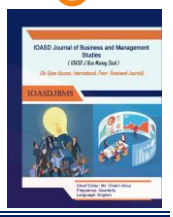
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E-Procurement Technology and Sustainable Procurement: The Moderating role of Regulatory Environment and Supplier Readiness & Collaboration

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ABSTRACT

Purpose: Despite the growing adoption of e-procurement platforms, the extent to which these technologies contribute to sustainable procurement objectives remains unclear and inconsistent, especially across varying institutional and market contexts. This situation highlights the urgent need for empirical research that addresses how and under what conditions e-procurement technologies can support sustainable procurement, particularly within regulatory and supplier-related contingencies. ***Methodology:*** The study employs a quantitative research approach. The study is also anchored in the positivist research philosophy. This study adopts the purposive sampling technique to obtain a sample size of 385. The study relies on primary data collected directly from the selected respondents. ***Findings:*** The study concludes that E-Procurement Technology (EPT) is a significant driver of Sustainable Procurement. It is also concluded that the Regulatory Environment strengthens the positive relationship between E-Procurement Technology and Sustainable Procurement. The study further concludes that Supplier Readiness and Collaboration (SRC) significantly enhances the effect of E-Procurement Technology on Sustainable Procurement. ***Implications:*** Organizations should prioritize the implementation of advanced e-procurement systems that integrate procurement, finance, and inventory operations to improve efficiency and transparency. Continuous training programs for procurement staff should be instituted to ensure effective use of digital tools and minimize errors associated with manual processes. Firms should regularly evaluate and upgrade e-procurement platforms to incorporate features that support sustainability, such as tracking environmental and social compliance of suppliers. Organizations should actively monitor and align their procurement processes with relevant national and industry regulations to ensure compliance and reduce legal risks.

Keywords: E-Procurement Technology; Sustainable Procurement; Regulatory Environment; Supplier Readiness & Collaboration.

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1.1 BACKGROUND OF THE STUDY

The emergence of e-procurement technologies has profoundly transformed the landscape of organizational purchasing processes, enabling faster, more transparent, and cost-effective procurement. E-procurement involves the use of electronic platforms, systems, or tools to conduct procurement activities such as sourcing, bidding, ordering, invoicing, and payment processing. Beyond efficiency, there is a growing interest in how these technologies contribute to sustainable procurement, which emphasizes social responsibility, environmental protection, and economic efficiency in procurement decisions (Walker & Brammer, 2019). In the face of increasing global sustainability demands, organizations are leveraging e-procurement to align procurement strategies with broader sustainability goals. Sustainable procurement is a critical component of sustainable development, especially in the public sector, where procurement expenditures constitute a significant share of national budgets. It goes beyond cost considerations to include life-cycle costing, ethical sourcing, fair labor practices, and minimizing environmental impacts (United Nations, 2020). With the pressing need to address climate change, resource depletion, and social inequality, procurement decisions are increasingly scrutinized for their sustainability impacts. However, implementing sustainable procurement practices often faces institutional,

technological, and operational challenges, particularly in developing and transitional economies.

E-procurement offers an opportunity to overcome some of these barriers by enabling better supplier management, data analytics for sustainability reporting, and real-time monitoring of procurement activities. For instance, e-procurement platforms can track carbon footprints, monitor supplier compliance with green standards, and facilitate supplier engagement through digital collaboration tools (Aguezzoul & Pires, 2021). Yet, the realization of these benefits is not guaranteed. The extent to which e-procurement supports sustainability objectives is contingent on several contextual factors, including the regulatory environment and supplier readiness and collaboration. The regulatory environment plays a crucial moderating role in shaping how e-procurement systems are adopted and aligned with sustainability outcomes. Regulatory frameworks that support green procurement, enforce transparency, and provide guidelines for ethical sourcing are essential for mainstreaming sustainable procurement through digital means. In contexts where regulations are weak, ambiguous, or poorly enforced, organizations may adopt e-procurement for efficiency but fail to leverage it for sustainable purposes (OECD, 2021). Hence, regulatory support is often the bedrock upon which technological interventions for sustainability are built.

Similarly, supplier readiness and collaboration significantly influence the effectiveness of e-procurement in advancing sustainability. Supplier readiness refers to the extent to which suppliers possess the technological, managerial, and operational capacity to engage in e-procurement processes. Collaboration entails trust, shared goals, and information exchange between buyers and suppliers. Where suppliers are technologically underdeveloped or lack awareness of sustainability requirements, e-procurement may result in exclusion or superficial compliance (Mun & Johnson, 2020). Conversely, high levels of readiness and collaborative engagement enable suppliers to align their operations with buyers' sustainability expectations, leading to improved outcomes in environmental performance, ethical standards, and supply chain transparency. Several studies have confirmed the positive link between e-procurement and procurement performance. For instance, Nawi *et al*. (2021) found that e-procurement adoption significantly improves efficiency and supplier communication. However, studies specifically examining the intersection between e-procurement and sustainable procurement especially the role of contextual moderators remain limited. In particular, the dual moderating influence of the regulatory environment and supplier readiness and collaboration on this relationship is underexplored, particularly in developing and emerging markets, where technological adoption and regulatory enforcement vary widely.

In the Ghanaian and broader Sub-Saharan African context, governments and private organizations have embarked on digitizing procurement functions through platforms such as the Ghana Electronic Procurement System (GHANEPS). While these platforms aim to improve efficiency and reduce corruption, there is growing interest in how they can be extended to support sustainability outcomes. Despite these ambitions, procurement processes in many institutions still suffer from poor enforcement of sustainable procurement policies, inadequate supplier capacity, and fragmented buyer-supplier relationships (Ameyaw *et al*., 2022). This context provides a fertile ground for examining the effectiveness of e-procurement as a tool for achieving sustainable procurement, particularly in the presence of regulatory and supplier-based contingencies. Given this backdrop, this study seeks to explore the relationship between e-procurement technology and sustainable procurement, with particular attention to the moderating roles of the regulatory environment and supplier readiness and collaboration. The study aims to provide a nuanced understanding of how digital procurement systems can be leveraged not only for efficiency but also as strategic tools for environmental, social, and economic sustainability. By examining the dynamic interplay among these variables, the study contributes to both theory and practice by offering insights into the conditions under which e-procurement can serve as a driver of sustainable procurement outcomes in resource-constrained and institutionally diverse environments.

The increasing complexity and globalization of supply chains, alongside intensifying environmental and social challenges, have compelled organizations to rethink traditional procurement practices. In response, e-procurement technologies have emerged as pivotal tools in streamlining procurement operations, improving transparency, and enhancing decision-making (Nawi *et al*., 2021). Concurrently, the rise of sustainable procurement which emphasizes environmental stewardship, social responsibility, and economic efficiency has become a cornerstone of corporate sustainability strategies (Walker & Brammer, 2019). Despite the growing adoption of e-procurement platforms, the extent to which these technologies contribute to sustainable procurement objectives remains unclear and inconsistent, especially across varying institutional and market contexts. Although existing literature has extensively documented the operational benefits of e-procurement such as cost reduction, process efficiency, and reduced cycle times (Aguezzoul & Pires, 2021) its transformative potential for sustainability has not been fully realized in practice. Many organizations, particularly in emerging economies, continue to underutilize e-procurement systems in aligning procurement decisions with environmental and social performance indicators. As such, while digital procurement systems are being increasingly deployed, their role in supporting sustainable procurement

outcomes is neither automatic nor guaranteed (OECD, 2021). The disconnect between technology implementation and sustainability outcomes raises critical questions regarding the enabling and constraining conditions that shape this relationship.

One such condition is the regulatory environment. Regulations and policy frameworks play an essential role in guiding and enforcing sustainable procurement practices. However, in many developing countries, the regulatory infrastructure is often underdeveloped, weakly enforced, or misaligned with sustainability goals (Ameyaw *et al*., 2022). In such contexts, the effectiveness of e-procurement systems may be limited to procedural efficiency without fostering deeper behavioral or strategic shifts toward sustainability. Conversely, where strong regulatory frameworks exist, e-procurement platforms can act as enablers of policy compliance and sustainability performance monitoring. This regulatory variation across jurisdictions creates an empirical gap in understanding the moderating role of the regulatory environment in shaping the e-procurement–sustainability nexus. In addition, supplier readiness and collaboration represent another critical but underexplored moderating factor. The success of e-procurement in driving sustainable procurement is dependent on the ability of suppliers to adopt digital platforms, understand sustainability requirements, and engage in collaborative initiatives. However, many suppliers, particularly small and medium-sized enterprises (SMEs), face barriers such as technological illiteracy, resource constraints, and limited exposure to sustainable practices (Mun & Johnson, 2020). Where supplier readiness is low, e-procurement may exacerbate exclusion or lead to superficial compliance. On the other hand, suppliers with high readiness and collaborative orientation can co-create sustainable value through innovation, transparency, and trust. The absence of empirical studies that investigate how supplier capabilities influence the effectiveness of e-procurement technologies toward sustainability represents a critical research void.

Furthermore, there is limited empirical evidence that simultaneously examines the triadic interplay among e-procurement technology, regulatory environment, and supplier collaboration in advancing sustainable procurement. The few existing studies tend to analyze these variables in isolation, offering little guidance to practitioners and policymakers on how these elements interact to produce sustainable outcomes. For instance, Nawi *et al*. (2021) focus on the operational impact of e-procurement, while Aguezzoul and Pires (2021) highlight its role in data collection and performance tracking, without considering contextual moderators. This fragmented understanding creates a theoretical and practical gap, hindering the formulation of integrated strategies for digital and sustainable procurement. The problem is especially pronounced in Sub-Saharan Africa, including Ghana, where the government has introduced platforms such as the Ghana Electronic Procurement System (GHANEPS) to digitize public procurement. While these systems promise greater efficiency and accountability, their potential to enhance sustainability in procurement has not been fully realized or empirically validated. Procurement officials and stakeholders continue to face challenges such as low supplier digital literacy, inconsistent policy enforcement, and fragmented buyer-supplier relationships, which weaken the impact of e-procurement on sustainability goals (Ameyaw *et al*., 2022). This situation highlights the urgent need for empirical research that addresses how and under what conditions e-procurement technologies can support sustainable procurement, particularly within regulatory and supplier-related contingencies.

In light of these gaps, this study seeks to investigate the impact of e-procurement technology on sustainable procurement, while examining the moderating roles of the regulatory environment and supplier readiness and collaboration. By addressing the intersecting influences of technology, regulation, and supply network capabilities, the research aims to provide a comprehensive understanding of how digital transformation can be leveraged to drive sustainability in procurement practices. This study not only responds to pressing theoretical questions but also offers actionable insights for policymakers, procurement professionals, and development partners seeking to align digital procurement systems with long-term sustainability objectives.

2. LITERATURE REVIEW

2.1 E-Procurement Technology

Electronic procurement (e-procurement) technology represents the digital transformation of traditional procurement processes through the use of internet-based tools and systems. It enables organizations to automate and streamline purchasing activities such as requisitioning, tendering, sourcing, ordering, invoicing, and payment (Mohungoo, Govender & Ruggunan, 2020). As businesses strive to improve transparency, efficiency, and compliance in procurement, e-procurement technology has become a critical enabler of procurement innovation, cost reduction, and supply chain integration. E-procurement technology refers to the suite of software applications and digital platforms that facilitate the electronic handling of procurement functions. These tools include e-tendering, e-sourcing, e-auctions, e-ordering, and e-invoicing systems that replace paper-based processes and enable real-time communication and collaboration between buyers and suppliers (Ahmed, Rahim & Gunasekaran, 2021). E-procurement not only enhances operational efficiency but also improves supplier management, compliance tracking, and data analytics capabilities. According to Yang *et al*. (2022), e-procurement involves three main phases: pre-tendering (vendor registration, needs identification), tendering (bidding, contract award), and

post-tendering (ordering, delivery, payment). These activities are executed through integrated systems such as Enterprise Resource Planning (ERP), Supplier Relationship Management (SRM), and cloud-based procurement platforms that ensure automation, standardization, and traceability across procurement functions.

E-procurement technology encompasses several functional dimensions, each contributing to procurement performance. E-Sourcing – This includes the identification and evaluation of suppliers through digital tools that enhance transparency and competitiveness (Madzimure, 2020). E-Tendering – Electronic invitation and submission of bids that reduce time and administrative burdens while improving fairness and auditability (Osman & Azan, 2021). E-Ordering – The placement of orders through online catalogues and automated workflows, which increases accuracy and reduces transaction cycles (Asare, 2022). E-Invoicing and Payment – Automated invoice matching and digital payment systems that minimize errors and improve financial control (Kimani *et al*., 2021). These components collectively enable procurement teams to manage complex supplier networks, gain data-driven insights, and align procurement with broader strategic goals such as sustainability and cost-effectiveness.

2.1.2 Sustainable Procurement

Sustainable procurement has emerged as a strategic imperative for organizations seeking to align purchasing decisions with broader environmental, social, and economic objectives. It is rooted in the principles of sustainable development and integrates sustainability considerations into all stages of the procurement lifecycle. In a global context characterized by climate change, social inequality, and growing stakeholder expectations, sustainable procurement practices enable organizations to not only achieve cost efficiency but also generate long-term value for society and the environment (Amann *et al*., 2021). Sustainable procurement is broadly defined as the process by which organizations meet their procurement needs in a way that achieves value for money while minimizing environmental harm and promoting positive social outcomes (Walker *et al*., 2021). It involves the selection of products, services, and suppliers that take into account the full life-cycle impact on people, planet, and profit. The International Organization for Standardization (ISO 20400:2017) provides a globally recognized standard for sustainable procurement, emphasizing ethical behavior, risk management, human rights, and environmental stewardship in procurement activities. According to Zhu, Sarkis, and Lai (2020), sustainable procurement goes beyond compliance and includes proactive efforts to embed sustainability into procurement planning, supplier selection, contract management, and performance evaluation. It also emphasizes the importance of stakeholder engagement, transparency, and continuous improvement across the supply chain.

2.1.3 Regulatory Environment

The regulatory environment refers to the system of laws, regulations, rules, and institutions established by governments or regulatory authorities to control, influence, and guide the behavior of businesses and economic actors within a specific jurisdiction. It plays a critical role in shaping market conditions, determining operational boundaries, ensuring legal compliance, and promoting transparency, accountability, and fair competition. In the context of public administration and private sector operations, the regulatory environment is essential for ensuring orderly conduct, protecting stakeholders, and aligning practices with national development goals (Haddad *et al*., 2020). A robust regulatory environment provides predictability, stability, and clarity for businesses and public sector actors, enabling them to make informed decisions. Conversely, weak, inconsistent, or overly complex regulations can hinder innovation, reduce operational efficiency, and increase the cost of compliance (Agyapong *et al*., 2021). Thus, the nature and quality of the regulatory environment have profound implications for business sustainability, investment decisions, and institutional effectiveness.

2.1.4 Key Elements of the Regulatory Environment

Legislative Framework: The foundation of the regulatory environment lies in the legal statutes enacted by national and local governments. These laws cover areas such as taxation, environmental protection, labor, health and safety, procurement, financial reporting, and corporate governance. A coherent legislative framework enables consistent enforcement and reduces the risk of legal uncertainty (Olawale & Garwe, 2019). Regulatory Institutions: These are government agencies or independent bodies tasked with enforcing rules and ensuring compliance. Effective regulatory institutions must be adequately resourced, free from political interference, and guided by transparent procedures. Regulatory bodies such as public procurement authorities, environmental protection agencies, and financial oversight commissions are vital in implementing regulations and deterring malpractice (Mensah *et al*., 2022). Enforcement Mechanisms: Enforcement is a key determinant of regulatory effectiveness. It involves monitoring compliance, investigating violations, and applying sanctions when necessary. The existence of strong enforcement systems enhances deterrence, fosters trust, and upholds the integrity of institutions (Wang & Xu, 2020). Regulatory Quality and Simplicity: Regulatory complexity can become a barrier to business entry and compliance, particularly for small and medium enterprises (SMEs). Simplified, streamlined, and digitized regulatory processes enhance ease of doing business, reduce bureaucratic burden, and encourage formal sector participation (Adusei, 2021). Transparency and Accountability: A transparent regulatory environment allows stakeholders to understand the rules governing their activities. Access to information, open

consultations, and public scrutiny of regulatory decisions are vital for promoting accountability and combating corruption (OECD, 2020).

2.1.5 Supplier Readiness and Collaboration

In today's dynamic and increasingly interconnected global supply chains, supplier readiness and collaboration have emerged as critical enablers of supply chain resilience, innovation, and performance. Supplier readiness refers to the extent to which suppliers are equipped operationally, technologically, financially, and strategically to meet the expectations of buying firms (Kuo *et al*., 2020). Supplier collaboration, on the other hand, is the degree of mutual coordination, trust, and information sharing between a buyer and its suppliers to achieve shared objectives (Wu & Chuang, 2022). While these concepts are distinct, they are deeply interrelated. High levels of supplier readiness enable effective collaboration, while collaboration itself often contributes to enhancing supplier capabilities. The synergy between readiness and collaboration creates a virtuous cycle that supports long-term competitiveness, especially in volatile markets and technologically advanced industries (Zhao *et al*., 2020). Supplier readiness is a multidimensional concept that encompasses several capabilities. These include production flexibility, delivery reliability, financial robustness, compliance with regulations, and technological integration (Sharma *et al*., 2021). Ready suppliers are better positioned to respond to buyer requirements, co-develop new products, and support lean, agile, or sustainable supply chain initiatives. Readiness is also a prerequisite for digital integration, especially as many buyers are shifting toward e-procurement and real-time data systems. Without adequate technological infrastructure and digital skills, suppliers cannot effectively collaborate in a digital supply chain environment (Lin *et al*., 2019). Moreover, suppliers' financial health and quality assurance systems form the basis for consistent collaboration and long-term partnerships.

Supplier collaboration refers to structured engagement between buyers and suppliers that goes beyond transactional relationships. It involves joint planning, co-investment in innovation, information sharing, and risk-sharing mechanisms (Amoako-Gyampah *et al*., 2020). Collaborative relationships foster trust and commitment, which are essential for achieving responsiveness and resilience in supply chains. Modern supply chain collaboration focuses on early supplier involvement in product development, sharing of demand forecasts, mutual performance monitoring, and conflict resolution strategies (Wu & Chuang, 2022). Such collaborative frameworks are especially critical when supply chains face disruptions, such as those caused by pandemics, climate events, or geopolitical shifts (Ivanov & Dolgui, 2020). Supplier readiness acts as both a prerequisite and a product of collaboration. Suppliers with high readiness levels operationally and technologically are more capable of participating in collaborative processes such as joint problem-solving or innovation development. Conversely, supplier collaboration itself contributes to improving readiness by exposing suppliers to new knowledge, buyer expectations, and best practices (Zhu *et al*., 2020). For instance, buyer-led supplier development initiatives often include training programs, technology transfer, and co-investment in systems that enhance supplier readiness (Yam *et al*., 2019). In turn, these efforts foster stronger collaboration and mutual value creation. A study by Eze *et al*. (2021) showed that digitally mature suppliers achieved superior collaborative performance outcomes than less-prepared counterparts. Additionally, when suppliers perceive collaboration as fair and beneficial, they are more motivated to invest in their readiness, such as upgrading systems or obtaining certifications. This mutual reinforcement loop improves trust, reduces opportunism, and enables supply chains to function more cohesively (Zhao *et al*., 2020).

In emerging economies like Ghana, supplier readiness and collaboration are often constrained by structural limitations, including lack of access to finance, outdated technology, and weak regulatory enforcement. Despite these barriers, collaborative relationships between multinational buyers and local suppliers have proven effective in building readiness through joint capacity-building efforts (Boateng & Asiedu, 2021). Moreover, government-led initiatives such as supplier prequalification systems and local content policies are beginning to incorporate readiness and collaboration criteria, recognizing their importance for achieving procurement efficiency and local supplier development (Asamoah *et al*., 2023). Supplier readiness and collaboration are mutually reinforcing constructs that are essential for effective supply chain management in the 21st century. While readiness ensures that suppliers have the capabilities to meet buyer requirements, collaboration nurtures trust, knowledge transfer, and joint performance improvement. As global supply chains become more digital, uncertain, and sustainability-driven, firms must prioritize both supplier readiness assessments and collaborative relationship-building as strategic imperatives.

2.2 Institutional Theory

Institutional Theory serves as a powerful lens for explaining the moderating effect of the regulatory environment on the relationship between e-procurement technology and sustainable procurement. Rooted in sociology and organizational theory, Institutional Theory posits that organizations operate not only to achieve technical efficiency but also to gain legitimacy by conforming to the norms, rules, and regulations of their institutional environment (Scott, 2014). In the procurement context, this theory suggests that regulatory pressures shape organizational behavior and influence the adoption and effective implementation of innovations such as e-procurement technologies in achieving sustainable procurement outcomes (Boateng & Asiedu,

2021). E-procurement technology refers to the digital platforms and tools used to automate and streamline procurement processes, thereby enhancing transparency, efficiency, and accountability (Lin *et al*., 2019). Sustainable procurement, on the other hand, emphasizes the integration of social, economic, and environmental considerations into purchasing decisions (UNEP, 2021). While the direct relationship between e-procurement and sustainable procurement has been established, the strength and direction of this relationship often depend on the prevailing regulatory environment (Asamoah *et al*., 2023). Institutional Theory identifies three types of institutional pressures that influence organizational behavior: coercive, normative, and mimetic (DiMaggio & Powell, 1983). Coercive pressures, in particular, stem from formal regulations, policies, and legal mandates imposed by government authorities.

These coercive forces are central to the regulatory environment and play a critical role in determining how effectively organizations adopt and leverage technologies like e-procurement for sustainability. A well-structured and supportive regulatory environment can strengthen the relationship between e-procurement and sustainable procurement by enforcing environmental compliance, setting procurement standards, and incentivizing green procurement practices (Amoako-Gyampah *et al*., 2020). For example, when procurement regulations require suppliers to meet environmental or ethical standards, organizations are more likely to use e-procurement systems to monitor supplier compliance and integrate sustainability criteria into their procurement processes. In contrast, a weak or inconsistent regulatory environment may dilute the effectiveness of e-procurement technologies in promoting sustainability, as firms lack the legal compulsion or institutional motivation to align with sustainable practices (Kusi *et al*., 2023). Furthermore, regulatory frameworks that promote data transparency, electronic audits, and standardization of procurement criteria create an enabling environment for e-procurement systems to facilitate sustainable procurement. Institutional Theory suggests that under strong regulatory guidance, organizations are compelled to utilize e-procurement tools not merely for cost reduction but also for broader social and environmental accountability (Boateng & Asiedu, 2021). Institutional Theory underscores that the regulatory environment moderates the e-procurement–sustainability link by acting as an external force that legitimizes, enforces, or constrains organizational actions. The stronger and more coherent the regulatory framework, the more effective e-procurement becomes as a vehicle for embedding sustainability in procurement processes.

2.2.1 Resource Based View Theory

The Resource-Based View (RBV) of the firm offers a robust theoretical foundation for examining the moderating effect of supplier readiness and collaboration on the relationship between e-procurement technology and sustainable procurement. RBV posits that an organization's sustained competitive advantage stems from its ability to acquire, develop, and utilize valuable, rare, inimitable, and non-substitutable (VRIN) resources and capabilities (Barney, 1991). In the context of supply chain and procurement management, RBV extends to the firm's network resources specifically the capabilities of its suppliers and the collaborative relationships it maintains with them (Liu *et al*., 2020; Amoako-Gyampah *et al*., 2020). E-procurement technology, as a resource, enables firms to enhance transparency, reduce transaction costs, improve traceability, and integrate sustainability criteria into purchasing decisions (Lin *et al*., 2019). However, the realization of these benefits is contingent upon complementary capabilities, especially from external partners. This is where supplier readiness and supplier collaboration serve as moderating variables that can either enable or constrain the effectiveness of e-procurement systems in driving sustainable procurement outcomes (Eze *et al*., 2021). From the RBV perspective, supplier readiness represents an external but strategically valuable resource. It encompasses a supplier's technological competence, quality management systems, environmental compliance, and financial capacity to meet procurement demands (Boateng & Asiedu, 2021). E-procurement systems rely on accurate and timely information sharing, digital compatibility, and sustainable sourcing inputs from suppliers. If suppliers are not technologically aligned or lack sustainability credentials, the utility of e-procurement technology is diminished. Thus, supplier readiness acts as a complementary resource that enhances the value creation potential of e-procurement by ensuring that suppliers can deliver on both functional and sustainability requirements (Sharma *et al*., 2021).

RBV further emphasizes relational capabilities inter-organizational resources embedded in collaborative ties. Supplier collaboration involves trust, joint planning, co-investment, and open communication between firms and their suppliers (Wu & Chuang, 2022). When such collaborative mechanisms are strong, organizations can more effectively embed sustainability goals within procurement activities and align technological initiatives with long-term environmental and social objectives. For example, collaborative suppliers are more likely to co-develop green innovations, adopt shared sustainability standards, and participate in performance improvement programs. These relational resources enhance the strategic impact of e-procurement technologies, particularly in sustainability-driven procurement frameworks (Zhu *et al*., 2020). When viewed through the RBV lens, the interaction between supplier readiness and collaboration becomes critical. While e-procurement technology provides the digital infrastructure, its full value is realized only when paired with supplier readiness (technical and operational) and collaboration (strategic and relational). Organizations that manage to align these resources are better positioned to achieve

sustainable procurement objectives, such as reducing environmental footprints, improving supplier accountability, and fostering social responsibility across the supply chain (Amoako-Gyampah *et al*., 2020). The Resource-Based View provides a comprehensive theoretical framework to understand how supplier readiness and collaboration moderate the relationship between e-procurement technology and sustainable procurement. These external and relational resources are essential complements to internal digital capabilities, and together they determine the extent to which e-procurement initiatives can deliver sustainable value.

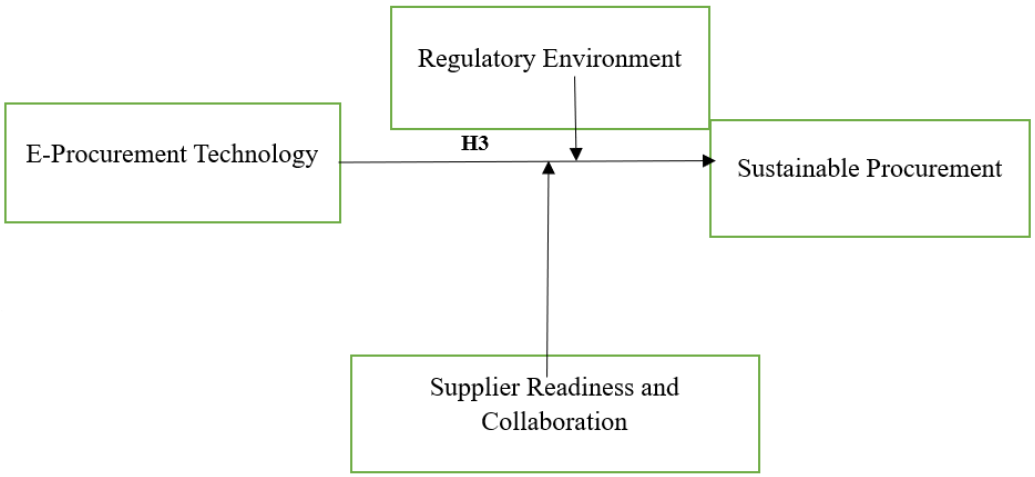


Figure 1 Conceptual Framework

2.3 Relationship between E-Procurement Technology Sustainable Procurement

The growing emphasis on sustainable procurement practices in both the public and private sectors has accelerated the adoption of e-procurement technologies. E-procurement refers to the digitalization of procurement processes such as tendering, supplier selection, contract management, and purchasing through web-based platforms (Lin *et al*., 2019). Sustainable procurement, on the other hand, integrates environmental, social, and economic concerns into purchasing decisions to promote long-term value creation and minimize negative impacts (UNEP, 2021). A substantial body of research demonstrates a positive relationship between e-procurement technology and sustainable procurement. E-procurement facilitates sustainable procurement in several ways. First, it enhances transparency and accountability in the sourcing process, enabling the systematic inclusion of sustainability criteria such as eco-labels, fair trade certifications, and labor standards during supplier evaluation (Boateng & Asiedu, 2021). This leads to better compliance with environmental and social regulations and encourages responsible supplier behavior. Second, the use of digital systems reduces reliance on paper-based processes, contributing to environmental sustainability through resource conservation (Eze *et al*., 2021). Third, e-procurement systems streamline supplier engagement, making it easier for firms to monitor supplier performance, identify risks, and collaborate on sustainability initiatives.

Moreover, digital procurement platforms allow organizations to integrate data analytics and automated reporting, which supports evidence-based decision-making and continuous improvement in sustainable procurement practices (Zhao *et al*., 2020). When effectively implemented, e-procurement creates efficiencies and reinforces sustainability goals by enhancing communication, reducing corruption, and supporting lifecycle costing approaches in procurement decisions. Given these positive outcomes, the relationship between e-procurement technology and sustainable procurement is not only complementary but also synergistic. The technological infrastructure provided by e-procurement amplifies the impact of sustainability policies and frameworks by operationalizing them in daily procurement activities.

$_H$1: E-procurement technology has a positive and significant effect on sustainable procurement.

2.3.1 moderating effect of Regulatory Environment on the relationship between E-procurement Technology and Sustainable Procurement

The regulatory environment plays a pivotal moderating role in strengthening the relationship between e-procurement technology and sustainable procurement. While e-procurement enhances transparency, traceability, and efficiency in procurement operations, the full realization of its potential in promoting sustainability often depends on the existence of strong regulatory frameworks that enforce sustainability standards and guide procurement behavior (Asamoah *et al*., 2023; Boateng & Asiedu, 2021). Regulations serve as external institutional forces that legitimize and reinforce sustainable procurement objectives. For instance, governments and public institutions that mandate the inclusion of environmental

and social criteria in procurement processes incentivize firms to utilize e-procurement platforms more strategically (UNEP, 2021). These regulations often require procurement officers to document and digitally report their adherence to green and ethical procurement practices, which e-procurement systems are designed to facilitate. Furthermore, when regulatory authorities integrate sustainability standards into e-procurement systems (e.g., through pre-qualification requirements, environmental certification filters, or compliance audits), they create a compliance-oriented culture that enhances the alignment between technology and sustainable practices (Zhao *et al*., 2020). In such contexts, organizations are not only motivated but compelled to utilize e-procurement to meet regulatory expectations, thereby amplifying its positive impact on sustainable procurement.

$_H$2: The regulatory environment positively moderates the relationship between e-procurement technology and sustainable procurement.

2.3.2 Moderating effect of Supplier Readiness and Collaboration on the relationship between E-Procurement Technology and Sustainable Procurement

The relationship between e-procurement technology and sustainable procurement is increasingly influenced by the level of supplier readiness and collaboration. While e-procurement enables transparency, efficiency, and integration of sustainability criteria into procurement processes, the realization of its full sustainability potential depends significantly on the preparedness and cooperative capacity of suppliers (Lin *et al*., 2019; Eze *et al*., 2021). Supplier readiness refers to a supplier's ability to meet buyer requirements in terms of digital competence, regulatory compliance, sustainability standards, and timely responsiveness (Boateng & Asiedu, 2021). When suppliers are digitally equipped and environmentally conscious, they can more effectively engage with e-procurement platforms, provide real-time data, and align their operations with sustainable procurement goals. Conversely, low readiness may lead to inefficiencies, non-compliance, or delays, weakening the effectiveness of e-procurement in achieving sustainability outcomes (Sharma *et al*., 2021). Supplier collaboration enhances this relationship further by fostering mutual trust, joint planning, and shared sustainability goals. Collaborative suppliers are more likely to participate in co-developing green initiatives, adopt ethical standards, and respond proactively to sustainability demands integrated into e-procurement systems (Wu & Chuang, 2022). This synergy facilitates deeper integration of environmental and social performance metrics across the supply chain.

$_H$3: Supplier readiness and collaboration positively moderate the relationship between e-procurement technology and sustainable procurement.

3. METHODOLOGY

This study adopts an explanatory research design, which is appropriate for establishing causal relationships among variables, particularly to explore how e-procurement technology influences sustainable procurement and how regulatory environment and supplier readiness & collaboration moderate this relationship. Explanatory design allows for hypothesis testing and quantification of variable interactions, making it suitable for the study's analytical requirements (Creswell & Creswell, 2018). The study further employs a quantitative research approach, which involved the collection and analysis of the numerical data to identify patterns, relationships, and generalizations. A quantitative approach is appropriate for testing predefined hypotheses and establishing measurable relationships among variables (Saunders *et al*., 2019). Given the nature of the study, which aims to determine the extent to which e-procurement influences sustainable procurement under varying levels of regulatory enforcement and supplier-related factors, a quantitative approach is both logical and effective. This study is underpinned by the positivist research philosophy, which holds that reality is objective and can be measured using empirical methods. Positivism emphasizes observable, quantifiable facts and the use of scientific methods to develop and test hypotheses (Collis & Hussey, 2021). This philosophy aligns with the study's aim to empirically investigate the influence of e-procurement technologies on sustainable procurement outcomes. This study adopts the purposive sampling technique, a non-probability sampling method in which the researchers deliberately selected the participants based on their knowledge, experience, or characteristics relevant to the research objectives (Etikan, Musa, & Alkassim, 2016). In the context of the current study, purposive sampling is appropriate because we targeted professionals such as procurement and supply chain managers, and IT managers who are directly involved in procurement decisions and the implementation of digital procurement tools. Data was collected using a structured questionnaire, distributed both electronically and in printed form that helped us to accommodate the preferences and access levels of respondents. We received 385 completed questionnaires from the respondents.

4. ANALYSIS AND RESULTS

Table 1 Reliability and Validity Results

Constructs	KMO	Cronbach's Alpha	Composite Reliability	Convergent Validity	Discriminant Validity
E-Procurement Technology	.857	.861	0.948	0.6461	0.8038
Regulatory Environment	.823	.809	0.942	0.7336	0.8565
Supplier Readiness and Collaboration	.796	.855	0.965	0.6446	0.8028
Sustainable Procurement	.687	.830	0.948	0.6203	0.7876

The reliability and validity tests presented in Table 1 provide evidence of the robustness of the measurement model. The key indices examined include the Kaiser–Meyer–Olkin (KMO) statistic, Cronbach's Alpha, Composite Reliability (CR), Convergent Validity (AVE), and Discriminant Validity (DV). The Kaiser–Meyer–Olkin (KMO) values range from 0.687 to 0.857, which fall above the threshold of 0.60 recommended for factor analysis (Kaiser, 1974). This suggests that the data are adequate for further multivariate analysis. In particular, E-Procurement Technology (0.857), Regulatory Environment (0.823), and Supplier Readiness and Collaboration (0.796) show strong sampling adequacy, while Sustainable Procurement (0.687) meets the minimum acceptable level, indicating that factor analysis was appropriate for all constructs. The Cronbach's Alpha coefficients, ranging between 0.809 and 0.861, exceed the conventional minimum threshold of 0.70 (Nunnally & Bernstein, 1994), confirming that the constructs demonstrate strong internal consistency. Similarly, the Composite Reliability (CR) values are very high, ranging from 0.942 to 0.965, surpassing the benchmark of 0.70 (Hair *et al*., 2019). This implies that the items used to measure each construct are highly reliable and provide consistent responses. The Average Variance Extracted (AVE) values, represented as convergent validity, range from 0.6203 to 0.7336, all above the threshold of 0.50 (Fornell & Larcker, 1981). This indicates that more than 50% of the variance in each construct is explained by its indicators, confirming that the measures are valid representations of their respective constructs. The highest AVE was observed for Regulatory Environment (0.7336), reflecting a strong concentration of variance explained by its indicators, while Sustainable Procurement recorded the lowest AVE (0.6203), but still within acceptable standards. The discriminant validity values for all constructs fall between 0.7876 and 0.8565, exceeding the benchmark of 0.70, which confirms that the constructs are empirically distinct from one another (Fornell & Larcker, 1981). This implies that although related, each construct measures a unique dimension of the study and does not overlap excessively with other constructs. For example, E-Procurement Technology (0.8038) and Supplier Readiness and Collaboration (0.8028) are closely related yet still distinct, thereby supporting construct validity.

Table 2 Fornell Lacker Criterion

		EPT	RGE	SRC	SSP
E-Procurement Technology	Pearson Correlation	***0.8038***	.477**	.411**	.425**
	Sig. (2-tailed)		.000	.000	.000
	N	385	385	385	385
Regulatory Environment	Pearson Correlation	.477**	***0.8565***	.489**	.398**
	Sig. (2-tailed)	.000		.000	.000
	N	385	385	385	385
Supplier Readiness and Collaboration	Pearson Correlation	.411**	.489**	***0.8028***	.428**
	Sig. (2-tailed)	.000	.000		.000
	N	385	385	385	385
Sustainable Procurement	Pearson Correlation	.425**	.398**	.428**	***0.7876***
	Sig. (2-tailed)	.000	.000	.000	
	N	385	385	385	385

***. Correlation is significant at the 0.01 level (2-tailed).*

Note: EPT= E-Procurement Technology; RGE= Regulatory Environment; SRC= Supplier Readiness and Collaboration; SSP= Sustainable Procurement

Table 2 presents the results of the Fornell Larcker Criterion, which is a widely accepted method for assessing discriminant validity in structural equation modeling (Fornell & Larcker, 1981). The criterion requires that the square root of the Average Variance Extracted (AVE) for each construct (diagonal values in bold) should be greater than the correlations between the construct and other constructs in the model (off-diagonal values). This ensures that each construct shares more variance with its own indicators than with other constructs, thereby confirming discriminant validity. The diagonal values reported for the constructs E-

Procurement Technology (0.8038), Regulatory Environment (0.8565), Supplier Readiness and Collaboration (0.8028), and Sustainable Procurement (0.7876)—are all higher than the respective inter-construct correlations. For example, the correlation between E-Procurement Technology and Regulatory Environment is 0.477, which is lower than both 0.8038 and 0.8565. Similarly, the correlation between Supplier Readiness and Collaboration and Sustainable Procurement is 0.428, which remains below their respective square root of AVE values (0.8028 and 0.7876). This pattern is consistently observed across all constructs, indicating that discriminant validity is well established. Furthermore, the significant but moderate correlations among constructs (ranging from 0.398 to 0.489, all significant at $p < 0.01$) highlight the theoretical interrelatedness of the constructs while confirming that they remain empirically distinct. For instance, E-Procurement Technology shows moderate positive correlations with Sustainable Procurement (0.425) and Supplier Readiness and Collaboration (0.411), suggesting that technology adoption complements sustainable practices and collaborative readiness but does not overlap conceptually with them. This aligns with prior studies that emphasize the enabling role of e-procurement technologies in enhancing supplier collaboration and sustainability outcomes (Gunasekaran *et al*., 2019; Dubey *et al*., 2020).

Table 3 Factor Loadings

Items	Loadings	Items	Loadings	Items	Loadings	Items	Loadings
EPT1	.797	**SSP1**	.773	**RGE1**	.776	**SRC1**	.791
EPT2	.853	**SSP2**	.826	**RGE2**	.790	**SRC2**	.861
EPT3	.868	**SSP3**	.731	**RGE3**	.930	**SRC3**	.859
EPT4	.756	**SSP4**	.816	**RGE4**	.903	**SRC4**	.815
EPT5	.765	**SSP5**	.752	**RGE5**	.749	**SRC5**	.762
EPT6	.836	**SSP6**	.826	**RGE6**	.935	**SRC6**	.822
EPT7	.758	**SSP7**	.739	**RGE7**	.790	**SRC7**	.775
EPT8	.799	**SSP8**	.863	**RGE8**	.904	**SRC8**	.736
EPT9	.857	**SSP9**	.757	**RGE9**	.900	**SRC9**	.802
EPT10	.736	**SSP10**	.782	**RGE10**	.862	**SRC10**	.797

Table 3 presents the factor loadings of the observed items used to measure the study's constructs: E-Procurement Technology (EPT), Sustainable Procurement (SSP), Regulatory Environment (RGE), and Supplier Readiness and Collaboration (SRC). Factor loadings are essential indicators of construct validity in confirmatory factor analysis (CFA) since they reflect the strength of the relationship between each observed item and its underlying latent construct (Hair *et al*., 2019).

For E-Procurement Technology (EPT), the loadings range between 0.736 (EPT10) and 0.868 (EPT3). These values surpass the commonly recommended threshold of 0.70 (Fornell & Larcker, 1981; Hair *et al*., 2019), indicating that all measurement items are reliable and significantly contribute to explaining the variance of the construct. This implies that items such as EPT3 (.868) and EPT2 (.853) are the strongest indicators of e-procurement adoption and integration. With respect to Sustainable Procurement (SSP), the factor loadings fall between 0.731 (SSP3) and 0.863 (SSP8). These values, though slightly lower for SSP3, remain above the acceptable limit of 0.70, thereby confirming the construct's measurement adequacy. The relatively higher loadings for SSP8 (.863) and SSP2 (.826) suggest that aspects related to environmentally responsible procurement practices are strongly represented in the dataset. For the Regulatory Environment (RGE), factor loadings are particularly strong, ranging from 0.749 (RGE5) to 0.935 (RGE6). This range demonstrates excellent construct representation, with the highest item loadings indicating that government regulations, compliance mechanisms, and policy structures significantly shape e-procurement and procurement sustainability outcomes. The strong consistency also reinforces the reliability of this construct in capturing external institutional influences (Podsakoff *et al*., 2016). Regarding Supplier Readiness and Collaboration (SRC), loadings range between 0.736 (SRC8) and 0.861 (SRC2). These values indicate acceptable convergent validity since all items load significantly onto the construct. The relatively higher loadings (e.g., SRC2 at .861 and SRC3 at .859) highlight that supplier integration, technological preparedness, and collaborative practices are crucial for effective procurement outcomes.

Table 4 Model Summary of the influence of E-Procurement Technology on Sustainable Procurement

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.477[a]	.227	.217	.679

a. Predictors: (Constant), EPT= E-Procurement Technology

ANOVAa

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10.167	1	10.167	22.080	.000[b]

	Residual	34.534	75	.460		
	Total	44.701	76			

a. Dependent Variable: SSP= Sustainable Procurement

b. Predictors: (Constant), EPT= E-Procurement Technology

Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.700	.314		5.416	.000
	EPT	.437	.093	.477	4.699	.000

a. Dependent Variable: SSP= Sustainable Procurement

Table 4 presents the regression analysis examining the influence of E-Procurement Technology (EPT) on Sustainable Procurement (SSP). The model results reveal an R value of .477, which indicates a moderate positive correlation between the two variables. The R^2 value of .227 suggests that e-procurement technology explains 22.7% of the variance in sustainable procurement practices. Although this is not a very high percentage, it is statistically meaningful, implying that while EPT significantly contributes to sustainability outcomes, other organizational, environmental, and institutional factors may also play critical roles (Gunasekaran *et al*., 2019).

The ANOVA results ($F = 22.080$, $p < .001$) confirm that the regression model is statistically significant, suggesting that e-procurement technology has a reliable predictive power on sustainable procurement. The coefficient analysis further supports this finding, as the unstandardized coefficient ($B = 0.437$, $p < .001$) indicates that a one-unit increase in e-procurement technology adoption leads to a 0.437 unit increase in sustainable procurement outcomes. The standardized beta coefficient (.477) also demonstrates a moderate but meaningful influence, highlighting the importance of digital procurement systems in embedding sustainability principles.

Table 5 Moderating effect of Regulatory Environment on the relationship between E-procurement Technology and Sustainable Procurement

R	**R-sq**	**MSE**	**F**	**df1**	**df2**	**p**
.4971	.2471	.2601	7.9876	3.0000	73.0000	.0001
Model 4	coeff	se	t	p	LLCI	ULCI
Constant	8.6229	1.9199	4.4914	.0000	4.7965	12.4492
EPT	1.6649	.5615	2.9653	.0041	2.7840	.5459
RGE	1.7413	.5372	3.2416	.0018	2.8118	.6707
Int_1	.5267	.1170	4.5005	.0000	.2935	.7600

Table 5 presents the moderation analysis assessing how the Regulatory Environment (RGE) influences the relationship between E-Procurement Technology (EPT) and Sustainable Procurement (SSP). The model demonstrates an R value of .497 and an R^2 of .247, indicating that approximately 24.7% of the variance in sustainable procurement is explained by e-procurement technology, regulatory environment, and their interaction. This suggests that while EPT significantly contributes to sustainable procurement, the regulatory context plays an important role in shaping the effectiveness of these technological interventions. The ANOVA results ($F = 7.988$, $p < .001$) confirm that the model is statistically significant, indicating that the combination of EPT, regulatory environment, and their interaction provide a reliable explanation of sustainable procurement outcomes. The coefficient results further reveal that EPT ($B = 1.665$, $p = .004$) and RGE ($B = 1.741$, $p = .002$) both individually have positive and significant effects on sustainable procurement. More importantly, the interaction term (Int_1; $B = 0.527$, $p < .001$) is statistically significant, providing strong evidence of a moderating effect. This indicates that the positive impact of e-procurement technology on sustainable procurement is enhanced when there is a supportive and well-enforced regulatory environment.

Table 6 Moderating effect of Supplier Readiness and Collaboration on the relationship between E-Procurement Technology and Sustainable Procurement

R	**R-sq**	**MSE**	**F**	**df1**	**df2**	**p**
.4160	.1731	.2857	5.0932	3.0000	73.0000	.0030
Model 4	coeff	se	t	p	LLCI	ULCI
Constant	10.1134	3.2516	3.1103	.0027	3.6330	16.5937
EPT	1.6445	.8890	1.8498	.0075	3.4163	.1273
SRC	1.6865	.7106	2.3734	.0004	3.1027	.2703
Int_1	.4864	.1309	3.7167	.0004	.2256	.7473

Table 6 presents the moderation analysis exploring how Supplier Readiness and Collaboration (SRC) influences the relationship between E-Procurement Technology (EPT) and Sustainable Procurement (SSP). The model shows an R value of .416 and an R^2 of .173, indicating that approximately 17.3% of the variance in sustainable procurement is accounted for by e-procurement technology, supplier readiness and collaboration, and their interaction. While the explanatory power is moderate, the model is statistically significant ($F = 5.093$, $p = .003$), confirming that the combination of these factors reliably predicts sustainable procurement outcomes. The coefficients reveal that EPT ($B = 1.6445$, $p = .0075$) and SRC ($B = 1.6865$, $p = .0004$) both have positive and significant effects on sustainable procurement individually. Importantly, the interaction term (Int_1; $B = 0.4864$, $p = .0004$) is significant, providing clear evidence of a moderating effect. This suggests that the positive influence of e-procurement technology on sustainable procurement is strengthened when suppliers are ready, technologically capable, and actively collaborate with the organization. Essentially, supplier engagement and preparedness amplify the effectiveness of e-procurement initiatives in achieving sustainability objectives.

5. DISCUSSIONS

These findings align with prior studies emphasizing that e-procurement tools enhance transparency, efficiency, and accountability in supplier selection and monitoring, which in turn strengthens the sustainability agenda of organizations (Chatterjee *et al*., 2021). Through features such as automated compliance checks, digital supplier evaluations, and electronic contract management, organizations are better positioned to integrate environmental, social, and ethical considerations into procurement decision-making (Appolloni *et al*., 2020). Interestingly, the moderate explanatory power of the model indicates that while e-procurement technology facilitates sustainability, its success may depend on complementary factors such as regulatory enforcement, supplier readiness, and organizational commitment to sustainability values. This suggests that technology alone cannot guarantee sustainable procurement unless supported by a conducive policy environment and collaborative supplier relationships (Okorie *et al*., 2021). In practical terms, the results imply that organizations should intensify investments in e-procurement technologies as part of their broader sustainable supply chain strategies. However, parallel efforts should focus on supplier capacity building, regulatory compliance, and staff training to maximize the sustainability benefits of digital procurement systems.

From a theoretical standpoint, these findings align with institutional theory, which emphasizes that organizational practices are shaped and reinforced by regulatory and normative pressures (Scott, 2014). The moderating effect underscores that the effectiveness of digital procurement tools is contingent upon the broader institutional context. Organizations operating under clear, consistent, and supportive procurement regulations are more likely to realize the sustainability benefits of e-procurement technologies. Practically, this suggests that organizations should not only invest in e-procurement technologies but also ensure compliance with regulatory requirements and actively engage with policymakers to create a conducive regulatory environment. Such alignment ensures that technology adoption translates into measurable improvements in environmental, social, and ethical procurement practices. The results highlight that regulatory support is critical for maximizing the sustainability potential of e-procurement technologies, suggesting a synergistic interplay between technology and institutional frameworks in driving sustainable procurement.

Theoretically, this finding aligns with supply chain collaboration theory, which posits that inter-organizational coordination and readiness are critical for realizing the full benefits of technological investments (Cao & Zhang, 2011). From a practical perspective, organizations cannot rely solely on e-procurement technologies; they must also cultivate supplier capabilities, provide training, and foster trust and communication to ensure collaborative participation. The results underscore the strategic importance of supplier readiness and collaboration in maximizing sustainable procurement outcomes. Firms seeking to leverage e-procurement technologies for sustainability should prioritize supplier engagement programs, joint planning initiatives, and capacity-building measures, thereby ensuring that technology adoption translates into tangible environmental, social, and ethical procurement benefits.

5.1 Theoretical Implications

The findings reinforce the technological-resource-based view (TRBV), demonstrating that digital tools like e-procurement are strategic resources that contribute to sustainable competitive advantage. The moderating effect of the regulatory environment supports institutional theory, highlighting how formal rules, norms, and legal frameworks shape the effectiveness of technology adoption in sustainability practices. The moderating role of supplier readiness aligns with supply chain integration theory, emphasizing that inter-organizational collaboration and capability alignment are critical for translating technological adoption into meaningful operational and sustainability outcomes.

5.1.1 Managerial Implications

Managers should prioritize the adoption and effective implementation of e-procurement technologies to enhance sustainable procurement practices. By integrating digital tools into procurement processes, organizations can achieve greater efficiency, transparency, and compliance with environmental and social standards. Regulatory compliance should be

actively monitored and integrated into procurement strategies. Managers must ensure that procurement processes align with national and industry regulations to maximize the benefits of e-procurement adoption. Managers should foster strong supplier relationships by engaging suppliers in collaborative planning, providing training, and ensuring technical readiness. This enhances the effectiveness of e-procurement systems and supports organizational sustainability goals.

5.1.2 Practical Implications

Organizations implementing e-procurement systems are likely to reduce manual errors, paperwork, and delays, thereby improving operational efficiency. A supportive regulatory environment provides certainty and guidance, allowing firms to leverage e-procurement for sustainability without the risk of non-compliance. Supplier collaboration ensures that sustainable procurement practices are not limited to internal processes but extend across the supply chain, promoting shared accountability for environmental and social outcomes.

5.1.3 Recommendations

Organizations should prioritize the implementation of advanced e-procurement systems that integrate procurement, finance, and inventory operations to improve efficiency and transparency.

Continuous training programs for procurement staff should be instituted to ensure effective use of digital tools and minimize errors associated with manual processes. Firms should regularly evaluate and upgrade e-procurement platforms to incorporate features that support sustainability, such as tracking environmental and social compliance of suppliers. Organizations should actively monitor and align their procurement processes with relevant national and industry regulations to ensure compliance and reduce legal risks. Policymakers and regulatory bodies should provide clear guidance, regular updates, and support mechanisms to facilitate the adoption of e-procurement systems for sustainable procurement. Firms should collaborate with regulators to identify compliance best practices that integrate sustainability objectives into procurement processes. Organizations should assess the technical capabilities and readiness of their suppliers before implementing e-procurement systems and provide support to bridge capability gaps. Firms should engage suppliers in joint planning, forecasting, and sustainability initiatives to ensure alignment of processes and objectives across the supply chain. Collaborative training and knowledge-sharing programs with suppliers should be established to strengthen system utilization and promote sustainable procurement practices. E-procurement adoption should not be isolated; it should be embedded within broader organizational strategies that integrate operational efficiency, regulatory compliance, and supplier collaboration. Management should incentivize sustainability performance for both internal teams and suppliers to reinforce accountability and continuous improvement.

5.1.4 Limitations and Suggestions for Future Studies

The study employed a cross-sectional survey design, capturing data at a single point in time. This limits the ability to establish causal relationships or observe the long-term effects of e-procurement adoption on sustainable procurement practices. The study examined only Regulatory Environment (RGE) and Supplier Readiness and Collaboration (SRC) as moderating variables. Other potential moderators—such as organizational culture, technological readiness, or managerial support—were not explored, which may also influence the effectiveness of e-procurement adoption on sustainable procurement. Future research should include multiple regions or countries and a wider variety of industries to enhance the generalizability of results and identify sector-specific variations in e-procurement adoption and sustainable procurement practices. Implementing a longitudinal study would allow researchers to observe the long-term impacts of e-procurement technology adoption and the evolving roles of regulatory frameworks and supplier collaboration in sustainability outcomes. Future studies could examine other moderating or mediating factors such as organizational culture, technological readiness, managerial support, or employee competency, which may influence the relationship between e-procurement technology and sustainable procurement.

5. 1.5 CONCLUSIONS

The study concludes that E-Procurement Technology (EPT) is a significant driver of Sustainable Procurement (SSP). Adoption of e-procurement systems enhances operational efficiency, promotes transparency, and supports environmentally and socially responsible procurement practices. The positive effect indicates that digital procurement tools are crucial for organizations seeking to embed sustainability in their supply chain operations.

It is concluded that the Regulatory Environment (RGE) strengthens the positive relationship between E-Procurement Technology and Sustainable Procurement. Organizations operating within a well-defined and supportive regulatory framework are better positioned to utilize e-procurement technologies effectively, ensuring compliance while achieving sustainability objectives. This underscores the importance of clear regulations, monitoring, and guidance in maximizing the benefits of technological adoption.

The study concludes that Supplier Readiness and Collaboration (SRC) significantly enhances the impact of E-Procurement Technology on Sustainable Procurement. Organizations with suppliers who possess technical capability, collaborative willingness, and adequate IT infrastructure can leverage e-procurement systems more effectively to achieve sustainable

procurement outcomes. Supplier engagement is therefore essential for translating technological adoption into measurable sustainability performance.

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