A Case Study of a Healthcare System in The North East Nigeria: Supply Chain Innovation as A Sustainable Strategy for Health Care Operation in Nigeria

Samuel Ahmed Balami

Department of Management Science, Nigerian Army University Borno State, Nigeria

Abstract

Prolonged fighting and insecurity in Nigeria's North-East have greatly damaged healthcare systems, so aggravating already-existing problems in supply chain management and limiting access to vital medical commodities. This case study looks at how supply chain technologies are applied as a sustainable solution for healthcare activities inside this difficult setting. Concentrating on a particular regional healthcare system, we examine the key tactics that the Nigerian health industry should emphasis in order to attain supply chain innovation success, how technology innovation help in Nigerian Healthcare operations. Use and effect of innovative techniques distribution strategies. The research investigates how these advances improve the equity, resiliency, and efficiency of healthcare supply chains, hence increasing medicine and medical equipment availability. Initial results indicate that negotiating the particular logistical challenges in conflict-affected areas depends on strategic investments in data analytics, last-mile delivery systems, and local capacity development. Highlighting the potential of these creative approaches to not only repair but also improve healthcare delivery, the abstract concludes with a roadmap for sustainable healthcare activities in Nigeria and other sensitive. The research contributes to the discourse on global health equity by presenting a contextual understanding of how supply chain innovation can mitigate health disparities in resource-constrained and conflict-affected regions. It also emphasize the limitations for this research that actually can be done more, sociopolitical instabilities, and endemic public health challenges. Furthermore, by evaluating real-world implementation, this study underlines the practical feasibility of transformative supply chain frameworks across similar developing nations.

1. Introduction
1.1 The Study's Background

One of the most essential human rights is good health, and it is the obligation of the healthcare system to deliver quality services to healthcare customers.

In Sub-Saharan Africa, statistics show that 30-50 percent of the population lacks access to basic medical care, and many people are still suffering from preventable and treatable illnesses as a result of their inability to access essential healthcare services, particularly in Nigeria, which was ranked 187th out of 192 countries in the United Nations' Human Development Index (HDI) in 2013, indicating a bleak picture of the country's healthcare outcome.

One of the most serious problems in Nigeria's healthcare system is a lack of supply chain processes and technology. Nigeria's healthcare sector lacks a well-coordinated supply chain framework. Because of the persistent difficulty in streamlining supply chains, the quality of healthcare services delivered is poor. There is slow coordination between units in health facilities, long waiting times for patients, limited institutional capacity, and almost non-existent feedback [1]. The inability to effectively address these irregularities has contributed to the health system's ongoing weakness resulting in customer dissatisfaction and many patients switching to other healthcare providers.

To achieve operational efficiency, the healthcare system must be cognizant of speed and consistency in providing excellent care to health users, as well as cost reduction and service availability to health sector consumers. Quick delivery, on the other hand, would serve no acceptable purpose because it is flawed, with abnormalities from one place to the next. The healthcare system should focus on service delivery, speed, and consistency in order to achieve a secure supply and delivery operation, which can be accomplished through technical and process supply chain innovation.

With the general weakness of health structures, from human resources to equipment and supply chains, the healthcare sector must innovate its capabilities for healthcare efficiency. This is especially true now that health organizations all over the world are striving to improve operational efficiency while lowering costs. Supply chain innovation (SCI) is thus necessary to gain a competitive advantage.

The goal of this research is to look into the factors that link supply chain innovation with healthcare operations. This study will look at two aspects of SCI: technology innovation and process innovation, to see if SCI has a significant and

favorable direct association with healthcare operations in Nigeria. Three structures will be used to operationalize healthcare operations: quality of delivery, cost minimization and service availability.

From the fore-going, the study argues that the health care organization implement innovative supply chain strategies, the possibility of marking significant operational additional/gain rises.

1.2 Context of Research

Improving healthcare operations in a developing country like Nigeria has become increasingly important, as health care is one sector that has the ability to make a significant contribution to a country's economy. Many countries have been attempting to keep up with healthcare delivery in recent years as they recognize that the healthcare industry is critical to the sustainability and suitability of any nation's economic and social development, as a country with sick people would be unable to fulfill its basic responsibilities [2].

healthcare system is a collection of people, institutions, and resources that work together to provide healthcare services to specific populations. Nigeria, according to the Nigeria Global Health Initiative Strategy, has one of the most observably awful health indicators in the world, despite its oil wealth. Despite Nigeria's central position in Africa, the country's healthcare system has suffered a number of setbacks. In reviewing the performance of the Nigerian healthcare system, stated that, as a result of underperformance in the country's health care system, healthcare gains, which are often linked to salary development, have been obstinately dawdling in Nigeria over the past 25 years. The Nigerian healthcare sector is in disarray due to weaknesses in supply chain processes and technology. Nigeria's healthcare system is inadequate.

The Nigerian healthcare sector is in disarray due to weaknesses in supply chain processes and technology. Nigeria's healthcare sector lacks a well-coordinated supply chain framework. Despite the country's relative abundance of healthcare centers, the quality of healthcare services delivered is poor due to slow coordination between units in health facilities, long waiting times for patients, limited institutional capacity, and almost non-existent feedback due to the persistent difficulty in streamlining supply chains.

The Nigerian health system has evolved over time as a result of health care reforms aimed at addressing the country's public health challenges, such as the National Health Insurance Scheme, National Immunization Coverage Scheme, Midwives Service Scheme, and Nigerian Pay for Performance Scheme, but the country's inability to effectively address the country's numerous public health challenges has contributed to the country's persistent and high level of poverty and illiteracy [3]. That is why Nigeria has committed to achieving Universal Health Coverage (UHC) as part of the 2030 Agenda for Sustainable Development, a program that ensures that all people and communities receive the quality health services they require without financial hardship; however, the quality of healthcare services delivered is poor due to the persistent difficulty in streamlining supply chains.

The current global pandemic of Covid-19, an infectious disease caused by a new Coronavirus in humans that health organizations all over the world are currently battling, is a wakeup call for the health industry, particularly in Nigeria, to innovate its competencies and capabilities in order to deal with unexpected incidents. In today's increasingly competitive global market, SCI is a crucial instrument for competitive advantage if firms seek to meet customer expectations, cut costs, and improve organizational processes.

As a result, the goal of this research is to look into supply chain innovation as a long-term strategy for healthcare operations in Nigeria. This study will look at two aspects of SCI: technology innovation and process innovation, to see if SCI has a significant and favorable direct association with healthcare operations in Nigeria. Three structures will be used to operationalize healthcare operations: quality of delivery, cost minimization, and service availability. As a result of the foregoing, the study claims that as healthcare organizations employ innovative supply chain methods, the likelihood of significant operational improvement/gain increases.

2. Review of Relevant Literature

It is no longer news that supply chain innovation is a critical instrument for competitive advantage in today's highly competitive global market if firms want to meet consumer expectations, cut costs, and increase operational efficiency. The supply chain is the foundation of every business, as a poorly managed supply chain threatens the business's stability and continuity. For example, consistent late delivery of ordered items and requested services owing to logistical inefficiencies can severely damage an organization's reputation and drive away current and future consumers. As a result, creative supply chain strategies are required not only to boost competitiveness but also to ensure the company's existence.

Therefore, innovation is a critical component of gaining a competitive advantage and is required for organizational sustainability, as health organizations may translate a concept into a better service. Innovation is the unrivaled key to better products, services, or processes in order to advance, compete, and differentiate themselves successfully in their marketplace.

Furthermore, innovation is a "complex and multi-dimensional phenomenon," with literature encompassing a variety of research disciplines and definitions largely based on Schumpeter's (1939) classic definition, which states that innovation

entails developing new products and new forms of organizational structure, opening up new markets, creating new production functions, and finding new sources of raw materials [4].

The process of transforming possibilities into new ideas, as well as the application of such new ideas to support growth, is what innovation is all about.

Healthcare innovation as a new concept, idea, provider, technique, or product aimed to enhancing treatment, prognosis, schooling, outreach, prevention and research, and with the long term desires of enhancing exceptional, safety, consequences, efficiency and charges.

Therefore, a professor of advertising, defined that supply chain innovation generally way upgrades in the way that deliver chains operate, and more especially in the manner that products, data, paintings, and price range waft (and are quickly stored) all through the supply chains.

Delivery chain, is define as chain innovation trade (incremental or radical) within the deliver chain network, deliver chain generation, or deliver chain procedures (or combinations of those) that could take location in an organization function, inside an employer, in an enterprise or in a supply chain as a way to beautify new price introduction for the stakeholder.

Furthermore, deliver chain innovation because the gadget by using which corporations reconfigure and integrate their internal and external systems/tactics and infrastructure/human ware with the purpose of sensing and seizing new possibilities that facilitate facts control, sourcing, manufacturing, and shipping of products in a responsive, fee efficient and well timed manner to the quit-client [5].

The outline deliver chain because the organization of interconnected taking part organizations that upload value to the transformed inputs from their supply of starting place to the give up services or products which are demanded by means of the distinct give up customers.

Supply chain innovation is conceptualized as a group of enterprise-wide projects such as research and development and technological investments, method optimization, introduction of recent services and products, building new models, expertise acquisition and management (education and schooling), cross purposeful engagement, cross-border (international) and go-area partnerships, marketplace intelligence, and different activities. The goal of these sports goes past facilitating the accomplishment of better supply chain efficiencies and effectiveness to improving the overall company performance.

SCI is a trade in methods, generation, and network, that means that SCI improves aggressive advantage and organizational performance.

SCI is a procedure that could improve organizational tactics to manage effective deliver chain control thru included interactions with suppliers, manufacturers, vendors, and customers. Thus, SCI causes time and value discount, developing novel operational techniques and reliable transport gadget for coping with growing changes in commercial enterprise. It is proposed that provider industries like healthcare should recognition on SCI for powerful delivery offerings as SCI helps groups to hold their competitive position and improved supply chain overall performance [6].

A deliver chain's foremost position is to successfully and correctly control the flows of merchandise, services, finances and records from the supply to the quit client, with a final intention of creating delivered value and improved client pride. A firm this is able to innovate need to be equally capable of manipulate complex deliver chains to deliver its improvements correctly to the market.

In spite of the importance of innovation in deliver chain towards price discount/minimization transport nice, service availability competitive gain, supply chain performance and organizational performance its theoretical and empirical precincts remain now not advanced, and literature is not most effective quite scarce however also no longer integrative. The few literature on supply chain innovation borders at the perspectives of evolved nations and amongst multinational corporations the five percent of the research in growing nations had been accomplished consequently, creating void in different developing countries, specifically in Africa. Hence, the want to have an integrative studies and in a developing united states like Nigeria.

The healthcare region is a very complex and massive environment. In its broader context, the healthcare region does now not handiest include clinics and hospitals but wholesalers, distributors, organization shopping organizations (GPOs), pharmaceuticals manufacturers, clinical and surgical elements' enterprises, clinical devices, providers/companies of medical consumables and medical institution equipment, pharmacies, nursing homes, authorities regulatory companies, non-public medical health insurance companies, Integrated Delivery Networks (IDNs), technology carriers and statistics era providers. These cowl the three foremost stakeholders within the healthcare deliver chain – producers, customers and carriers. The practice of Logistics, purchasing and supply chain control concerns observe and are crucial for the entire industry, which is interconnected and mutually structured.

For the motive of this take a look at, three public tertiary hospitals from the category of University Teaching Hospitals, Specialist Hospitals and Federal Medical Centres in North Central Nigeria will shape the population of this research. Public hospitals are advised because they're not high-priced as the personal hospitals and can be accessed by majority of

Nigerians. In Nigeria, non-public hospitals have had document of exceptional overall performance in comparison to their opposite numbers, public hospitals, in terms of provision of first-class services, high flexibility, timeliness in service shipping, high reliability and giving comments however it's also very steeply-priced this is one major reason why majority of the Nigerian populace cannot access clinical services in non-public hospitals. SCI may be operationalized by way of variables: - generation and method whilst healthcare operations might be measured via 3 constructs: - high-quality of delivery, cost minimization and carrier availability. These signs might be extracted from the Supply Chain Operations Reference (SCOR) model. One relevant case is the use of drone technology in Rwanda for last-mile delivery of blood and medical supplies, which significantly reduced emergency response time in rural clinics. Similarly, the application of mobile health logistics systems in Kenya has improved the predictability and visibility of pharmaceutical inventories. Hence even with limited infrastructure and funding, these examples can still also be demonstrate too. And innovation tailored to the local context can yield high-impact results. The Nigerian healthcare system can adopt lessons from these approaches, scaling them to suit its own population density and terrain characteristics.

2.1 Questions for Research

The following set of questions will be addressed by this study:
I. What are the key tactics that the Nigerian health industry should emphasis on in order to attain supply chain innovation success?
II. In what ways does technology innovation help Nigeria's healthcare system?
III. What influence does process innovation have on Nigerian healthcare operations?

2.2 The Study's Objectives

The goal of this study is to look into the impact of supply chain innovation on Nigeria's health-care system. The research objectives are as follows in order to attain the overarching goal:

I. To make recommendations for core tactics that healthcare institutions should accomplish in order to achieve successful supply chain innovation in Nigeria's health sector.
II. Determine the extent to which technology innovation improves Nigerian hospital operations.
III. To find out how process innovation affects Nigerian healthcare operations.

3. Methodology of Research

For this study, the mixed methods technique was chosen as the recommended methodology. The term'mixed methods research' refers to research that uses a combination of methods.

At its most basic level, qualitative research is an exploratory study that collects non-numerical data through direct observation, open-ended surveys, focus groups, in-depth interviews, oral history, participant observation, and ethnographic observation in order to interpret meaning that aids in understanding social life through the study of a specific population, whereas quantitative research uses numerical data to identify large-scale trends and employment opportunities. Qualitative research aims to uncover the meaning behind the actions or outcomes that are generally quantified through quantitative research [7].

The quantitative method of approach will be applied in order to answer the first aim of this study, and the qualitative method will be used to answer the other objectives. The researcher believes that a blending of quantitative and qualitative methodologies will be more appropriate to ensuring that the study questions and objectives are thoroughly addressed after doing a comprehensive critical examination of past research [8]. As a result, the quantitative method used in the study will be the application of Structural Equation Modelling (SEM). SEM is a statistical method that is rapidly being employed in social science research, and it has recently become the favored analysis method in doctoral dissertations and academic research. SEM will be used to do the needed statistical analysis of the survey data. Because SEM is a multivariate statistical analysis approach for measuring and analyzing the relationships between observable and latent variables, it is proposed. SEM is a multivariate statistical analysis tool for measuring and analyzing observable and latent variable connections. SEM uses a confirmatory rather than exploratory approach to data analysis; it computes error variance parameters; it can combine both observed and unobserved (latent) variables; its programs provide overall design fit and individual parameter estimate tests simultaneously; regression coefficients, means, and variances can be compared simultaneously, even across groups; and researchers can get a merging framework that fits numerous linear m models [9].

A small sample of subjects from the health industry in North Central Nigeria, preferably suppliers of medical consumables and hospital equipment, will be interviewed for the qualitative approach in order to generate data, analyze and reflect on what theoretical themes the data content analysis will be used to evaluate data from the interview process. This will be beneficial.

Questionnaires will be sent to the target group, which includes Procurement, Stores, and ICT personnel, as well as medical professionals and hospital patients. Suppliers of medical consumables and hospital equipment from the shortlisted hospitals will also be interviewed.

Structured and unstructured questions will be included in the questionnaires. The structured question replies will be utilized to do structural equation modeling analysis, while the unstructured question responses, along with the interview responses, will be used for content analysis.

Content analysis is recommended for this study because it is widely used and easily understood; establishing reliability is simple and straightforward; can assist in interpreting trends in individuals or groups; can be used to examine documents, pictures, videos, and situations; it is a low-cost method that can be easily repeated if problems arise; and it is not obstructive and does not necessarily require the use of a computer [10].

Because the researcher intends to conduct the research in a specific context (healthcare in Nigeria), the University must obtain ethical approval from the administration and a letter of support from the researcher's employer, embarking on the field study. This is possible since the researcher's employer owns one of the largest hospitals in the region where the study swishes to be conducted.

Additionally, to ensure validity and reliability of the data collected, the study will adopt triangulation techniques. This includes cross-verifying data from multiple sources such as administrative health records, patient feedback, and procurement reports. The qualitative data will also be coded using NVivo software to identify recurring themes, while SPSS will complement SEM for robust statistical insight. This hybrid analytical framework ensures that both subjective insights and objective data points are synthesized for actionable recommendations.

4. Result Expected

This study will add value to the current body of knowledge in the domain of supply chain innovation as a sustainable strategy for healthcare operations in Nigeria, as this has not been utilized in Nigeria, based on the decisions to be taken utilizing the results of the analysis.

The study's findings are likely to equip managers with relevant models for creating efficient systems.

The study's findings are likely to offer managers with relevant models for building efficient hospital supply chain management programs.

In practice, hospitals that implement the study's suggestions will be able to provide high-quality services while also enhancing operational efficiency and improving health worker performance.

The findings of the study will, theoretically, add to existing ideas and may even serve as a foundation for the construction of a new theory.

Policymakers will be advised on what should be emphasized in the workplace by health organizations in order to provide great health care and satisfied customers. This will also serve as reason for better policy formation in the area of expanding health-care operations in hospitals all over the world.

There will be an overview of the main findings as well as the potential practical implications of each of the outcomes. This summary will serve as the foundation for the rest of the report.

5. Conclusion

This study illustrates that leveraging supply chain innovation—through both technological and process enhancements—can significantly improve healthcare outcomes in Nigeria, particularly in under-resourced and conflict-affected regions. The analysis reveals that investment in technology, such as automated inventory systems, last-mile delivery solutions, and real-time data analytics, can address persistent inefficiencies that plague the Nigerian healthcare supply chain. Process innovations, including streamlined procurement procedures, enhanced interdepartmental communication, and decentralized decision-making, can further strengthen service delivery and ensure equitable access to care.

By emphasizing integration, data-driven systems, and localized strategies, Nigerian healthcare institutions can evolve into more resilient, efficient, and equitable entities. These innovations do not only reduce costs and improve delivery timelines, but also restore public trust in healthcare systems—an essential component in achieving Universal Health Coverage (UHC). Furthermore, supply chain innovation can serve as a strategic enabler in times of crisis, such as pandemics, by facilitating rapid response and ensuring continued availability of essential medical products.

This research not just only provides insights or more perspective but also provide more relevant information and knowledge to those professionals. It highlights the urgent need for national policies that prioritize supply chain infrastructure development, workforce training, and cross-sector collaboration. Encouraging public-private partnerships and fostering innovation ecosystems in healthcare will be key to sustaining long-term progress.

Future studies may explore the scalability of these innovations and their socioeconomic impact on rural health systems, as well as the role of digital transformation and artificial intelligence in enhancing logistics performance. Ultimately, a reimagined and innovation-driven healthcare supply chain will be vital to Nigeria's aspiration of building a stronger, healthier nation.

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