

Digital Transformation and Sustainable Procurement: Opportunities for Ghana's Manufacturing Sector

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Abstract

The paper was to examine digital transformation and strengthening sustainable procurement within Ghana's manufacturing sector where firms continually face challenges related to supplier readiness, cost constraints and weak enforcement of environmental regulations. Drawing conceptual research designs. The study synthesised literature on digital technologies, sustainable procurement and integrated findings from Ghanaian studies/documents barriers to sustainability adoption. The analysis evidenced digital tools such as e-procurement platforms, blockchain systems, artificial intelligence and traceability technologies offer significant opportunities for improving transparency, supplier evaluation and lifecycle monitoring. These technologies address limitations that historically weakened sustainability performance in Ghana& help firms respond to rising expectations from regulators and customers. The conceptual-framework developed in the study links institutional pressures, organisational capabilities and stakeholder relationships to demonstrate how digital transformation enables sustainable procurement outcomes. The findings indicate practical policy implications that emphasise phased digital adoption, capacity building and stronger regulatory support. Essentially, the study provides foundation for future empirical research, reinforces the importance of digital readiness as strategic requirement for achieving sustainability in manufacturing.

Keywords: *Blockchain; E-procurement; Ghana; Institutional pressures; Manufacturing; Slow Digital transformation; Sustainable procurement; Supplier evaluation; Traceability*

Introduction

Sustainable procurement has become a central concern in global supply chains as organisations seek to balance economic growth with environmental responsibility and social wellbeing. Today, procurement is no longer viewed as a narrow administrative activity but as a strategic function that can influence competitiveness and legitimacy across industries and this is a view reinforced by scholars such as Walker and Brammer (2009) who emphasise the role of procurement in sustainable development. In many developing economies, manufacturing firms consume significant resources and generate considerable amounts of waste which makes their procurement actions critical to environmental performance. The definition of sustainable procurement offered by ISO 20400 touches on the integration of environmental, social and economic considerations into purchasing decisions as a principle that guides global best practice (ISO, 2017). As expectations for responsible sourcing continue to rise, firms are required to adopt systems

that support transparency and sustainability across their supply chains. Without such systems, sustainability remains an aspiration that is difficult to achieve in practice.

Digital transformation has also emerged as a powerful force that is reshaping the way organisations conduct procurement and manage supplier relationships. Technologies such as artificial intelligence, blockchain, e-procurement and advanced traceability systems offer opportunities for improving efficiency and accountability which are essential for sustainability. The growing importance of digitalisation is recognised in studies that show how information systems enhance monitoring, compliance and decision-making across supply chains (Wilcox et al., 2012). These technologies also support paperless transactions, reduce waste and enable firms to track environmental performance more accurately. Although digital transformation has progressed rapidly in advanced economies, its relevance for developing countries is equally strong as global markets increasingly demand transparency throughout the supply chain. The challenge now is how manufacturing firms in countries like Ghana can take advantage of these technologies to strengthen their sustainability efforts and close existing gaps.

The manufacturing sector in Ghana presents a unique and important context for this conversation. Manufacturing firms operate within supply chains that face challenges related to supplier readiness, environmental compliance and regulatory enforcement, all of which have been documented as barriers to sustainable procurement in Ghana (Dza et al., 2021). Several studies also show that firms misunderstand or partially understand the environmental, economic and social dimensions of sustainable procurement, which further slows adoption (Mensah & Ameyaw, 2012). While some Ghanaian firms have begun adopting e-procurement and paperless systems, the potential of advanced technologies remains largely unexplored. This limited adoption reduces the ability of firms to integrate sustainability into procurement decisions and affects their competitiveness in markets where sustainability and traceability are becoming essential (Issah, 2019). As a result, the sector continues to face gaps in implementation despite growing awareness of sustainability challenges.

There is therefore a strong need to understand how digital transformation can enable sustainable procurement in Ghana's manufacturing sector. Much of the existing research on sustainable procurement in Ghana focuses on regulatory weaknesses, gaps in awareness or challenges in practice without exploring the digital tools that can address these barriers (Adjei-Bamfo & Maloreh-Nyamekye, 2019). Meanwhile, evidence from international literature shows that digital technologies such as blockchain and artificial intelligence can enhance transparency, reduce risk and improve environmental performance although these tools have not yet been examined in-depth within the Ghanaian context (Zaidi et al., 2019). This creates a clear research opportunity for linking digital innovation with sustainable procurement. By identifying how digital tools can enhance traceability, reduce waste and strengthen decision-making, the discussion can provide new insights for advancing sustainability in the sector. Such an examination is timely as firms navigate increasing pressure from customers, regulators and international supply chain partners.

This paper therefore examines the opportunities created by digital transformation for strengthening sustainable procurement within Ghana's manufacturing sector. The aim is to analyse how digital technologies can address existing barriers and support the integration of environmental, economic and social sustainability into procurement

processes. The paper also points out the practical implications for Ghanaian firms and the policy implications for national institutions that seek to promote sustainability across industries. By drawing on evidence from existing studies and aligning them with emerging technological trends, the paper contributes to ongoing debates on sustainable procurement and digital innovation. It also provides a foundation for future empirical research that can test the relationship between digital capabilities and sustainable procurement performance. The sections that follow include a review of the relevant literature, an analysis of the opportunities offered by digital transformation and recommendations for both practice and further study.

Review of Related Literature

This section presents a review of related literature. The review has been organized according to key concepts within the remit of procurement.

Sustainable Procurement: Concepts and Core Principles

Sustainable procurement has evolved into a strategic mechanism for integrating environmental, social and economic considerations into purchasing decisions. ISO 20400 describes sustainable procurement as a process that supports long-term value creation by balancing organisational needs with environmental and social responsibility (ISO, 2017). This broad understanding has shaped global discussions and has encouraged firms to rethink traditional procurement practices that focus only on short-term cost savings. Scholars have shown that sustainable procurement can reduce environmental impacts by improving waste control, energy efficiency and material selection across the supply chain (Ruparathna & Hewage, 2015). In Ghana, the concept has gained attention as manufacturing activities contribute significantly to resource consumption and environmental degradation. Despite its benefits, understanding of sustainable procurement in Ghana varies widely and is often constrained by limited awareness of its environmental, economic and social dimensions (Mensah & Ameyaw, 2012). These limitations make the adoption of sustainable procurement uneven across firms.

Drivers of Sustainable Procurement

Several internal and external factors influence the adoption of sustainable procurement in manufacturing organisations. Internal drivers such as leadership commitment, organisational culture and management support play key roles in guiding sustainability priorities (Feng et al., 2020). External drivers include pressure from customers, government regulations and stakeholder expectations which create incentives for firms to engage in environmentally responsible procurement practices (ISO, 2017). For example, binding environmental regulations have been identified as an important motivator for sustainable procurement in the manufacturing sector as firms seek to comply with national and international standards (Wong et al., 2016). In developing countries, institutional pressures also shape how firms adopt sustainable practices with government agencies playing a dual role as regulators and market participants (Alden & Appleby, 2018). However, scholars note that the strength of these drivers varies and is affected by the maturity of policy frameworks and the capacity of firms to respond effectively. As a result, even strong regulatory expectations may not always lead to consistent implementation in contexts where enforcement is weak (Mensah & Ameyaw, 2012).

Barriers to Sustainable Procurement in Developing Economies

Although sustainable procurement offers clear benefits, its implementation remains challenging for many firms in developing economies. Studies in Ghana have shown that cost implications, limited training and lack of technological capacity are significant

barriers that hinder adoption (Dza et al., 2021). Firms often face constraints related to funding, supplier readiness and the perceived increase in capital costs associated with sustainable alternatives. Weak regulatory enforcement has also been identified as a major limitation as inconsistent monitoring reduces the incentives for firms to comply with sustainability requirements (Issah, 2019). Many suppliers lack the technical and financial resources needed to meet sustainability standards which further complicates procurement decisions for manufacturers who rely heavily on local sourcing. These challenges are compounded by varying interpretations of sustainability which create confusion and limit meaningful action (Mensah & Ameyaw, 2012). As a result, firms continue to struggle to integrate sustainability even when they recognise its value.

Digital Transformation in Supply Chains

Digital transformation refers to the integration of digital technologies into business processes to improve performance, efficiency and decision-making. In supply chain contexts, digital tools enable organisations to track materials, monitor supplier behaviour and improve the visibility of procurement activities. Technologies such as electronic procurement platforms, data analytics and smart monitoring tools have proven effective in streamlining processes and reducing errors (Wilcox et al., 2012). Digitalisation is particularly important for enhancing transparency which is a key pillar of sustainable procurement. It allows firms to maintain accurate records, reduce paperwork and improve communication across supply chain partners. In global markets where transparency and traceability are increasingly demanded, digital transformation has become a strategic necessity rather than an optional enhancement. However, adoption in developing economies remains uneven due to infrastructural limitations and varying levels of technological readiness.

Technologies Supporting Sustainable Procurement

Digital tools offer significant opportunities for strengthening sustainable procurement systems. E-procurement platforms can reduce paper use, enhance compliance and create efficient approval processes that support sustainability objectives (Adjei-Bamfo, 2017). Blockchain technology provides immutable records of transactions which can reduce corruption and build trust in procurement systems, especially in contexts where transparency is a concern (Zaidi et al., 2019). In contemporary times, artificial intelligence offers predictive capabilities that help organisations assess supplier risk, evaluate sustainability performance and identify future trends that may affect supply chain stability. Internet of Things devices can monitor energy consumption, emissions and waste output in real time which allows procurement teams to make informed decisions about environmentally responsible sourcing (Frikha and Mrad, 2025). Traceability systems also support sustainable procurement by following materials across their lifecycle which helps firms comply with environmental laws and stakeholder expectations (Acquaye et al., 2025). These technologies collectively create a foundation for integrating sustainability into procurement by improving information quality and accountability.

The Ghanaian Manufacturing Context

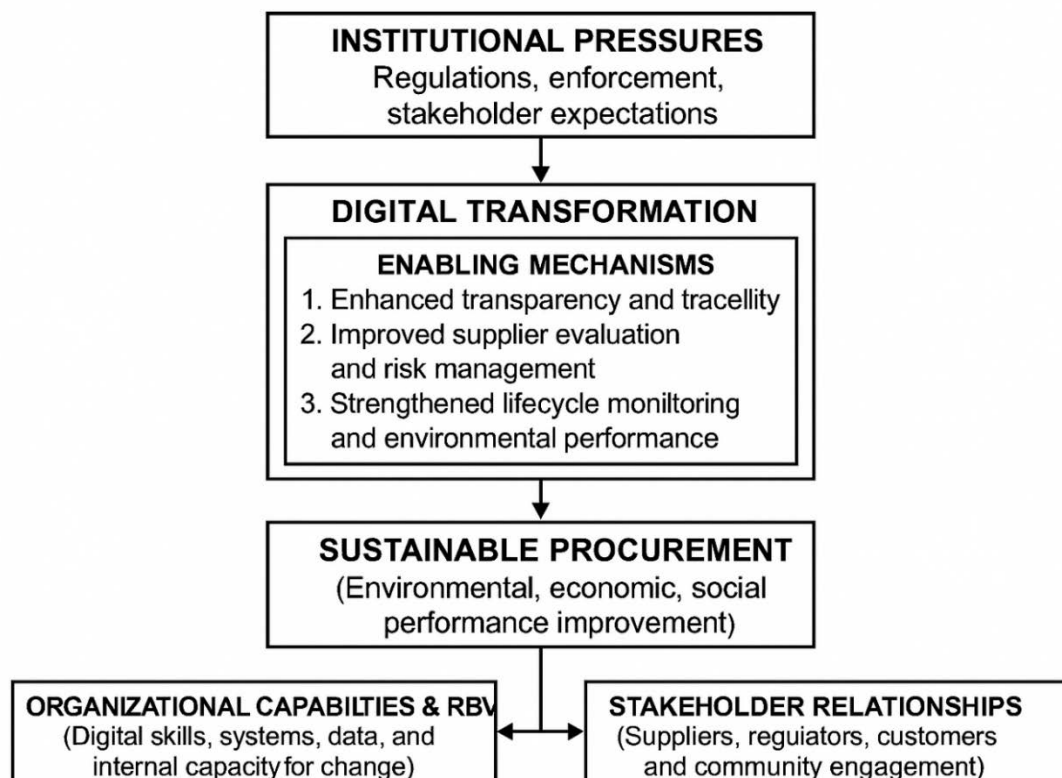
Ghana's manufacturing sector operates within a complex environment characterised by both opportunities and constraints. Manufacturing firms contribute to national development yet face challenges related to environmental regulation, resource efficiency and waste management. Studies show that many Ghanaian firms do not fully understand the multi-dimensional nature of sustainable procurement which reduces the effectiveness

of their sustainability initiatives (Mensah & Ameyaw, 2012). Regulatory bodies such as the Environmental Protection Agency and Public Procurement Authority play important roles but often struggle with limited enforcement capacity which weakens sustainability outcomes (Issah, 2019). Supplier readiness also remains a significant challenge as many local suppliers lack the skills, resources or motivation to meet sustainability standards (Nsowah, 2023). These issues call for the need for digital tools that can support training, monitoring and compliance across the supply chain. Without such tools, the sector risks falling behind global sustainability expectations.

Gaps in Current Literature

Although global literature increasingly recognises the role of digital technologies in enhancing sustainable procurement, research focused on African manufacturing contexts remains limited. Ghanaian studies have generated relevant discovery into the challenges of sustainable procurement yet rarely explore how digital transformation can address these obstacles (Adjei-Bamfo & Maloreh-Nyamekye, 2019). There is little empirical work linking specific technologies such as blockchain or artificial intelligence with procurement sustainability in manufacturing industries. Much of the existing research also takes a general approach to sustainability without considering the technological enablers needed for long-term transformation. As a result, the relationship between digital capabilities and sustainable procurement performance remains poorly understood in Ghana. This gap presents a strong opportunity for theoretical development and practical recommendations that reflect the realities of firms in resource-constrained environments. Addressing this gap can support stronger policy frameworks and help manufacturing firms adopt sustainability practices more effectively.

Digital Transformation Framework for Sustainable Procurement



Objectives

Interpreting the Framework

The conceptual framework presented in this study illustrates how digital transformation acts as a central driver that strengthens sustainable procurement in Ghana's manufacturing sector. The framework begins with institutional pressures which include regulatory expectations, customer demands and broader stakeholder concerns that encourage firms to adopt more responsible procurement practices. These pressures have been documented in Ghanaian studies that reiterate how environmental regulations and rising stakeholder expectations influence procurement behaviour (Ruparathna & Hewage, 2015; ISO, 2017). However, weak enforcement and inconsistent monitoring often limit the impact of these pressures, which makes digital transformation essential for creating more transparent and accountable systems (Issah, 2019). By positioning institutional pressures at the top of the framework, the model reflects the external environment that shapes procurement decisions before digital tools are introduced. In this way, the framework shows that sustainability does not occur in isolation but emerges from a combination of internal and external influences.

At the centre of the framework is digital transformation which acts as the primary mechanism that enables sustainable procurement. Digital tools such as e-procurement systems, blockchain platforms and traceability technologies improve visibility across supply chains and make sustainability performance easier to measure. These tools help firms overcome barriers such as poor record keeping, unreliable supplier data and limited monitoring of environmental impacts. They also support procurement staff by enhancing decision-making through automation and improved data quality which strengthens overall procurement credibility. The central placement of digital transformation within the framework reflects its strategic importance in addressing challenges that have been identified in Ghana's manufacturing sector. As a result, the framework suggests that digitalisation is not merely supportive but essential for advancing sustainability outcomes.

The framework identifies three enabling mechanisms through which digital transformation influences sustainable procurement. The first mechanism, enhanced transparency and traceability, improves the visibility of procurement transactions and supplier performance which reduces opportunities for non-compliance and strengthens accountability. The second mechanism, improved supplier evaluation, allows firms to assess environmental and social risks more effectively which is important in contexts where supplier readiness remains low (Nsowah, 2023). The third mechanism, strengthened lifecycle monitoring, enables firms to track emissions, waste and resource consumption across production processes which aligns with the recommendations of sustainability scholars who wrote on the importance of lifecycle assessment (Bolton, 2010). These mechanisms operate simultaneously and collectively improve the reliability of procurement decisions. By including them in the framework, the study shows how digital tools translate institutional expectations into practical and measurable outcomes.

The lower section of the framework presents sustainable procurement outcomes which emerge as a result of the enabling mechanisms. These outcomes reflect improvements in environmental stewardship, operational efficiency and long-term value creation which are central to sustainable procurement as defined by ISO 20400 (ISO, 2017). The framework emphasises that digital transformation strengthens the firm's ability to achieve these outcomes by improving access to real-time information and reducing uncertainty in

supplier relationships. This structure demonstrates that sustainable procurement is not an isolated activity but a performance result that depends on the strength of digital processes. Improved outcomes also enhance the firm's reputation and competitiveness which are particularly relevant in industries facing global supply chain scrutiny. The framework therefore links digital innovation directly to measurable improvements in procurement sustainability.

The final components of the framework are organisational capabilities and stakeholder relationships which influence how effectively firms adopt and sustain digital transformation. Organisational capabilities refer to the internal skills, resources and systems that support digital adoption, such as staff expertise, technology infrastructure and data management practices. These elements align with the Resource-Based View which argues that valuable and inimitable resources strengthen firm performance. Stakeholder relationships emphasise the role of suppliers, regulators, customers and communities in shaping sustainability behaviour which reflects perspectives from Stakeholder Theory. Strong digital systems support these relationships by facilitating communication, promoting shared responsibility and encouraging collaborative problem solving. Their inclusion in the framework shows that digital transformation is most effective when supported by both internal capacities and external engagement.

Conclusively, the framework provides a holistic explanation of how digital transformation can strengthen sustainable procurement in Ghana's manufacturing sector. It connects environmental pressures, organisational capacities and technological capabilities to show how firms can overcome barriers that have traditionally undermined sustainability efforts. By interpreting the framework through institutional, resource-based and stakeholder perspectives, the study offers a comprehensive understanding of the mechanisms that influence sustainable procurement performance. The framework also highlights the importance of digital readiness as a strategic requirement for firms operating in increasingly regulated and competitive environments. The model therefore serves as both an analytical tool and a practical guide for firms, policy makers and researchers who aim to advance sustainability through digital innovation.

Methodology

This study adopted a conceptual research design that draws on existing academic literature, policy reports and empirical studies to examine the relationship between digital transformation and sustainable procurement in Ghana's manufacturing sector. Conceptual research is appropriate when a topic requires theoretical integration rather than the collection of new field data, particularly when existing findings present gaps that need to be synthesised and reframed (Xin et al., 2013). Prior studies in Ghana reveal barriers to sustainable procurement related to cost, regulatory weakness and supplier readiness yet offer limited analysis of digital solutions, which makes a conceptual approach suitable for exploring new possibilities (Malik et al., 2024; Etse et al., 2022). This method allowed the paper to connect theoretical perspectives with the practical realities documented in recent sustainability studies. Through this approach, the paper identified patterns across published work and interprets them in a way that offers new insight. The aim was not to measure relationships but to deepen understanding and develop a stronger explanatory basis for future empirical work.

To ensure rigour, the study used a structured literature review process that involved three main stages: identification, evaluation and synthesis. In the identification stage, relevant

peer-reviewed articles, industry publications and policy documents were sourced from academic databases and from the sustainability and procurement literature referenced in the researcher's thesis. The evaluation stage involved examining how each source contributed to understanding sustainable procurement barriers, digital innovation trends and the broader context of manufacturing in Ghana. The synthesis stage then combined these insights to generate a coherent narrative that explains how digital transformation can support sustainability outcomes. This iterative process allowed the study to build a conceptual link between technological tools and sustainability principles. It also ensured that the findings reflected both global developments and local realities.

Although this research did not involve primary data collection, it draws heavily on empirical evidence reported in existing Ghanaian studies. Studies such as Issah (2019), Dza et al. (2021) and Mensah and Ameyaw (2012) provide detailed accounts of the systemic challenges that undermine sustainable procurement. These findings serve as the contextual anchor for evaluating the relevance of digital technologies. The conceptual analysis therefore built upon established empirical knowledge rather than replacing them. This strengthens the study's relevance and ensures that its conclusions are grounded in documented practice. It also positions the paper as a bridge between theoretical discussion and future empirical investigation.

Analysis

The limitations of this methodology stem primarily from its conceptual nature. Without primary data, the study cannot measure the actual digital readiness of firms or test the impact of specific technologies in real settings. The conclusions drawn therefore remain exploratory and require validation through case studies, field experiments or quantitative assessments. However, the conceptual approach remains valuable because it indicates gaps in existing knowledge and proposes a foundation for further research. By identifying theoretical linkages and practical opportunities, the study supports the development of richer empirical studies in the future. In this way, the methodology advances understanding while acknowledging the need for continued investigation.

Table 1. Summary of Literature Reviewed.

Author(s) & Year	Focus of Study	Key Contribution to This Paper
Walker & Brammer (2009)	Sustainable procurement in public sector organisations	Establishes sustainability as a strategic procurement function influencing legitimacy and competitiveness
ISO (2017)	Global guidance on sustainable procurement principles	Defines sustainable procurement and its environmental, social and economic dimensions
Mensah & Ameyaw (2012)	Sustainable procurement awareness and challenges in Ghana	Highlights gaps in understanding and implementation within Ghanaian organisations
Dza et al. (2021)	Barriers to sustainable procurement in developing economies	Identifies cost, training and supplier limitations as major constraints for Ghana

Issah (2019)	Effectiveness of procurement regulations in Ghana	Demonstrates regulatory weakness and enforcement challenges
Adjei-Bamfo (2017)	E-procurement and environmental sustainability	Shows that paperless processes improve efficiency and support sustainability
Adjei-Bamfo & Maloreh-Nyamekye (2019)	Digital tools in sustainable public procurement	Suggests that digital systems enhance transparency and compliance
Zaidi et al. (2019)	Barriers to sustainable procurement adoption	Supports the role of digital technologies in improving traceability and reducing corruption
Wong et al. (2016)	Drivers enabling green procurement	Reinforces the importance of regulatory and institutional forces
Alden & Appleby (2018)	Models for integrating sustainability in procurement	Provides frameworks for embedding sustainability into procurement systems
Feng & Shanthikumar (2022)	Decision-making and systems optimisation	Highlights the analytical value of digital tools for procurement evaluation
Wilcox et al. (2012)	Information systems for supply chain monitoring	Shows how digitalisation enhances monitoring and data accuracy
Krause, Vachon & Klassen (2009)	Sustainable supplier management	Supports the link between supplier performance and sustainability outcomes
Bolton (2016)	Public procurement and innovation	Reinforces lifecycle considerations and sustainability-driven decision making
Etse, McMurray & Muenjohn (2022)	Role of regulation and organisational culture	Explains how governance structures enable sustainability adoption
Nsowah & Phiri (2023)	Supply chain sustainability practices in Ghana	Highlights supplier readiness challenges affecting sustainability progress
Vishwakarma, Patro & Acquaye (2025)	AI for carbon reduction in supply chains	Demonstrates the potential of AI for sustainability and decarbonisation
Frikha & Mrad (2025)	AI-driven supply chain decarbonisation	Shows emerging digital pathways for sustainability innovations

Findings and Discussion

This section discusses the findings that emerged from the synthesis of existing literature and the conceptual framework. It highlights the keyways in which digital transformation can enhance sustainable procurement and address persistent challenges within Ghana's manufacturing sector. The discussion presents these insights through the main themes identified in the review.

Enhanced Transparency and Traceability

Available literature reveals that digital transformation offers significant opportunities for improving transparency within procurement processes which is a key enabler of sustainability. Blockchain technology, digital audits and e-procurement systems create records that cannot be easily altered and therefore reduce opacity in purchasing decisions.

This is particularly important in contexts where weak enforcement of regulations limits compliance and creates inconsistencies in sustainability performance, as observed in Ghana's manufacturing sector (Issah, 2019). When procurement activities are digitised, firms gain clearer visibility of supplier behaviour and environmental risks which strengthens accountability. Enhanced traceability also addresses concerns raised by scholars who argue that firms are now held responsible not only for their own behaviour but also that of their suppliers (Krause et al., 2009). As a result, digital transparency supports a shift from voluntary sustainability practices to more verifiable approaches. This strengthens institutional trust and supports long-term procurement credibility.

Improved Supplier Evaluation and Risk Management

Digital tools provide more reliable ways of assessing supplier performance which is essential for sustainable procurement. Artificial intelligence, data analytics and automated scoring systems enable firms to evaluate suppliers based on environmental, social and economic indicators. This addresses a major barrier identified in Ghanaian studies where suppliers often lack the readiness or capacity to meet sustainability standards (Nsowah, 2023). Digital systems allow firms to detect non-compliance early which reduces the risks associated with poor supplier practices. These tools can also support supplier development by identifying training needs and monitoring progress over time which responds to challenges related to knowledge gaps and limited understanding of sustainability among supply chain actors (Dza et al., 2021). By improving supplier evaluation, digital transformation strengthens the quality of procurement decisions. This creates a more resilient and responsible supply base.

Reduction of Waste Through Paperless Systems

One of the most immediate benefits of digital transformation is the reduction of paper use through e-procurement and automated workflows. Paperless systems reduce administrative waste and minimise errors associated with manual record keeping which supports environmental sustainability objectives. The use of e-procurement platforms has already been recognised as a quick win in Ghana's manufacturing sector because it reduces paper consumption while improving efficiency (Adjei-Bamfo, 2017). This shift aligns with ISO 20400's emphasis on integrating environmental considerations into procurement processes (ISO, 2017). Paperless systems also make it easier to track procurement data which helps firms monitor sustainability indicators. As firms face increasing pressure to demonstrate environmental responsibility, digital processes allow them to show measurable reductions in waste. This contributes to more credible sustainability reporting.

Strengthened Lifecycle Monitoring and Environmental Control

Digital transformation enables firms to monitor environmental performance across the lifecycle of materials and production processes. Internet of Things devices, smart meters and digital traceability tools help organisations track emissions, energy consumption and waste output in real time. This responds directly to calls for more rigorous environmental control within Ghana's manufacturing sector where pollution risks and waste management challenges are widely documented. Firms that are able to monitor their environmental performance more accurately can make better procurement decisions that reflect lifecycle impacts. This approach supports global recommendations that emphasise the importance of assessing environmental consequences from product inception to disposal (Bolton, 2010). Lifecycle monitoring also strengthens compliance with national environmental regulations which have traditionally suffered from weak enforcement

(Issah, 2019). As a result, digital environmental control tools make sustainability more measurable and actionable.

Improved Collaboration Across the Supply Chain

Digital platforms create opportunities for enhanced collaboration among buyers, suppliers, regulators and recyclers which is essential for sustainable procurement. Collaboration has been shown to strengthen legitimacy and resource mobilisation, particularly in environments where internal capabilities are limited (Mensah & Ameyaw, 2012). Digital communication tools and shared platforms make it easier to coordinate sustainability efforts, document responsibilities and facilitate dialogue among stakeholders. This responds to findings that sustainable procurement requires the participation of all actors in the supply chain, including regulators, customers and communities (ISO, 2017). For example, digital platforms can link firms with waste management partners in ways that support recycling and circular economy practices which are becoming more important in Ghana's industrial landscape. Improved collaboration also supports supplier development initiatives by offering shared training resources and performance dashboards. These networks ultimately strengthen the sustainability ecosystem.

Strengthened Regulatory Oversight and Enforcement

Weak enforcement has been repeatedly identified as a major barrier to sustainable procurement in Ghana yet digital transformation provides tools that can support more consistent oversight. When procurement and environmental data are digitised, regulators such as the Environmental Protection Agency and the Public Procurement Authority can monitor compliance more efficiently. Scholars argue that sustainability outcomes depend heavily on the strength of institutional oversight, and this remains an area where Ghana faces persistent challenges (Issah, 2019). Digital records make it more difficult for firms to bypass requirements or hide non-compliance because transactions are visible and verifiable. Enhanced monitoring reduces the dependency on infrequent physical inspections which often leave gaps in enforcement. As a result, digital oversight tools support a regulatory environment that encourages more consistent adoption of sustainable procurement. This reduces the barriers that have historically weakened sustainability efforts across the manufacturing sector.

Strategic Advantage and Competitiveness

Digital transformation offers firms an opportunity to build stronger reputational and competitive advantages through sustainability. Studies show that organisations that adopt sustainability practices attract investors, improve stakeholder confidence and enhance their market image (Belfitt et al., 2011). When digital tools make sustainability more visible and measurable, firms can communicate their performance more effectively to customers and external partners. This creates opportunities in local and international markets where sustainability has become a key purchasing criterion. As firms strengthen their procurement practices, they also reduce operational risks and improve long-term resilience which is critical in an increasingly competitive manufacturing environment. Digital transformation therefore supports both sustainability and business growth. This dual benefit makes it a strategic priority for firms aiming to remain competitive.

Implications of the Findings

Practical Implications for Manufacturing Firms

The findings of these syntheses of literature offer several practical implications for manufacturing firms that aim to strengthen sustainable procurement through digital transformation. Firms must recognise that digital tools are not only efficiency enhancers but strategic enablers that reduce sustainability risks, improve traceability and support more reliable supplier assessment. By adopting e-procurement platforms, digital audit systems and traceability tools, firms can overcome long-standing barriers such as poor record keeping, inconsistent monitoring and limited visibility across the supply chain. These technologies also help firms respond to increasing pressure from customers and regulatory bodies which demand evidence of responsible sourcing and environmental performance (ISO, 2017). Manufacturers are encouraged to invest in capacity building so that procurement officers and supply chain staff can use digital tools effectively and integrate them into day-to-day decision-making. Establishing phased digital adoption strategies will help firms minimise cost burdens while strengthening their sustainability commitments. Ultimately, firms that embrace digital transformation will be better positioned to compete in markets where sustainability is becoming a key determinant of credibility and performance.

Policy Implications for Government and Regulatory Institutions

The findings also hold important implications for policy makers, particularly agencies such as the Environmental Protection Agency and the Public Procurement Authority. Weak enforcement has been identified as a major limitation affecting sustainable procurement in Ghana, yet digital technologies provide new opportunities to strengthen regulatory oversight (Issah, 2019). Policy makers should consider integrating digital monitoring tools into national procurement guidelines and environmental compliance frameworks to improve consistency and transparency. Government institutions can also promote the adoption of digital systems by offering incentives such as tax reliefs, certification schemes and preferential treatment for firms that demonstrate commitment to digital sustainability practices. Investing in national digital infrastructure will further support manufacturing firms that face challenges related to cost and technological readiness. Clear policies on digital procurement will help standardise practices across the sector and encourage suppliers to upgrade their processes. Such interventions will create a more robust sustainability ecosystem that aligns national development goals with international standards.

Implications for Supplier Development and Stakeholder Engagement

The study points out the need for stronger engagement with suppliers who often struggle with readiness, technical capability and understanding of sustainability requirements (Nsowah, 2023). Digital platforms offer opportunities for structured supplier development by facilitating training, sharing compliance requirements and monitoring performance over time. Firms and regulators can use these tools to provide suppliers with clearer guidance which addresses the knowledge and communication gaps documented in previous Ghanaian studies (Dza et al., 2021). Improved digital engagement enhances collaboration and builds trust which is essential for sustainable procurement that relies heavily on multi-stakeholder cooperation. Communities, customers and industry associations can also benefit from digital transparency as it gives them access to verifiable sustainability information. In this way, digital transformation strengthens stakeholder relationships and supports collective responsibility for environmental and social

outcomes. These improvements create conditions for a more inclusive and coordinated approach to sustainability.

Theoretical Implications for Academic Research

The conceptual framework developed in this study provides theoretical implications for the academic community. It demonstrates that digital transformation can be understood not only as a technological shift but also as an institutional and capability-building mechanism that enhances sustainable procurement outcomes. By combining Institutional Theory, the Resource-Based View and Stakeholder Theory, the model offers a more holistic understanding of how digital tools influence procurement behaviour. This integrated perspective responds to gaps in existing literature where the relationship between digital capabilities and sustainability has been underexplored, especially in developing economies. Future research can build on this framework by conducting empirical studies that examine how specific technologies influence procurement outcomes in different organisational contexts. Researchers may also explore sectoral comparisons or longitudinal studies which address calls for broader and more sustained analysis of sustainable procurement practices (Adjei-Bamfo & Maloreh-Nyamekye, 2019). This study therefore lays the foundation for academic inquiry that is aligned with emerging global trends in digital sustainability.

Recommendations

The findings of this study point to several recommendations that can support the integration of digital transformation into sustainable procurement within Ghana's manufacturing sector. First, manufacturing firms should adopt a phased approach to digitalisation by prioritising low-cost tools such as e-procurement platforms before scaling to advanced technologies like blockchain or artificial intelligence. This allows firms to manage cost constraints while gradually building the internal capabilities needed to support more complex systems. Second, firms should invest in continuous training for procurement officers and supply chain staff so they can use digital tools effectively and apply sustainability indicators confidently in decision-making. Training may be done internally or through partnerships with industry associations, universities and digital service providers. Third, firms should collaborate more closely with suppliers by using digital platforms to communicate requirements, track improvements and provide targeted support, especially for suppliers who lack readiness for sustainability compliance. Strengthening supplier involvement will improve overall value chain performance and reduce the risk of excluding smaller suppliers from sustainability initiatives.

Policy makers should also adopt measures that support digital transformation in procurement. Government agencies such as the Environmental Protection Agency and the Public Procurement Authority should integrate digital monitoring systems into enforcement and compliance processes to reduce gaps caused by manual oversight (Issah, 2019). Policy makers may also consider introducing incentive schemes such as tax rebates, preferential procurement scores or certification programmes for firms that demonstrate commitment to digital sustainability practices. Strengthening national digital infrastructure will further support firms that face technological constraints, particularly in areas with poor network coverage or limited access to affordable digital tools. In addition, regulatory bodies should establish updated guidelines that reflect modern digital procurement practices to encourage uniform adoption across the manufacturing sector. Such policy support can accelerate digital readiness while ensuring that sustainability becomes a measurable and accountable requirement. These actions will collectively help

to build a more transparent, competitive and environmentally responsible manufacturing sector in Ghana.

Conclusion

This study concludes that sustainable procurement remains essential for balancing environmental, social and economic goals yet its adoption in Ghana has been limited by supplier unreadiness, cost implications and weak institutional enforcement, as mentioned in earlier studies (Dza et al., 2021; Issah, 2019). Digital transformation helps to mitigate these constraints by improving transparency, enhancing supplier evaluation and supporting more reliable environmental monitoring across the lifecycle of goods and services. Technologies such as e-procurement platforms, blockchain systems and smart monitoring tools make sustainability more measurable and help firms respond more effectively to rising expectations from customers and regulators. These tools also strengthen collaboration among supply chain actors while improving procurement credibility and accountability.

The conceptual framework developed in this study shows that digital transformation works through key mechanisms that are shaped by institutional pressures, organisational capabilities and stakeholder relationships. By integrating Institutional Theory, the Resource-Based View and Stakeholder Theory, the framework presents the ways in which digital technologies can support sustainability even in contexts where enforcement remains inconsistent. The analysis suggests that digital tools create value not only by improving efficiency but by enabling firms to comply more easily with emerging sustainability standards. In this regard, the study contributes to the broader understanding of how developing economies can adopt innovative approaches to sustainable procurement. It also identifies digital readiness as a strategic capability that can enhance competitiveness and resilience within the manufacturing sector.

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