

GENERATIVE AI FOR SUPPLY CHAIN OPTIMIZATION: OPPORTUNITIES AND ETHICAL RISKS IN PROCUREMENT

Godspower Onyekachukwu Ekwueme

Department of Industrial & Production Engineering, Nnamdi Azikiwe University, Awka Anambra State
Nigeria

*Corresponding author, email: og.ekwueme@unizik.edu.ng

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Abstract

The introduction of Generative Artificial Intelligence (Generative AI) technology in supply chain management has facilitated the automation of procurement processes, supplier selection, optimization of inventory management and demand forecasting among other benefits. However, the use of Generative AI in procurement processes brings forth several ethical issues including transparency, algorithmic biases, data privacy and security, accountability and displacement of jobs. This study focused on investigating the opportunities and ethical dilemmas posed using Generative AI technology in supply chain optimization, particularly procurement process. The research employed a qualitative approach through the content analysis of academic journals. The secondary data used in the study includes journal articles, conference papers, industrial reports, and policy documents. It is found out that Generative AI technology is highly efficient in improving procurement through intelligent supplier assessment, contract creation, predictive analysis, demand forecasting, inventory optimization, and real-time decision-making processes. On the other hand, the findings suggest that poor governance frameworks, low data quality, algorithm discrimination, lack of transparency, cyber-security threats, and ethical issues associated with accountability can jeopardize the sustainable implementation of the technology. It can be concluded that the incorporation of Generative Artificial Intelligence in supply chain management has many advantages ranging from increased efficiency to better decision-making capabilities, forecasting accuracy, procurement activities, and increased resilience. Unfortunately, there are various challenges facing companies in Nigeria that limit the ability to incorporate generative artificial intelligence in supply chain management.

1. Introduction

Considering the increased complexity in the supply chain environment across the globe, organizations have been forced to use advanced technologies to make their operations more efficient, cost-effective, build good relations with suppliers and make their operations competitive. One of the most revolutionary innovations in the world of technology when it comes to the supply chain operations is that of the Generative Artificial Intelligence. Unlike regular artificial intelligence which is meant for classification, prediction and automation of routine processes, Generative AI provides the provision for creation of content, procurement reporting, creating supplier agreements, summarization of suppliers' performance, making recommendations on sourcing, and decision-making among others (Dwivedi et al., 2023).

The recent developments in large language models have resulted in the increased use of Generative AI within procurement departments, allowing firms to automate interactions with suppliers, analyze procurement risks, predict market demand, manage inventory levels, and improve negotiation techniques. Firms have started using procurement assistants that rely on AI technologies to decrease procurement cycles, reduce costs, and increase accuracy (Wamba et al., 2024).

In developing countries such as Nigeria, digital transformation has become more critical because companies want to use new ways of increasing efficiency (Eduprojectsng, 2026). As stated by Ekwueme (2025), the application of Artificial Intelligence increases engineering efficiency,

operational efficiency, and decision-making efficiency in Nigeria's manufacturing companies by using automation and prediction models. Similarly, Ekwueme, Onwurah, and Ogbodo (2024) established that Artificial Intelligence influences the organizational performance positively due to its contribution towards efficiency, innovation, and strategic management. This indicates that artificial intelligence is an asset that has the potential to transform organizational processes not only in manufacturing but also in procurement.

Moreover, successful supply chain management is still critical for competitiveness within organizations. As stated by Ekwueme (2026), successful supply chain management ensures better inventory management, customer service, and organizational efficiency through effective procurement and logistics operations. Thus, the development of Generative AI can be viewed as a logical step forward in the process of digital transformation aimed at enhancing procurement operations and responsiveness of supply chains.

Even though these opportunities exist, the integration of Generative AI into procurement comes with many ethical considerations. Decisions within procurement are becoming more dependent on the recommendations provided by AI, and this brings up issues such as algorithmic bias, unexplainable algorithms, privacy issues, cyber-security considerations, intellectual property rights, and accountability of automated decision-making. Therefore, this study seeks to highlight the opportunities and ethical concerns regarding the use of Generative AI in supply chain optimization, with a focus on procurement practices.

1.1. Statement of the Problem

The fast growth of Generative AI is revolutionizing supply chain management by allowing companies to forecast demand more accurately, plan procurement and make better decisions on supplier choice and inventory control. Whereas developed countries have already widely adopted Generative AI to become more efficient and competitive, many companies in Nigeria have not made use of the opportunities provided by the technology yet. It has been observed that the sluggish adoption is due to various reasons, including lack of adequate technology, low level of technical skills, implementation expenses, poor quality of data, and resistance to change from the organization side. Due to which, many organizations are using traditional methods of procurement and logistics that might affect their productivity and performance in the digital age.

In addition to the hurdles of adoption, the increasing usage of Generative AI in procurement practices has generated several ethical issues that need to be addressed. These issues include algorithmic bias, data privacy and security, transparency in automation, AI accountability, and the issue of role displacement. In Nigeria, where the regulatory framework for the use of AI technology is still at a developmental stage, these issues could be damaging to trust among stakeholders and pose a risk to organizations in terms of legality and reputation. While there is growing interest globally about the use of Generative AI, empirical research about its potential, difficulties and ethical issues has not been done in Nigeria. It becomes impossible for managers, policymakers, and researchers to formulate sound policies on the adoption of AI because of this information gap. This research aims at evaluating the prospects of using Generative AI for supply chain optimization, challenges encountered in implementing Generative AI, and ethical issues related to the adoption of Generative AI in procurement within Nigerian firms.

1.2. Objectives of the Study

The specific objectives of this study are to:

- i) Explore the opportunities that Generative Artificial Intelligence offer for optimizing supply chains in Nigerian firms
- iii) Discuss the ethical concerns related to the use of Generative AI in procurement in Nigerian Organizations
- iii) Examine the challenges affecting the adoption and implementation of Generative Artificial Intelligence for supply chain optimization in Nigerian firms

1.3. Literature Review

1.3.1. Concept of Generative Artificial Intelligence

Generative Artificial Intelligence involves the use of sophisticated Artificial Intelligence techniques in the generation of original texts, reports, contracts, recommendations, codes, pictures, and analysis from big data using deep learning architectures (Dwivedi et al., 2023). The difference between traditional AI techniques and Generative AI is that while traditional AI uses prediction and classification techniques, Generative AI creates human-like answers that aid in strategic decision-making. In procurement, Generative AI helps organizations in creating procurement documents, assessing supplier performance, recommending sourcing, negotiating deals, highlighting procurement risks, and better contract management. Such services help decrease the workload in procurement while improving the accuracy of procurement. According to Ekwueme (2025), Artificial Intelligence increases productivity through automation and predictive analytics in the Nigerian manufacturing companies. Such techniques help procurement personnel in their supplier management and sourcing.

1.3.2. Supply Chain Optimization

It involves ensuring that the processes of buying, manufacturing, stockpiling, delivering, and distributing the goods in question are well coordinated to achieve organizational effectiveness and reduce costs. The modern-day supply chain uses Artificial Intelligence technology for optimizing functions such as forecasting, collaboration among suppliers, visibility of inventory, coordination of logistics, and consumer responsiveness. According to Ekwueme (2026), effective supply chain management has greatly increased the capability of managing inventory and providing excellent customer services. The introduction of Generative AI in supply chain management has made all these easier through decision support, automation of documentation, demand forecasting and supplier intelligence. The recent research suggests that incorporation of Generative AI leads to efficient procurement due to automated supplier assessment, demand forecasting, spend analysis, risk assessment, and contract management life cycle (Wamba et al., 2024; Min, 2024).

1.3.3. Empirical Review

A study by Abaku, Edunjobi, and Odimarha's (2024) *Theoretical Approaches to Artificial Intelligence in Supply Chain Optimization: Pathways to Efficiency and Resilience*. This study applied a qualitative review methodology through an analysis of recent literature on the applications of artificial intelligence in supply chain management. Secondary data were collected from peer-reviewed journals and other academic sources relating to AI-based supply chain optimization. The results of the study showed that artificial intelligence has a great impact on demand forecasting, inventory management, supplier relationship management, logistics planning, and efficiency. In addition, the research has shown that AI increases organizational resilience through predictive analysis, real-time decision making, and pro-active risk management in the supply chain process. Conclusion of the study and policy suggestions: The conclusion of the research showed that AI technology is vital in improving the efficiency of the supply chain process as well as organizational competitiveness. Therefore, it suggests that the organization needs to invest more in AI technology infrastructure, develop the digital skills of employees, and create a digital transformation strategy for maximizing the benefit of AI.

Amusa et al. (2024) conducted research on "Digital Procurement 4.0: Rethinking Government Procurement Systems through AI-Powered Ethics, Compliance, and Optimization." The study used a qualitative research approach based on documentary analysis of government procurement systems, policies, existing literature in AI governance, and digital procurement procedures. Ethical and governance challenges in the adoption of Artificial Intelligence in procurement systems were explored. From the results, it was evident that although AI makes the procurement process more efficient and compliant, there are many ethical issues that should be considered such as biased algorithms, lack of transparency in decision making, privacy of data, cyber-security issues, accountability, and legal compliance. From the study, it was found out that lack of ethical governance framework may lead to lack of trust of stakeholders in AI-enabled procurement decisions.

Eteyen (2024) conducted a study on "Digital Transformation in Supply Chain Management: Utilizing Artificial Intelligence and Big Data for Improved Efficiency in the Nigerian Oil Industry." This study used a descriptive research design where secondary data was collected from published materials, reports from the government, industry magazines, and empirical research carried out on the adoption of Artificial Intelligence in the Nigerian oil and gas supply chain. The results of this study revealed that poor digital infrastructure, unstable power supply, expensive costs of implementing AI systems, lack of Artificial Intelligence experts, poor quality of data, cyber-security, and organizational reluctance towards technology adoption are major barriers to Artificial Intelligence adoption in Nigerian supply chains. The study further highlighted that poor regulatory structures and inadequate investments in digital technologies hinder the application of AI across various organizations. The study found out that even though Artificial Intelligence is highly likely to revolutionize the operations of supply chain in Nigeria, various factors such as infrastructural, financial, technological, and institutional challenges still hinder its application. The study suggested that to facilitate the adoption of Artificial Intelligence, more investments should be made on digital infrastructures and improved Internet access among other recommendations.

1.4. Theoretical Framework

1.4.1. Technology Organization Environment (TOE)

The TOE framework has been formulated by Tornatzky and Fleischer in 1990. According to the TOE framework, there are three important elements needed for the successful implementation of technology innovation: readiness of technology, readiness of organization, and the environment. Even though TOE model has been designed before the advent of Generative Artificial Intelligence (Generative AI), it is one of the most common theoretical frameworks.

With the technological perspective, some of the advanced capabilities of Generative AI include intelligent automation, natural language processing, predictive analysis, supplier intelligence, decision support systems, among others. Through reduced manual labor, efficient assessment of suppliers, and contract management, Generative AI has made procurement processes more efficient. From research, firms using Generative AI have managed to attain operational excellence, high levels of customer satisfaction, greater automation, and effective supply chain management. Nonetheless, there are technology-related constraints, such as quality of data, cyber security, and integration, that have limited its implementation. Organizational factors are those such as management commitment, competence of employees, IT infrastructure, governance, and organizational readiness. Companies with high digital skills have an advantage of being able to integrate Generative AI into procurement processes. Factors that limit successful integration of Generative AI into procurement include low competence of employees and lack of good organizational change management.

2. Methodology

As stated by Asika (2009), research designs are usually termed as the structure of an investigation that attempts to determine variables and relationships among them. In this research, the research design used is systematic qualitative content analysis. Consequently, the sources of data in the form of newspapers, textbooks, journals, articles and other written texts concerning generative AI for supply chain optimization, opportunities and ethical risks in procurement. Thus, the research design is secondary.

3. Results and Discussion

3.1. Opportunities that Generative Artificial Intelligence can offer for optimizing supply chains

GenAI provides tremendous potential for making improvements in the functioning of the supply chain by means of improved decision-making, operational efficiencies, and business resilience. As opposed to conventional AI, which only processes structured data, GenAI can process both structured and unstructured data, making it possible for an organization to predict the demand and stock requirements as well as foreseeing any disruptions in the supply chain. Moreover, GenAI performs repetitive procurement tasks such as supplier assessment, contract negotiation, creation of purchase orders, and expenditure analysis so that the procurement specialists can engage themselves in

making strategic decisions. GenAI technology enables enhanced management of the supplier relations because real-time analysis of performance of suppliers, market trends, and procurement risks is performed with it. Furthermore, GenAI helps to make scenario plans by modeling different scenarios of sources and logistics, thus responding to unforeseen events such as supply chain disruptions. In the context of Nigeria, the implementation of GenAI is expected to result in improved visibility of the supply chain, increased competitiveness, shortened procurement cycles, and aid in the process of digital transformation within various sectors of the economy. As companies increasingly adopt intelligent technologies, GenAI will likely play a pivotal role in building resilient, sustainable, and innovative supply chains in an environment defined by uncertainty and evolving markets (Abaku et al., 2024; Eteyen, 2024; McKinsey & Company, 2024).

3.2. Generative Artificial Intelligence opportunities optimizing supply chains

Table 1: Researchers’ conceptualization (2026)

Generative Artificial Intelligence	opportunities optimizing supply chains
09 Solution Digital Brain	Decision making platform
Coupa Supply Chain Modeler	Procurement & Risk
DAT UP	Conversational Intelligence
Interos Ai Supply Chain Risk Platform	(Resilience & Compliance)
Fourkites Real-Time Visibility	(Logistics & Route Optimization)

The above shows the list of Generative Artificial Intelligence in supply chain and their opportunities

3.3. Ethical concerns related to the use of Generative AI in procurement

While Generative Artificial Intelligence offers several advantages for procurement processes, there are several ethical challenges in implementing AI in procurement practices that need to be addressed. The first challenge includes the issue of algorithmic bias which can be described as the development of discriminatory recommendations by AI systems due to biased or incomplete datasets used in training. The problem of bias can significantly affect the selection of suppliers, contract assessments, and purchases. There is also an issue of data privacy and confidentiality that requires to be considered equally significant in this respect is transparency, as most GenAI models are “black boxes,” thus making it challenging for procurement officers to grasp and justify the mechanisms behind recommendations. The problem of explainability may undermine the principle of accountability in case the use of artificial intelligence in decision-making leads to financial losses or any disputes in the procurement process. In addition, the over-reliance on the AI system will likely result in human control reduction and, hence, increase the risk of providing misleading recommendations or information based on artificial intelligence. Hence, companies need to develop strong AI governance frameworks that stress transparency, human involvement, ethics, security, and regulation for responsible and reliable AI integration in the procurement process (Amusa et al., 2024; McKinsey & Company, 2024).

Table 2: Researchers’ conceptualization (2026)

Generative Artificial Intelligence (For supply chain)	Ethical challenges
09 Solution Digital Brain	Algorithmic bias: AI decisions may favor certain suppliers, regions, or business priorities based on biased training data
Coupa Supply Chain Modeler	Lack of transparency: Managers may not understand why AI recommends certain decisions, creating accountability problems
DAT UP	Data ownership issues: Questions arise over who owns and controls the data collected from conversations and logistics interactions.
Interos Ai Supply Chain Risk Platform	False risk identification: AI may incorrectly classify suppliers as risky, damaging reputations and business relationships.
Fourkites Real-Time Visibility	Job displacement: Automation of routing and logistics decisions may reduce demand for some human roles

The above shows ethical concerns and problems when applying generative AI in supply chain

3.4. The challenges affecting the adoption and implementation of Generative Artificial Intelligence for supply chain optimization in Nigerian firms

Although there is much to be gained from Generative Artificial Intelligence, there are still certain elements that make the integration of this technology challenging for companies in Nigeria. The lack of digital infrastructure is one of the major obstacles to the use of GenAI in business. This issue includes electricity problems, poor broadband access, and the absence of adequate cloud computing capacity needed for GenAI. Another issue is the scarcity of professionals that have the skills in artificial intelligence, data analytics, and the digitalization of the supply chain process. Moreover, the low quality of data, fragmented databases, and poor data governance decrease the effectiveness of AI solutions since good-quality data are required to receive precise information. The lack of willingness among organizational members to adopt new technologies, as well as their low understanding of the strategic importance of GenAI, makes the transition slow since many of the employees are afraid of losing their jobs. In addition, there is an evolving regulation in Nigeria, which is why the problem of AI governance arises (Eteyen, 2024; Hassan, 2024; Abaku et al., 2024)

The above results indicate that the use of generative AI presents chances for the supply chain through better decision-making, greater efficiency in operations, and organizational resilience. The main advantage of using GenAI over traditional AI is the ability to analyze not only structured but unstructured data, which allows organizations to make an accurate forecast of the demand and manage inventories to foresee any supply chain issues. It aids in proactive planning, lowers operational cost and eliminates stock shortage as well as overstocking issues, which aligns with the study conducted by Abaku, Edunjobi and Odimarha (2024). In the study on the "Theoretical Approaches to Artificial Intelligence in Supply Chain Optimization: Pathways to Efficiency and Resilience". The results showed that Artificial Intelligence greatly increases demand forecasting, inventory management, supplier management, logistics planning and operational efficiency.

According to the results, the ethical problem that comes with the utilization of Generative AI in procurement is the bias that may occur in the process since these algorithms are capable of making recommendations based on biased or incomplete data sets. This can create an unfair advantage for the selection of suppliers and contracts. The other ethical problem that may come out of the application of Generative AI in procurement is the aspect of data privacy and confidentiality. Similarly, transparency is also crucial as most GenAI models operate as "black box systems," rendering it hard for procurement experts to comprehend and explain how certain recommendations were made, as stated in the works of Amusa, Mike-Olisa, Ogeawuchi, Abayomi, and Agboola (2024), which examined "Digital Procurement 4.0: Redesigning Government Contracting Systems with AI-Driven Ethics, Compliance, and Performance Optimization." Their study showed that, although AI has helped improve procurement performance and compliance, serious ethical issues remain, including algorithmic bias, lack of transparency in automated decisions, data privacy, cybersecurity, accountability, and legal compliance.

Generative AI can optimize procurement by providing better decision-making and real-time risk mitigation but poses several ethical risks. One of the most important is that platforms such as 09 Solution Digital Brain can have algorithmic biases that lead to discriminatory vendor choices. The socio-cultural realities and regional nuances in developing markets such as Nigeria can compound this risk, as certain groups may feel excluded by the historical data that is historically biased (Okezie, 2021). Moreover, the "black box" characteristics of tools such as Coupa result in transparency problems that affect managerial accountability for automated decision-making that results in financial disagreements. Issues of data ownership because of the conversational tools and generative learning processes pose risks to confidentiality and corporate privacy (Obikezie et al., 2023). Also, predictive platforms such as Interos can identify risks, that may be false, and tarnish supplier reputation. The automation of the logistics tracking system is also going to extend the loss of jobs, and the skills that are required for the workforce to be job ready are going to be developed proactively to meet that job requirement (Onyiorah, 2025). To fill these gaps, it is necessary for organisations to adopt a flexible structure by leveraging the use of internet technologies and effective risk management frameworks (Emeasoba et al., 2026; Oguejiofor & Onyiorah, 2021). Increase in the digital marketing, entrepreneurship education and technical literacy is a critical requirement to

ensure the efficient navigate of automated supply chain while keeping pace with the global competition (Oguejiofor et al., 2022; Okoro et al., 2025).

The findings above also show that the problems identified in the use of Generative Artificial Intelligence in optimizing supply chain management in the Nigerian companies are in agreement with the findings of Eteyen (2024) in the study titled "Digital Transformation in Supply Chain Management: Leveraging Artificial Intelligence and Big Data for Enhanced Efficiency in the Nigerian Oil Sector". The findings revealed that the major factors that hinder the efficient use of AI in Nigerian supply chain include lack of adequate digital infrastructure, unstable electricity supply, high costs of implementing AI, lack of AI experts, poor data quality, security threats, and failure to integrate AI by the organization. It was also revealed that lack of proper regulation and investment in digital technology constrain the use of AI.

4. Conclusion

The incorporation of Generative Artificial Intelligence in supply chain management has many advantages ranging from increased efficiency to better decision-making capabilities, forecasting accuracy, procurement activities, and increased resilience. Unfortunately, there are various challenges facing companies in Nigeria that limit the ability to incorporate generative artificial intelligence in supply chain management. In addition, ethical issues such as bias in algorithms, data privacy, and accountability need to be addressed to ensure that AI is adopted responsibly. As a result, companies should put in place a strong AI governance framework, build digital capabilities, and adopt ethical practices to maximize the advantages of Generative AI and minimize the risks involved.

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