delivered (Trushkina et al., 2020). This definition recognizes that digital transformation requires organizations to evolve in fundamental ways, prompting them to rethink their strategies, structures, and cultural norms (Nadkarni & Prügl, 2021). Such a depth of impact is often overlooked in narrower definitions that focus solely on technology. In effect, Hinings et al. (2018) definition of digital transformation is a constellation of digital innovations triggering changes across actors, structures, practices, values, and beliefs offers a profound perspective that captures the complexity and depth of this phenomenon. By acknowledging the interconnectedness of various dimensions and the transformation's impact on culture, strategy, and ecosystems, this definition provides a comprehensive framework for understanding how digital transformation reshapes organizations in the digital age.

Building upon the definition proposed by Hinings et al. (2018), this paper proposes a focus on investigating the holistic impact of the various organizational aspects, including management capabilities, employee empowerment, organizational culture, organizational structure, employee skills and competencies, and technological capabilities of digital transformation on an outcome of a firm. Thus, the author argues that there is an interplay between digital innovation and the fundamental elements that constitute an organization's functioning. In other words, it is argued based on the definition of Hinings et al. (2018), that an organization that embraces and integrates digital transformation across multiple dimensions will have a positive impact on its overall outcomes, such as business model, competitiveness, and long-term performance. It is being proposed that organizations that effectively implement digital transformation initiatives to enhance their management practices, empower their employees, cultivate an adaptable organizational culture, optimize their structure, develop employee skills, and leverage technological capabilities will position themselves more favorably in today's digitally disrupted business landscape. Hence, it is hypothesized that:

H1: *The degree of digital transformation within an organization, as indicated by the presence of enhanced management capabilities, employee empowerment, organizational culture, organizational structure, employee skills and competencies, and technological capabilities, positively influences firms' outcomes.*

Business Model Innovation

The concept of business model innovation is multifaceted and varies among scholars and studies. Different definitions and perspectives exist, contributing to a diverse understanding of the term. Wirtz et al. (2016) initially characterized business model innovation as a paradigm shift necessitating fundamental rethinking of the company, whereas Teece (2017) viewed it as a framework for generating and delivering customer value while securing a portion of that value. In recent times, business model innovation has gained significance as a competitive advantage (Hossain, 2021). Other scholars, including Foss and Saebi (2017), Saqib and Satar (2021), and Bashir et al. (2020), define it as purposeful changes in existing models or the introduction of new elements. This may involve altering market position, introducing novel combinations of existing products or services, or transitioning from product-centric to outcome-based services (Haaker et al., 2021;Hussain et al., 2021;Foss & Saebi, 2017). Despite debates about whether it's planned or spontaneous, most scholars concur that business model innovation is intentional and strategic (Trischler & Li-Ying, 2022;Teece, 2017;Bouwman et al., 2019). Business model innovation emerges as a strategic process shaped by deliberate decisions, distinct from regular improvement (Hacklin et al., 2018). The potential of business model innovation lies in enhancing a company's resilience, particularly in the face of digital transformations (Parida et al., 2019). Geissdoerfer et al. (2018) propose that it can facilitate transitions between business models, enhancing adaptability and long-term competitiveness. Different configurations of business model innovation can be observed, such as startups, model changes, diversification, and acquisitions (Geissdoerfer et al., 2018). It is acknowledged that the digital era requires continuous improvement and adaptation, making business model innovation an ongoing process that is pivotal for survival and success (Lang, 2020; Heredia et al., 2022). Overall, business model innovation is a dynamic and strategic phenomenon, essential for staying competitive and relevant amidst evolving market landscapes and technological advancements (Ritter & Lettl, 2018).

According to research conducted by (Khaddam et al., 2021), business models serve six distinct functions: delineating the value proposition, outlining market segments, characterizing the structure of the value chain, projecting costs and profits related to offered

products, specifying the firm's position within the value network, and formulating the competitive strategy of the firm. Scholars such as Clauss (2017) and Matzler et al. (2013) have proposed a triad of dimensions for gauging Business Model Innovation (BMI): value creation, value proposition, and value capture innovation. Matzler et al. (2013) define a prosperous business model as one that adeptly integrates both high-value production and high-value capture. On the other hand, Chen et al. (2021) classify business models into two distinct categories: product-oriented and customer-oriented.

The literature consistently identifies three key aspects as the cornerstones that shape an organization's business model: value creation, value proposition, and value capture (Kraus et al., 2020; Yang et al., 2021; Nambisan et al., 2019; Parida et al., 2019; Chen et al., 2021; Clauss, 2017; Hermes et al., 2019; Vaska et al., 2021). Clauss (2017) introduces a tripartite framework for quantifying BMI, encompassing value creation innovation, value proposition innovation, and value capture innovation. Additionally, Khaddam et al. (2021) emphasize that the creation of business model value emerges through interactions and transactions among pertinent entities like resource providers and purchasers, along with the reduction in transactional costs.

Ibarra et al. (2020) advocate that in order to meet the standards of BMI, organizations must institute novel adaptations within the components of their business models, particularly in value creation, value proposition, and value capture. Changes to value creation encompass efficient production, alignment of internal and external company processes with those of suppliers, employee training, data-driven transparent decision-making, real-time insights into manufacturing, sales, and inventories, as well as the incorporation of fresh physical and human resources (Vaska, et al., 2021). Alterations in value proposition entail new offerings, intelligent products, customer segmentation, and direct interactions (Trischler & Li-Ying, 2022). Lastly, value capture adjustments involve cost optimization, savings, and the identification of new revenue streams (Rezazadeh & Carvalho, 2018).

Beyond the core tenet of value proposition, a business model also endeavors to depict the phases of value creation, value distribution, and value realization (Geissdoerfer et al., 2018; Ranta et al., 2021). These four components constitute the foundational structure of a business model (Khaddam et al., 2021; Clauss et al., 2019; Yang et al., 2021; Parida et al., 2019), although in a rudimentary and holistic manner, resonating with the majority of the aforementioned perspectives. Thus, it is argued that four elements – value proposition, value creation, value delivery, and value capture – are the focal points underpinning business model innovation of an organization.

It is argued that organizations that proactively innovate and adapt within the fundamental dimensions of value proposition, value creation, value delivery, and value capture in their business models are poised to experience positive outcomes of increased competitiveness and sustained growth (Kohtamäki et al., 2019). This argument rests on the premise that strategic alignment with evolving customer preferences, emerging technological trends, and dynamic market conditions can confer distinct market positioning, improved customer engagement, optimized resource allocation, and novel revenue streams (Zhang et al., 2021). By strategically crafting offerings that address shifting customer needs and framing value propositions that resonate within the current landscape, these organizations can cultivate a competitive edge while aligning value capture methods with innovative ways of monetizing their products or services (Tonder et al., 2020). This proactive approach is anticipated to lead to enhanced organizational resilience and success, fostering a responsive and forward-looking operational framework that remains adaptable in the face of changing business environments (Alshawaaf & Lee, 2020). Based on this argument, it is hypothesized that:

H2: *In the context of business model innovation (BMI), organizations that strategically modify their value creation, value proposition, and value capture dimensions are more likely to achieve enhanced market competitiveness and sustainable growth.*

Digital Leadership

Digital leadership, defined as the ability to inspire and persuade individuals to collaborate in achieving common goals, is a crucial factor that is likely to impact the outcomes of digital transformation processes within work teams and organizations (Zaccaro and Klimoski, 2002; Yukl, 2006). Research has shown that digital leadership significantly influences organizational operations and workforce performance overall (Cortellazzo et al., 2019; Gemeda and Lee, 2020). In the context of an organization's efforts to digitize and transform, digital leadership and technological advancements intersect regularly (Cortellazzo et al., 2019). Technology can challenge leaders to adapt and grow by creating new situations that require innovative approaches (Cortellazzo et al., 2019). Sandel (2013) defines digital leadership as the competencies and capabilities that foster a creative environment by maximizing technology and digital capacities. These qualities include being a creative, inspiring, credible, knowledgeable, collaborative, interactive leader who trusts subordinates. According to Rudito (2017), characteristics of digital leadership include technology leadership, digital visioning, and digital execution. Digital leadership, according to Zhu (2015), is the ability to deal with volatility, uncertainty, complexity, and ambiguity (VUCA) to create a shared and dynamic challenge in digital transformation. The author defines digital leadership as a collection of five characteristics. The first is a thought leader, as competition has tightened and intensified as new competitors enter the market and disrupt the existing firm. This necessitates the presence of a leader with difficult capabilities. The creative leader, on the other hand, uses digital technology to create new business models and broaden the scope of innovation. Because innovation has become the key to gaining a competitive advantage, the digital leader must have a creative and innovative mindset capable of turning a future vision into a business reality.

The third type is a global visionary leader who can provide guidance and act as an orchestra in the development of a digital company. The inquisitive leader is the fourth type of leader. Because VUCA variables create a complex and dynamic environment, the digital

leader must be able to learn and integrate new learning and digital capabilities. The fifth type of leader is the profound leader, who has in-depth knowledge and understanding of policy because, in the internet and digital era, information is becoming more open and everyone can access and analyze information comprehensively, and they can profound the knowledge and make better decisions by using their interpretation, assumptions, and synthesizing the information. Considering the inquisitive and learning-oriented characteristics of digital leaders, it can be said that leaders who can effectively integrate new knowledge and digital capabilities into their decision-making will have a more significant impact on the success of digital transformation initiatives. Hence, it is hypothesized that:

H3: *Digital leadership's ability to integrate knowledge and adapt to novel situations positively influences its role in digital transformation success.*

Digital Transformation and Business Model Innovation

The integration of digital technology into all areas and activities of an organization results in infrastructure changes in how the business operates and provides value to its customers (Kraus et al., 2022; Vial, 2019). Digital transformation, as defined by Hinings et al. (2018), is the result of multiple digital innovations that give rise to new actors (and actor constellations), structures, practices, values, and beliefs that alter, threaten, replace, or supplement preexisting norms within organizations, ecosystems, or industries. Ulrich and Fibitz (2020) emphasized that digitization has an impact on enterprises of all sizes, industries, and structures. Therefore, businesses need to reevaluate their value design in order to remain competitive and prevent oblivion in the marketplace. This makes it essential for practitioners and researchers alike to comprehend the connection between digital transformation and business models.

In light of the recent conversation about digital transformation and business model innovation, it is clear that the former has an effect on the latter. For instance, Vaska et al. (2021) conducted a literature study on how digital technology is impacting business model innovation. Their studies demonstrated that digital transformation has an impact on the development, delivery, and capture of value in almost every firm. Rachinger et al. (2018) evaluated the influence of digitalization on BMI. The authors especially looked at how digitalization affects a company's value generation, offer, and capture, as well as how organizations deal with the issues that growing digitalization presents. A qualitative study approach was employed to collect empirical data from 12 important informants from two diverse sectors, media, and automobile. The findings show that digitization has a significant impact on the value-generation component of business model innovation in both the automobile and media industries. The research also discovered the impact of changing personnel qualifying standards. Furthermore, the study's findings demonstrated a beneficial impact of digitalization on the value proposition and value capture elements, resulting in increased and extra revenues.

Tavoletti et al. (2021) conducted an exploratory study of business model changes used by management consulting companies to stay competitive throughout the digital transformation. Using a longitudinal multiple case study of the European practices of major global management consulting firms, the study found that management consulting firms' business model innovations, such as value creation innovation, value proposition innovation, and value capturing innovation, are influenced by the firm's digital transformation. Rummel et al. (2021) investigated how manufacturing organizations' innovation processes might be adapted to produce unique business models to handle the difficulties of digitalization. The research used a multiple-case study technique to gather data on BMI processes in six manufacturing organizations. The findings indicate that digital transformation has an impact on the design of business model innovation processes. The authors emphasized that to remain competitive, manufacturing organizations must innovate beyond new goods and services and build their digital business model innovation processes.

Using existing research, Verhoef et al. (2021) explored digital transformation and its impact on business model innovation. The authors discovered that digital transformation influences firm business model innovation. The authors stated that digital transformation necessitates certain organizational structures and has implications for the metrics used to assess success. They also believe that digital transformation and the resulting business model innovation have fundamentally changed customers' expectations and habits, exerting enormous pressure on established enterprises and disrupting many marketplaces. Ulrich and Fibitz (2020) investigated the impact of digital transformation on company models. The study's findings showed that innovating business models is aided by a greater focus on digital technologies and the use of specific digital approaches.

Legowo et al. (2021) investigated the impact of digitization on BMI in SMEs. The purpose of the research was to identify the elements that impact digitalization implementation in developing, modifying, and upgrading the values of business model innovation in Indonesian SMEs. Data was gathered from 100 Indonesian SMEs. The study found that digitalization, as influenced by external business variables and dynamic capacity elements, has a key role in developing, modifying, and increasing values in business model innovation for Indonesian SMEs. Menchini et al. (2022) investigated the strategic competencies for digitalizing company models. The study's goal was to determine the relationship between the ability to apply enterprise architecture tools and the efficacy of business model digitalization in organizations. The authors employed two research methodologies - a survey and a focus group - to examine the link between enterprise architecture (EA) maturity and digital maturity from the standpoint of socio-materiality. The authors discovered that top management's dedication and clarity, as shown by its sponsorship of strategy communication, contribute to the integration, involvement, and flexibility of individuals engaged and are responsible for increased maturity in business model digitization.

Digital Transformation and Business Model Innovation: Moderating Role of Digital Leadership

Although current research on digital transformation confirms that digital transformation disrupts the existing business models of transitioning organizations, research investigating the underlying processes and the particular effect is still limited (Metzler & Muntermann, 2021). Rachinger et al. (2018) emphasized that, although research on digitalization in the context of business model innovation is now receiving more attention, there is still a research vacuum in this subject due to the low number of empirical findings. An empirical evaluation of studies on the link between digital transformation and business model innovation indicated that the majority of research has focused on digitalization and business model innovation. Meanwhile, no hypothesis is identified in any of the examined research works that examines the link between digital transformation and business model innovation through value creation, value proposition, value delivery, and value capture. As a result, this research hypothesized that:

H4*: Digital transformation has a positive impact on value creation, value proposition, value delivery, and the value capture of business model innovation*.

Digital transformation and business model innovation moderated by digital leadership

Digital leaders encourage digital innovation and allow the beginning and execution of digital transformation inside a company while transferring knowledge and skills to subordinates (Mwita & Jonathan, 2019; Foss & Stieglitz, 2014; Karippur & Balaramachandran, 2022). According to Mihardjo et al. (2019), when led by a visionary CEO, digital leaders may invest extensively in technology as a competitive enabler and effectively execute radical organizational transformations that can infect the whole business. According to Kane (2019), organizations that want to succeed in the digital age need to make changes to their leadership, culture, mindsets, risk attitudes, work practices, technology, and ability to deal with uncertainty and fast change. Florek-Paszkowska et al. (2021) suggest that the architectural and gradual modifications in an evolutionary business model innovation place more expectations on digital leadership. According to Sjoback and Spaak (2021), business model innovation impacts the whole business model, and digital leadership is neither consistent nor limited to a single business unit. Saiyed (2019) relates that digital leadership acts as a moderator, providing a coarse roadmap of system-wide initiatives to stimulate and steer search; and moderating the various disputes and changes to re-establish coherence. This implies that digital leadership is associated with various digital technologies, tactics, and talents.

According to Zhu (2015), digital leadership has five characteristics: creative leader thought leader, global visionary leader, inquiring leader, and deep leader. Because of volatility, unpredictability, complexity, and ambiguity, the dynamic environment forces the leader to be more creative and constantly think innovatively via in-built capacity or cooperation (Mihardjo et al., 2019; Karippur & Balaramachandran, 2022). Kane et al. (2019) report that firms may be divided into two types based on their digital transformation journeys: digital leaders and digital followers. Jimenez et al. (2018) indicated that more than 85 percent of Asia Pacific firms polled in 2017 had begun their digital transformation journeys, with just 7 percent being categorized as digital leaders. The authors also reported that digital leaders received twice as many benefits as digital followers, and they identified five organizational characteristics of digital leaders: a risk-taking culture, flexibility and adaptability, collaboration with employees and partners, and alignment of organizational strategies. According to Linde et al., 2020), digital leaders have a better holistic vision and digital strategy, and their digital transformation initiatives generate greater returns. Based on this evaluation of the literature, it is possible to assert that digital leadership moderates the link between digital transformation and business model innovation.

Digital leadership is a big transition process that lays enormous expectations on senior management and might strain an organization's digital transformation and business model innovation initiatives (Sow & Aborbie, 2018; Ibrahim & Trzcielinski, 2021; Kwon & Park, 2017; Konopik et al., 2022; Mihardjo et al., 2019). In addition, digital leadership is not uniform (Mwita & Joanthan, 2019; Sow & Aborbie, 2018). Mihardjo et al. (2019) propose that certain firms have CEOs with a greater digital aptitude than others. Jimenez et al. (2018) also claim that certain firms may have enterprise-wide digital leadership including almost all personnel. Therefore, it is acceptable to claim that diverse digital leadership helps diverse digital transformation and business model innovation.

In the meantime, despite the extensive practitioner and academic focus on BMI and DT over the past decade, little or no research has addressed the moderating role of digital leadership in the relationship between digital transformation and business model innovation. We are unaware of any study that systematically relates digital transformation with business model innovation in a manner that is adequately tempered by various digital leadership competencies. This in no way implies that digital transformation, BMI, and digital leadership have been ignored; in fact, the opposite is true. However, the importance of digital leadership as a moderator in the link between digital transformation and business model innovation is not supported by available research. Therefore, this research hypothesizes that:

H5*: Digital leadership positively moderates the relationship between digital transformation and business model innovation.*

Conceptual Framework

Based on the theoretical framework of the study, the following conceptual framework, as shown in Figure 1, is proposed for the study. In this conceptual framework, digital transformation is represented as a central driver of change within manufacturing companies in Ghana. It is viewed through the lens of the socio-technical systems perspective, emphasizing the interaction between digital technologies and the organizational and social aspects of these companies. The proposed conceptual framework encompasses an array of dimensions within the scope of digital transformation, encompassing factors such as management capabilities, employee

empowerment, organizational culture, organizational structure, employee skills and competencies, and technological capabilities, which serves as the independent variables. This digital transformation process is hypothesized to directly influence business model innovation, reflecting the extent to which organizations adapt and innovate their business models to leverage digital technologies. As outlined in the framework, the dependent variables are characterized by the multifaceted dimensions of business model innovation, specifically encompassing value delivery, value creation, value capture, and value proposition.

Digital leadership, as influenced by the upper echelon theory, serves as a key moderator in this framework. It represents the leadership qualities and cognitive frames of top executives within these companies. Digital leadership is expected to moderate the relationship between digital transformation and business model innovation, influencing how the impact of digital transformation is realized within the organization. This conceptual framework provides a structured approach to explore the intricate dynamics between digital transformation, digital leadership, and business model innovation within the Ghanaian manufacturing context. The framework contributes to a deeper comprehension of how digital leadership, characterized by leadership qualities, cognitive frames, and the ability to navigate technology-driven change, moderates and shapes the impact of digital transformation on business model innovation. It recognizes that successful digital transformation is not solely about technology adoption but also hinges on effective leadership. In essence, this conceptual framework bridges the gap between technological and human elements, providing a nuanced understanding of the intricate relationships that drive innovation in a digitalized manufacturing sector. It offers a valuable foundation for empirical research and practical insights, facilitating informed decision-making by organizations, leaders, and policymakers seeking to thrive in the digital age.

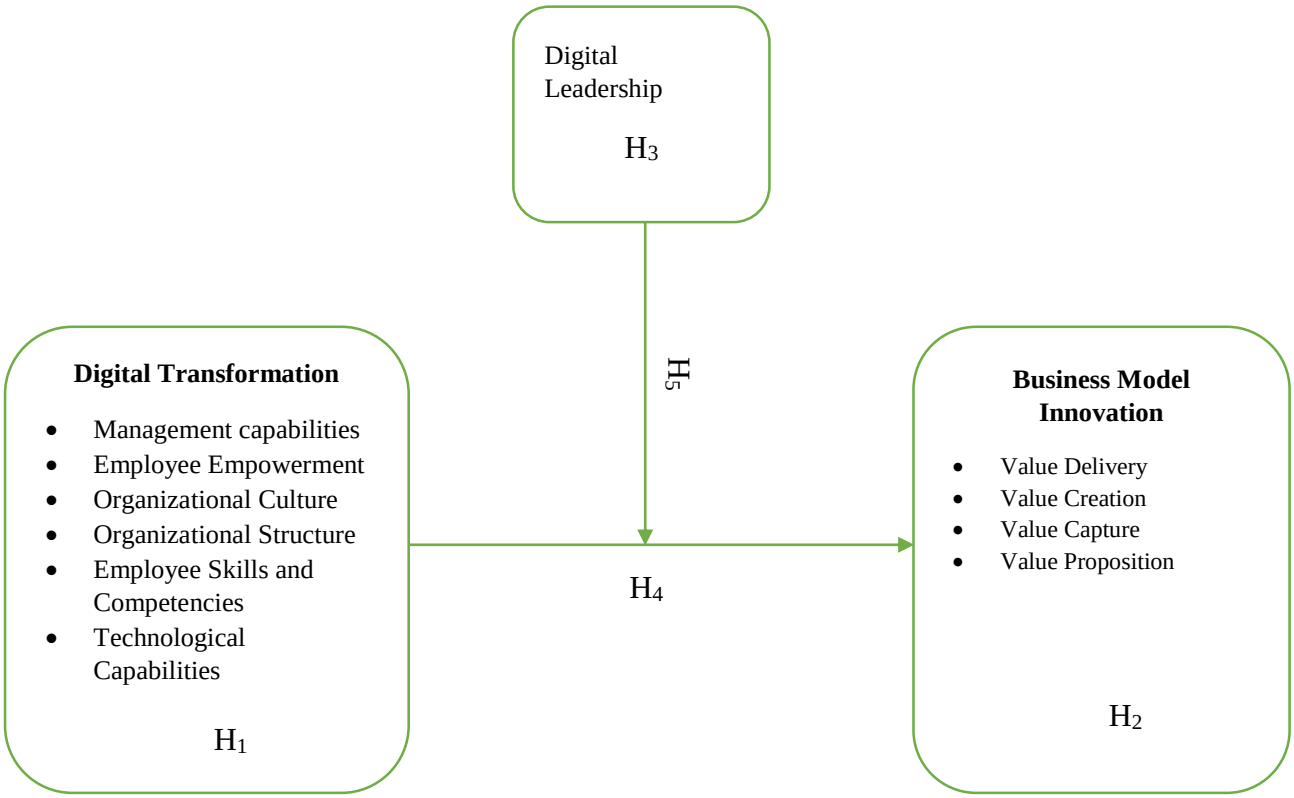

Figure 1: Conceptual Framework of the Study

Implication of the Study

Implication for research

This research significantly contributes to the academic landscape by integrating two influential theoretical perspectives—socio-technical systems theory and the upper echelon theory. The fusion of these theories provides a nuanced understanding of how digital transformation, digital leadership, and business model innovation interact within the manufacturing sector in Ghana. This theoretical synthesis enriches the body of knowledge by shedding light on the complex interplay between technological and human elements in the context of digital transformation. Researchers can build upon this framework to explore similar phenomena in diverse settings and industries, advancing our theoretical understanding of digital transformation and its implications. In addition, the study's focus on the manufacturing sector in Ghana adds a distinctive contribution to the research landscape. Empirical investigations in this region are relatively limited, and the Ghanaian context presents unique challenges and opportunities for digital transformation. This research fills a crucial gap by providing empirical insights into the specific challenges and dynamics faced by manufacturing companies in Ghana as they navigate the digital age. Researchers and scholars interested in the dynamics of digital transformation

in emerging economies can draw upon these insights to inform their own studies and develop a more comprehensive understanding of the global implications of digital transformation.

Implications for practice

This study carries substantial practical significance for manufacturing practitioners, particularly in the context of Ghana. It highlights the pivotal role of digital leadership as a moderator in shaping the outcomes of digital transformation initiatives. For manufacturing executives and leaders, this underscores the critical importance of cultivating and nurturing digital leadership qualities among top management and key decision-makers. Practically, this means prioritizing leadership development programs that focus on skills such as adaptability, technological acumen, and the ability to inspire teams to embrace digital change. In addition, by recognizing digital leadership's role as a moderator, manufacturing companies can tailor their leadership strategies to meet the demands of the digital age more effectively. It guides leaders in understanding how their leadership styles and capabilities impact the success of digital transformation efforts. This practical insight empowers manufacturing organizations to appoint leaders who possess the necessary digital competencies and vision to guide their teams through the complexities of digital transformation. Furthermore, this research offers a substantial contribution to manufacturing practitioners by highlighting the critical role of digital leadership as a moderator in the digital transformation journey. It sheds light on how the leadership qualities, cognitive frames, and capabilities of top executives influence the impact of digital transformation on business model innovation. In practical terms, this signifies that manufacturing companies should actively invest in leadership development programs that foster digital leadership skills. These programs can encompass not only technological acumen but also qualities like adaptability, innovation, and the ability to guide teams through digital transitions effectively. Thus, this study's practical significance lies in its ability to empower manufacturing practitioners with actionable insights concerning digital leadership. By recognizing digital leadership as a critical moderator, manufacturing companies in Ghana and similar contexts can proactively address the challenges posed by digital transformation, nurture a culture of innovation, and achieve sustainable growth and competitiveness in an increasingly digitalized world. This understanding serves as a practical compass guiding manufacturing leaders toward effective leadership strategies that maximize the positive impact of digital transformation efforts.

Implications for policy

This research carries substantial importance for policymakers in Ghana, particularly those concerned with fostering economic growth and competitiveness through digital transformation. First, the study's recognition of digital leadership as a moderator in the relationship between digital transformation and business model innovation provides valuable insights. Policymakers can utilize this understanding to design and refine policies that encourage the development of digital leadership capabilities within the manufacturing sector. This can include incentivizing leadership training programs and initiatives that emphasize digital acumen and adaptability among top executives. Second, policymakers often focus on promoting the growth of small and medium-sized enterprises (SMEs) as a means to drive economic development. This study's findings are particularly relevant in this context. By acknowledging the pivotal role of digital leadership, policymakers can tailor support programs to assist SMEs in developing digital leadership competencies. Accessible training, mentorship, and funding initiatives aimed at nurturing digital leadership qualities can be established. These policies can empower SME leaders to drive digital transformations effectively, thereby enhancing their competitiveness and contribution to the national economy. Third, policymakers can use this research to shape the broader digital ecosystem within Ghana. Recognizing the significance of digital leadership can inform the design of regulations, standards, and incentives that foster a conducive environment for digital transformation. This includes ensuring that regulations support the development and recognition of digital leadership within organizations. Additionally, policies can be crafted to encourage collaboration between the public and private sectors, enabling knowledge sharing and the dissemination of best practices related to digital leadership and transformation. Finally, in the era of global trade and digital connectivity, Ghana's manufacturing sector must remain competitive on the international stage. Policymakers can draw on this research to inform trade policies and strategies that leverage digital leadership to enhance the competitiveness of Ghanaian manufactured goods and services in the global market. This may involve the creation of trade agreements that prioritize digital transformation and innovation as key components of international trade, thus positioning Ghana as a competitive player in the global manufacturing arena. Thus, this study's significance for policy lies in its potential to guide policymakers in crafting informed, targeted policies that support digital transformation and innovation within Ghana's manufacturing sector. By recognizing the role of digital leadership, policymakers can design interventions that stimulate economic growth, empower SMEs, create a favorable digital ecosystem, and enhance Ghana's competitiveness in the global economy. These policy considerations align with the nation's aspirations for sustainable economic development and prosperity in the digital age.

CONCLUSION

In conclusion, this research delves into the intricate dynamics of digital transformation within the context of Ghanaian manufacturing companies, shedding light on its multifaceted impacts and the role of digital leadership. The manufacturing sector in Ghana has witnessed substantial growth in recent years, with digital transformation playing a pivotal role in its continued evolution. While this

growth has been historically driven by small and medium-sized enterprises (SMEs), certain industries within Ghana, including design, architecture, advertising, textiles, and fashion, face challenges in embracing the digital age. Insufficient technological infrastructure, limited access to funding, and the absence of collaboration among sector firms have hindered their digital transformation efforts. To address these issues, the Ghanaian government has implemented policies aimed at bolstering the nation's digital infrastructure, fostering digital literacy, and promoting innovation to invigorate the manufacturing sector's growth. As a result, Ghana continues to make strides in enhancing its digital capabilities, as reflected by its ranking in the Network Readiness Index. This research offers a comprehensive framework that elucidates the complex relationships among digital transformation, digital leadership, and business model innovation. By integrating socio-technical systems theory and the upper echelon theory, the study provides a nuanced understanding of how technological and human elements interact within the Ghanaian manufacturing context. It recognizes digital leadership as a critical moderator, influencing the outcomes of digital transformation initiatives. This holistic conceptual paper not only informs practice by guiding leadership development and strategic decision-making within manufacturing organizations but also contributes to research by advancing theoretical perspectives, offering unique empirical insights, and fostering interdisciplinary exploration. Overall, this study serves as a valuable compass, guiding manufacturing leaders, policymakers, and researchers in their endeavors to navigate the dynamic landscape of digital transformation, innovation, and leadership in the manufacturing sector.

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