



## **THE INFLUENCE OF SUPPLY CHAIN PRACTICES ON HEALTH SERVICE DELIVERY UNDER THE NATIONAL HEALTH INSURANCE FUND SCHEME: A CASE OF SELECTED HOSPITALS IN TANZANIA**

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Received: Apr 01, 2025

Accepted: May 22, 2025

Published: June 01, 2025

### **Abstract:**

*The study aimed to examine the influence of supply chain practices (process integration, agile practices, and strategic partnerships) on health service delivery under the NHIF scheme in selected hospitals in Tanzania. The research utilized a cross-sectional design, enabling data collection from 189 employees in a single snapshot at a specific moment. These participants were drawn from five selected hospitals under the National Health Insurance Fund (NHIF) scheme within Dodoma city. Data were collected using structured questionnaires scaled to a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) and then analyzed using multiple regression techniques. Findings show that the independent variables collectively account for 41.1% of the variance in the dependent variable. The best predictor of the dependent variable is strategic partnership practices which have a standardized coefficient of 0.484;  $p = 0.001$  followed by agile supply chain practice with a beta coefficient of 0.342;  $p = 0.011$ , and lastly process integration practices with a beta coefficient of 0.297;  $p = 0.019$  whereby the variables in totality calls for the need to continue prioritizing the effective supply chain practices, given their substantial positive impact on health service delivery. The study provides novelty by linking key variables of supply chain practices with health service delivery under the NHIF scheme in the Tanzanian context as an area overlooked by other studies.*

### **Keywords:**

Supply Chain Practices, Health Service Delivery, NHIF

### **1. Introduction**

Supply chain practices plays a significant role in enhancing high quality of services in business sectors including the healthcare sector. This is achieved by establishing a well-coordinated supply chain functions whereby goods and services are planned, ordered and delivered to customers on time and at low cost hence ensuring better services to end users including patients in health sector perspective (Saragil et al, 2020). Currently, supply chain practices have gained attention worldwide in relation to business operations due to their impact on delivery of goods from upstream to the downstream points. For example, following its criticality, many developed countries such as United States of America and Italy have established a well-functioning logistics system in supply of goods which has enabled them to speed up supply chain operations, reduce stock-out and improve service delivery in healthcare sector (Wieland & Durach, 2021). Despite the effort undertaken by many developing countries in streamlining and coordinating the supply chain functions to meet the targets achieved by developed countries, still some challenges exist in supply chain such as high cost of operations and delay of goods which threatens service delivery in business sectors including the healthcare sector (Govindah et al, 2020).

In Africa, countries such as South Africa and Botswana have made notable progress in strengthening their supply chains while others continue to struggle due to limited resources, inadequate infrastructure, and weak governance systems (Areri & Gekara, 2019). Challenges such as poor forecasting, unreliable logistics, and poor process-integrated systems hamper effective flow of goods along supply chains operations in many African healthcare settings (Mogere, et al., 2023). In recent years, some developing countries including Tanzania have done some improvement in healthcare service delivery by developing infrastructures that connect urban and rural areas to enable

smooth flow of materials to ending customers (Renggli et al., 2020). In addition, the government of Tanzania has introduced the Electronic Logistics Management Information System and the integration of supply chain management into the national health policy framework (Ruhago et al., 2022). Despite these positive steps in improvement of health sector, the NHIF as a special design scheme in Tanzania has been reported to face several challenges such as insufficient funds, poor infrastructure, poor communication systems, and inadequate resources (Mwaiseje & Mwangike 2019). Furthermore, the reimbursement processes under the NHIF scheme and management of insurance claims pose administrative complexities that impact the smooth flow of goods and services within the supply chain (Embrey et al., 2021). The main objective in the procurement of medical supplies in the health sector is provision of goods and services at right time, right price, right quality and in right quantity (URT, 2017). This means that poor service delivery in supply chain operations particularly in NHIF scheme can pose negative effect on health and life of people who depends on services offered by such a scheme hence putting their health at a more risk situation. In connection to the challenges of the supply chain, Wang et al (2023) argue that lack of supply chain system integration among stakeholders contributes to the delay of medical supplies which consequently results to poor service delivery in terms of increased mortality rate of patients and reduced reputation to the Government (Mitchell et al, 2020). In addition, Didia (2017) states that an agile supply chain and long-term relationships with suppliers are common practices that enable the organization to improve efficiency in the supply chain. Agile supply chain practices concerned with being flexible and fast in doing activities to meet customer requirements in time while long-term relationships with suppliers are concerned with forming alliances, partnerships, or collaborations that create trust, integrity, and cooperation among the supply chain partners. This implies that to be successful in health service delivery, organizations need to establish better strategies for supply chain which will enable them to become more efficient and effective in meeting their customer requirements.

Based on the theory and what is done in the supply chain of medical supplies, particularly in developing countries including Tanzania, it is observed that the performance of health service delivery under the NHIF along the supply chain has been affected by several factors that pose severe consequences to the beneficiaries of health services and the public at large which at the end leads into customer dissatisfaction. Worse still, previous studies have predominantly concentrated on assessing challenges of health service delivery in general terms (Areri & Gekara, 2019; Oduro, 2020; Mwaiseje & Mwangike 2019) and overlooked addressing the aspect of the National Health Insurance Fund as an emerging scheme that has a unique vision, mission, systems, procedures and structures (URT, 2005). The sensitivity of the services offered by the NHIF scheme makes it become a special area that has the role of serving the life of the people hence demanding special treatment including assessment of its performance in terms of service delivery. Therefore, this study has attempted to investigate the influence of supply chain practices on healthcare service delivery under the National Health Insurance Fund Scheme. Based on the literature and information on supply chains that emanates from this study, the following hypotheses were formulated:

H0: Process integration practice does not influence health service delivery under NHIF scheme

H1: Process integration practice influences health service delivery under NHIF scheme

H0: Agile supply chain practice does not influence health service delivery under NHIF scheme

H2: Agile supply chain practice influences health service delivery under NHIF scheme

H0: Strategic partnerships practice does not influence health service delivery under NHIF scheme

H3: Strategic partnerships practice influences health service delivery under NHIF scheme

## **2. Literature Review**

### **2.1 Stakeholder Theory**

To address issues of service delivery along the supply chain continuum, this study has adopted the Stakeholder Theory which stipulates that better service delivery in operations will be achieved when there is interconnected relationships among stakeholders involved in supply chain. The model contends that a business should generate value for all stakeholders which means that when business organizations are delivering services to customers along the supply chain they need to put more weight on adding value to the services offered to its stakeholders including end customers.

### **2.2 Process Integration**

Process integration between buyer and supplier in supply chain means the situation whereby information flow, materials and funds flow are functioning in an integrative manner to enhance efficiency in operations.

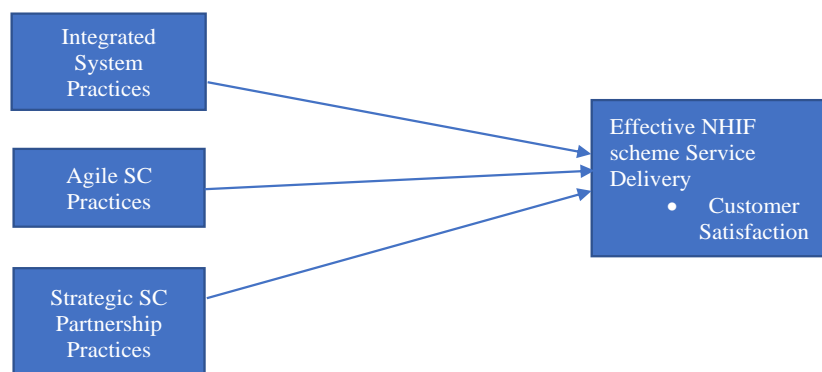
Organizations can establish different pattern of supply chain integration such as forming internet-based collaborations which in one way or another can enable the business parties to leverage in their business endeavor. The emergence of globalization and advanced use of technology have caused revolutionary change in the business environment today whereby organizations are forced to integrate their operating systems to enable them achieve competitive advantages in the market. Mavengere (2014) asserts that process integrated system enables a faster flow of information communication which means that when the internal operating processes are integrated with other outside partners it encourages the delegation of core modules of products within the networks of collaborating firms (Didia, 2017). Integration of key business processes between upstream and downstream collaborators enhances service delivery that add value to customers and other stakeholders. In other words, supply chain integration enables value creation and transfer processes between upstream vendors and downstream end-users (Rana et al, 2016).

### 2.3 Agile Supply Chain Practices

Agile supply chain practices require the business organization to sense and respond to customers' requirements in time to ensure customer satisfaction. Nileshe (2022) states that business organizations should respond promptly to their customer requirements regardless of the existing challenges in the supply chain. According to Piya et al (2020), agility in supply chain can be enhanced with factors such as collaboration, commitment, integrated information systems, and the use of advanced technology. In the health sector agility in the supply chain is more crucial because the service delivery here involves saving the life of the people so any abnormality in the supply of these life-oriented products can have severe consequences for the end-users (patients). Therefore, the parties involved in the supply chain should consider delivery speed, flexibility, and use of information technology as crucial factors in the supply chain of pharmaceutical and medical equipment (Mehralian et al, 2015).

### 2.4 Strategic Supply Chain Partnership Practices

Didia (2017) suggests that developing collaborative relationships among supply chain stakeholders such as vendors, customers, and regulatory bodies can aid in increasing trust, integrity, and cooperation thus enabling the parties to improve competitiveness and sustain in the business. Business organizations across the world have recognized that supply chain partnerships are an important factor in enhancing efficiency and effectiveness in public procurement processes. This means that when the parties are working together as partners it promotes trust, cooperation, and openness in the supply chain (Oduro et al, 2020). The use of strategic supplier relationships can enable the organization to achieve its competitive advantage as well as enhance innovations in the supply chain processes (Abtahi et al, 2023). Strategic supply chain partnerships create a better working environment for the parties including the sharing and exchange of important business information which serves as a fundamental basis for establishing better service delivery (Morrison- Smith & Ruiz, 2020).



**Figure 1: Conceptual Framework of Supply Chain Practices and Health Service Delivery**

Source: Developed from Literature Review 2024

## 3. Methodology

This study has used a cross-sectional design which involves collection of data at one point in time across the units of enquiries. The study was conducted across five hospitals in Dodoma City that provide healthcare services under the National Health Insurance Fund (NHIF) program. The hospitals included Aghakhan Hospital, DCMC, Dodoma Region Referral Hospital, Makole Hospital, and Dodoma Medicare Specialized Clinic. These hospitals were selected due to their active involvement in delivering healthcare services under the NHIF scheme. The study targeted a specific group within these five hospitals, comprising employees involved in the delivery of health services under the NHIF, totaling 189 individuals from various departments such as Procurement, ICT, Pharmacy, Medicine, Nursing, Customer Care, Transport, Quality Assurance, and the Outpatient Department. Respondents were chosen based on their roles in conducting routine NHIF operations in the healthcare sector. Using the Yamane formula, the sample size was calculated to yield 128 respondents. Structured questionnaires were then employed, designed around three constructs of Supply Chain Practices: process integration, agile supply chain, and strategic partnerships. These constructs were derived from a study by Mogere et al. (2023), which examined the relationship between supply chain practices and service delivery in Kenya's public healthcare sector. Each construct comprised four items, measured using a 5-point Likert scale ranging from "1 - strongly disagree" to "5 - strongly agree." For sampling procedures, both simple random sampling and purposive sampling techniques were utilized. In the case of simple random sampling, questionnaires were distributed to respondents in early April 2024 using a drop-off and pick-up (DOPU) approach, which facilitated the identification of eligible respondents. Additionally, interviews were conducted with one patient from each hospital who had been admitted for at least two weeks, resulting in a total of five key informants across the selected hospitals. These patients were viewed as key informants because they provided unbiased information regarding the services offered under the NHIF scheme. They were identified through the nursing in-charge's register, which contained details of all admitted patients. For data analysis, quantitative data were analyzed using multiple linear regression analysis to assess the significant relationship between the independent variable (supply chain practices) and the dependent variable (health service delivery). Meanwhile, qualitative data were analyzed using content analysis, which supplemented the quantitative findings by providing confirmatory information from the questionnaires. To ensure the validity of the data, the tools were pre-tested on five NHIF staff members at Makole Hospital who were not part of the sample. Noted ambiguities were corrected to enhance the accuracy and credibility of the tools. Reliability was assessed using Cronbach's Alpha technique, with all constructs showing values above the cut-off point of 0.7, as indicated by Hair et al. (2020). This demonstrates that the data in the constructs are consistent internally, justifying the model's fitness in evaluating the influence of Supply Chain Practices on Health Service Delivery under the NHIF scheme. Table 1 presents the results of the reliability testing.

The multiple regression equation was presented as follows:  $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e$

Where;

Y= Dependent Variable

$\beta$  = Beta coefficient

$X_1$  = Process integration practice

$X_2$  = Agile supply chain practice

$X_3$  = Strategic partnership practices

$\beta_1$  = Regression coefficient for  $X_1$

$\beta_2$  = Regression coefficient for  $X_2$

$\beta_3$  = Regression coefficient for  $X_3$

e = error term

Table 1: Reliability testing

Construct	Number of items	Cronbach's Alpha value
Process integration	4	0.82
Agile supply chain	4	0.87

Strategic partnerships	4	0.78
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The results of reliability testing in Table 1 indicate that all items have a Cronbach's alpha value above 0.7 which is an acceptable cut-off point from a research perspective implying that the data used in this study are consistent and fit to address issues of supply chain practices about improved health service delivery under NHIF.

#### 4. Results

This study tried to examine the influence of supply chain practices on healthcare service delivery under NHIF scheme whereby the regression model was used to analyze and arrive at the expected objectives of the study. In this case, the independent (predictor) variables in relation to supply chain practices included process integration, agile and strategic partnerships while health service delivery represented the dependent variable.

**Table 2: Model Summary Results**

	R	R Square	Adjusted R Square	Std. Error	R Square Change	F Change	df	Sig. F Change
41 <sup>a</sup>	0.641	0.41	0.397	0.7	0.411	28.865	12	<0.001

Results in Table 2 show that the values of the predictor variables collectively account for 41.1% of the variance in healthcare service delivery as a dependent variable. These results implies that the predictor variables have a significant influence on health service delivery under NHIF scheme. In other words, it signals that supply chain practices plays a significant role in improvement of services in health sector.

**Table 3: ANOVA Results**

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	44.204	3	14.735	28.865	<0.001
Residual	63.296	124	0.510		
Total	107.5	127			

a. Dependent Variable: overall\_service\_delivery

b. Predictors: (Constant), Strategic\_partneship, Supply\_Chain, Integration

The results of ANOVA in Table 3 indicate that the F-value is 28.865 ( $p < 0.001$ ) meaning that there is a significant relationships between the independent variable and dependent variable. The F-value indicates a model fitness in the use of regression model to analyze the influence of supply chain practices on health care service delivery under NHIF scheme. In other words, it suggests that the data used in this study were valid and reliable to represent operationalization of supply chain practices in improving the NHIF service delivery.

**Table 4: Coefficient Regression Results**

Table 1. Coefficient Regression Results						
Model	Unstandardized Coefficients		Standardized Coefficients	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta		Lower Bound	Upper Bound
(Constant)	.859	.192		.000	.479	1.239

Process Integration Practices	.290	.071	.297	.019	.431	.150
Agile Supply Chain Practices	.333	.069	.342	.011	.196	.470
Strategic Partnership Practices	.473	.073	.484	.001	.329	.617

In analysing the influence of each predictor variable the results in Table 4 indicate that the most influential variable in improving service delivery in NHIF scheme is strategic partnership practices. This variable has a beta coefficient of 0.484 and a p-value of 0.001 which implies that strategic partnership in supply chain has a significant relationship with service delivery in health sector thus needing special attention in supply chain management perspective. Following these results, an alternative hypothesis was accepted in the view that strategic partnerships between health facilities and their stakeholders significantly influence better services in the health sector.

On the other hand, agile supply chain was observed to be the second influential predictor in improvement of healthcare services whereby its beta coefficient is 0.342 and its p-value is 0.011 implying that supply chain agility enhances fast service delivery to customers in health sector. Following the results, an alternative hypothesis was taken as a better option in the sense that agility in supply chain speeds up service delivery in NHIF scheme and thus meet customer satisfaction. About process integration, the variable emerged as the last in terms of influencing supply chain practices on health service delivery whereby the variable has a beta coefficient of 0.297 and a p-value of 0.019 meaning that the variable has a significant relationships with improving health service delivery. In this case, an alternative hypothesis was accepted with a view that integration of the operating systems and processes between the supply chain partners provides a positive and meaningful influence in improving health service delivery.

## 5. Discussion

The results from this study concur with the results obtained from other past studies that tried to do research on supply chain practices in relation with health service delivery. For example, a study by Singh et al (2023) insisted on integrating systems and processes including financial systems to improve service delivery in health sector. This indicates the need to integrate financial systems and other operating systems among different departments within the organization or even outside stakeholders for effective collaboration and to create a unified flow of healthcare services. Similarly, the study of Oduro (2020) on supply chain factors and the performance of public hospitals observed a positive relationship between supply chain factors (financial, innovation, learning) and improved healthcare services which aligns with findings from this study on agile supply chain practices, particularly in terms of quick medical assistance and process integrated practices which are important factors in improving health service delivery. In other words, the aspect of agility together with establishing an integrated system of operation in the organization is an appropriate strategy that improves service delivery in health care services due to the fact that the nature of health services has a high risk on the life of the people. Therefore, results from this study on the influence of supply chain practices on health service delivery provide broader opportunities for supply chain optimization.

Furthermore, the findings obtained from this study are in harmony with the studies of Mogere *et al.* (2023) as well as Areri & Gekara (2019) who assessed supply chain practices in the health sector and reported that effective communication and resilience in service delivery offers a significant impact on improving the performance of health care sector. Also, the findings from this study support the stakeholder theory which stresses the interconnected relationships between an organization and its stakeholders such as customers, suppliers, employees, communities, and others. This means that when health institutions have established an integrated information system as well as being strategically connected with their supply chain partners it will lead to giving quick responses to patients and other beneficiaries of health services hence saving the lives of the people. In other words, the results suggests that supply chain practices can give a significant impact in management of health service logistics particularly the NHIF operations which are normally needed urgently and in large quantities for serving life of the people. For example, a well-integrated supply chain processes enhances responsiveness in delivering services to patients like identification of needs, order placing, tracking and delivering medical supplies to ending customers. To sum up, the current study's findings are not only consistent with past studies but also contribute to the existing body of knowledge by

specifically examining the influence of the presented supply chain practices on health service delivery under the NHIF scheme. The convergence of insights across these studies highlights the multifaceted nature of supply chain dynamics in healthcare and emphasizes the need for strategic partnerships, agile practices, and integrated processes/systems to enhance overall health service delivery.

## 6. Conclusion

This study attempted to examine the influence of supply chain practices on healthcare service delivery with a major focus on NHIF scheme as a crucial area needing special attention due to its sensitivity on serving life of the people. In this view, the study assessed three variables of interest in relation with supply chain practices namely process integration, agility and strategic partnerships. The first objective was to assess the influence of process integration on healthcare service delivery under NHIF scheme whereby the study concluded that there is a significant relationships between supply chain process integration and healthcare service delivery. In other words, the results suggests that by integrating processes and systems among supply chain partners increases responsiveness in customer needs and orders particularly beneficiaries of NHIF services (patients).

Second, the study examined the influence of supply chain agility on health service delivery under NHIF scheme whereby the study concluded that the two variables have a positive significant relationships in the sense that by allowing flexibility and operating supply chain functions in time ensures fast delivery of medical supplies to patients thus safeguarding their well-being and achieving customer satisfaction.

Third. The study assessed the influence of strategic partnership on healthcare service delivery under NHIF scheme and concluded that there is a significant relationships between the two variables which imply that establishment of partnerships between buyer and supplier enables the parties to share resources and solve existing challenges in a friendly manner thus ensuring smooth flow of materials along the supply chain towards ending customers (patients).

## Acknowledgment

The author gives thanks to all participants in this study particularly College of Business Education community for their material, moral, and financial support which helped much to improve the quality of this study.

## Ethics statement

In order to comply with ethical issues, the researchers sought a permission letter from the employer (College of Business Education) which assured credibility and integrity of researchers in data collection to the visited institutions. In addition, participants were approached voluntarily and anonymously.

## Conflict of interest

No conflict of interest observed that could affect objectives of this study.

## Funding statement

This study was done independently by using own resources of authors.

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