Examining the Role of Non-traditional Actors in the Healthcare Supply Chain Network

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Abstract
The traditional actors have been the focus of healthcare supply chain network studies over the years. Authors have used linear perspectives to examine the challenges and proposed solutions to them. The non-traditional actors in the HSC network including the regulators, and information technology (IT) service providers have been left unexplored. We argue that the non-traditional HSC actors contribute to the successes and failures in the HSC network, and that there is the need to examine how the non-traditional actors influence the HSC network. We leverage the actor network theory and the snowball sampling technique to identify and select sixteen (16) actors and interviewed forty-three (43) individuals to examine how the non-traditional actors contribute to the successes and failures of the HSC network. We found that, both the regulators, insurance firms and IT service providers influence the HSC network. We discussed the findings, contributions of the study to knowledge and practice, and provided avenues for extending this study.

Key words: Healthcare supply chain network, Non-traditional actors, Supply chain disruptions, Actor-network theory.

Introduction

The healthcare supply chain (HSC) is a network of both traditional and non-traditional actors (Carmagnac, 2021; Marques et al., 2020). The traditional HSC actors are the parties involved in the vertical buyer-seller relationships (Asamoah et al., 2011). Studies have identified these parties to include the manufacturers, distributors, wholesalers, retailers and patients (Marques et al., 2020; Manso et al., 2013; Asamoah et al., 2011). The non-traditional supply

chain actors are the actors who do not form part of the traditional HSC however, their operations affect the HSC network (Hopp et al., 2019). They include the health insurance service providers, regulators and IT services providers (Marques et al., 2020).

Studies over the years have examined the traditional actors, how they influence themselves and the challenges they face in the HSC network. For instance, empirical evidences show that the HSC is challenged by the occurrence of frequent stockouts and delays in restocking, poor distribution networks, inadequate and questionable data, inadequate trained human resources, poor quantification and forecasting, constant pace of technological innovations, and poor supply chain financing (Iwu *et al.*, 2020; Kweku, Amu, *et al.*, 2020; Dassah, Adu-Sarkodie and Mayaud, 2018; Manso, Annan and Anane, 2013; Chandani *et al.*, 2012). We argue that the non-traditional HSC actors contribute to the successes and failures in the HSC network, and that there is the need to examine how the non-traditional actors influence the HSC network.

Although the HSC network literature acknowledges the existence of the non-traditional actors, knowledge is lacking on how the non-traditional actors influence the HSC network (Carmagnac, 2021; Marques et al., 2020; Sakyi et al., 2012). Specifically, knowledge is limited on the role of the non-traditional actors in strengthening the HSC network, and the contributions of the non-traditional actors in HSC network disruptions. It is important to address this gap because there is the need to identify and understand the dynamic roles of the non-traditional actors on the HSC network to provide information to managers and policy making bodies towards sustainable HSC network. For instance, (Sakyi et al., 2012) indicated that delays in cashflows from insurance firms result in stockouts, which goes a long way to help managers and policy making bodies to manage insurance firms to reduce HSC disruptions.

Interestingly, few studies have examined the non-traditional HSC actors and were conducted in developed countries (Carmagnac, 2021; Marques et al., 2020). This provides a justification to conduct this study from an emerging country like Ghana to capture evidences and insights from developing countries. This study advances HSC network research by extending the findings of (Carmagnac, 2021; Marques et al., 2020; Sakyi et al., 2012) to account for the contributions of the non-traditional HSC actors from a developing country's perspective.

Brief Literature Review

Actors in the Healthcare Supply Chain Network

The interactions between the traditional and non-traditional actors transforms the HSC to a network. Several studies have made attempt to identify the actors in the network. The study of (Marques et al., 2020) adopted a systematic literature review approach to examine the extent to which the HSC has been examined from network perspectives. The study included seventy-four (74) scholarly articles. Review of the articles identified suppliers, cooperatives, hospitals, clinics, pharmacy, patients, distributors, purchasing companies, medical laboratories, and homecare as traditional actors in the HSC network (Manso et al., 2013; Asamoah et al., 2011). Further, the study identified

regulators, insurance firms (Sakyi et al., 2012), and technology providers as non-traditional HSC network actors. The study of (Manso et al., 2013) adopted a linear approach to assess logistics management in Ghana Health Service (GHS). The study identified central medical stores, regional medical stores, and service delivery points (e.g., clinics, health post) as actors in the traditional HSC network.

The Role of Non-Traditional Supply Chain Actors on the Healthcare Supply Chain Network

The non-traditional actors contribute to the successes and failures in the HSC network. Knowledge is lacking on the role of the non-traditional actors on the HSC network (Marques et al., 2020). Evidences from contemporary studies have shown that the non-traditional actors provide training, develop standards, increase co-creation and connect actors in the supply chain (Carmagnac, 2021; Hyatt & Johnson, 2016). For instance, (Hyatt & Johnson, 2016) adopted social movement perspectives to propose a supply chain framework that included non-profit making organizations (NGOs). The study revealed that, the NGOs work alongside with certain supply chain firms, and go beyond technical roles to serve as coordinators, conveners, organizers, brokers, and negotiators who facilitate multiparty agreement on sustainability issues within and across supply chains. In addition, the study of (Carmagnac, 2021) adopted a systematic literature review approach to examine the role of non-traditional actors in sustainable supply chain management. The study included 58 journal articles between 2008 to 2021. Findings of the study revealed that, the non-traditional actors plays four (4) main roles in supply chain management: (a) instigation – campaigning and exercising pressure on firms using unsustainable ingredients in their products; (b) supporting – provide trainings and develop standards for sustainable supply chain management; (c) facilitating – promote joint initiatives and connect supply chain actors; and (d) leading – manage supply chain and implement changes (Hyatt & Johnson, 2016).

Despite the contributions of the non-traditional actors to the successes in the HSC network, they affect the HSC network through supply chain financing (Kweku, et al., 2020; Sakyi et al., 2012). The healthcare supply chain drives on financial health. The unavailability and delay of HSC funds from health insurance service providers, financial authorities and other financial institutions negatively affects the smooth operations of the HSC resulting in poor healthcare services (Kweku, et al., 2020; Sakyi et al., 2012). The unavailability of funds has resulted in the non-availability of health logistics and delays in restocking (Kweku, Amu, et al., 2020). The effects of information technology (IT) in HSC network is immeasurable. IT is useful at operational automations, data management and processing, tracking and visibility, information sharing through electronic health records (Konduri et al., 2018; Ibegbunam & McGill, 2012). IT is a supply chain enabler and its absence result in various delays and disruptions in the healthcare supply chain (Asamoah et al., 2011). Studies have identified that, technological systems improve healthcare supply chain indicators and harness decision making in the management of healthcare supply chain thereby dealing with the prevalent problem of stock-outs and wastes (Alemu et al., 2020; Konduri et al., 2018; Windisch et al., 2011).

Actor Network Theory

The actor network theory (ANT) was developed in the early 1980s and it highlights the relevance of social forces and actors on the development of technological artefacts, systems and networks (Vicsek et al., 2016). The theory explains that engineering and scientific works are basic building blocks of larger networks or systems (Vicsek et al., 2016; Sismondo, 2011). This means that engineering and scientific works are products of heterogeneous elements involving both human and non-human elements. These elements can only be part of the network (engineering and scientific works) as long as the motive or reasons for their existence in the network is met. ANT posits that, these elements that together forms a network and subsequently a larger and resilient network, are distinct and are governed by their own internal logic (Vicsek et al., 2016; Volti, 2005). Users do not question how these separate entities operate after they are assembled. And that, entities within the network are traced when they fail to cooperate with the other elements of the network. So, when a vehicle transporting pharmaceutics fails to cooperate with the driver, they start to examine to identify which part of the complex network failed. At that point, the vehicle becomes a complex network of electronics and mechanical pieces. ANT is used in different context to trace and understand the integration of both human and non-human elements within a network. This study draws on the actor-network theory to identify and select all the actors that forms part of the HSC network.

Method

The Study Population, Sampling and Firm Selection

Research population is a collection of all objects that are the main focus of a scientific enquiry (Saunders et al., 2007). The population of the study constituted all the actors in the HSC network. We believe that, the ideal path to examine the role of the non-traditional actors in the HSC network is by collecting data from the traditional actors and finally verifying their inputs through the identified non-traditional actors. This provides a justification to why the population constituted both the traditional and non-traditional actors. We adopted the snowball sampling technique (chain-referral-sampling) as a non-probabilistic approach to identify and select hidden actors in the HSC network (Etikan, 2016; Cohen et al., 2002). Since the snowball sampling technique begins with a convenient sample of initial subject through which other "hidden" subjects or units are discovered or recruited, there was the need to select initial actors to begin with. We leveraged the findings of (Marques et al., 2020; Manso et al., 2013) to select the initial actors through which all other actors were identified for data collection. The firms included in the study are firms that have been legally registered with the registrar general department in Ghana, operate under a recognized license within the healthcare space and has been in continuous operation for at least two (2) years. These firms have a considerable amount of experience and capable of referring the researchers to hidden actors.

Development of Research Instrument and Data Collection

We used interview approach for the data collection. The data collection instrument was developed from expert opinions and journal articles (Marques et al., 2020; Manso et al., 2013; Asamoah et al., 2011; Neuberger, C., & Nuernbergk, 2010). We went through three (3) steps or processes in developing and validating the research instrument for the data collection. Drawing on contemporary research studies in the area of HSC and networks, we developed the initial interview guide. The research instrument was then emailed to two (2) HSC researchers with over seven (7) years' experience. Their comments helped us to refine the interview questions. We then emailed the refined interview questions to one (1) HSC traditional actor (a pharmacist and a researcher), one (1) health insurance service provider, one (1) IT service provider, and one (1) regulator for validations. Following the comments received, we developed the final research instrument for the data collection exercise. Table 1a, 1b and 2 are summaries of the research instrument for the traditional actors and non-traditional actors respectively.

In the data collection process, we started with the known traditional actors. The identified firms were asked about where they buy their health supplies from, their competitors, regulators and service providers, their customers, and how each one of them complemented and contradicted their operations in the HSC network. The identified firms were categorized based on the sector they belonged (e.g., manufacturing, distribution, private hospital, etc.). We then followed up on the newly identified firms to ask them same questions until no new inputs were received (saturation).

Permissions were sought from the interviewees to tape record the interviews. We then transcribed the recorded interview data in accordance with acceptable qualitative data analysis practices (Ozcan & Eisenhardt, 2009) and emailed them to the interviewees to ensure that no important information was left out. To ensure the validity and reliability of the data, we hired a professional research firm with extensive qualitative research experience in Ghana to check and recode the taped interview data using a structured coding template. A strong inter-coder agreement of 82% was obtained between the two coders.

We identified sixteen (16) actors made up of 4(25%) non-traditional and 12(75%) traditional actors. A total of 43 participants were interviewed constituting four (4) manufacturers, four (4) distributors, four (4) wholesalers, three (3) retailers, three (3) IT service providers, two (2) regulators, four (4) private health insurance service providers, one (1) public health insurance service provider, three (3) private hospitals, three (3) private clinics, three (3) Private Diagnostics and Medical Laboratories, three (3) public hospitals, two (2) public health centers/clinics, and four (4) National Community Health Planning and Services (CHPS)/community posts.

Table 1a: Research instrument development for the traditional actors

Constructs	Number of questions	Focus	Rationale	Source
Traditional actors	5	• Supplier • Complementarities • Contradictions • Solutions to problems • Buyers	• Identify actors • Identify complementarities. • Identify contradictions or challenges emanating from the suppliers	(Manso et al., 2013; Neuberger, C., & Nuernbergk, 2010)
Co-opetition	6	• Competitors • Complementarities • Contradictions • Solutions to problems	• Identify actors. • Identify complementarities. • Identify contradictions or challenges emanating from the competitors.	(Marques et al., 2020)
Regulators	5	• Regulators • Complementarities • Contradictions • Solutions to problems	• Identify regulators. • Identify how they regulate the actors. • Identify complementarities. • Identify contradictions or challenges emanating from the regulators.	(Marques et al., 2020)
Information technology service providers	4	• Technology • Complementarities • Contradictions • Solutions to problems	• Identify technology usage • Identify complementarities • Identify contradictions or challenges emanating from the IT service providers	(Marques et al., 2020; Asamoah et al., 2011)

Source: Authors construct, (2023).

Table 1b: Research instrument development for the traditional actors

Constructs	**Number of questions**	• **Focus**	• **Rationale**	**Source**
Private health insurance service providers	4	• Insurance and finance • Complementarities • Contradictions • Solutions to problems	• Insurance services • Identify complementarities • Identify contradictions or challenges emanating from private health insurance providers	(Marques et al., 2020; Asamoah et al., 2011)
Public health insurance service providers / national health insurance scheme (NHIS)	4	• Insurance and finance • Complementarities • Contradictions • Solutions to problems	• Insurance services • Identify complementarities • Identify contradictions or challenges emanating from public health insurance providers	(Marques et al., 2020; Asamoah et al., 2011)
Other unknown non-traditional actors	4	• Regulators and service providers • Complementarities • Contradictions • Solutions to problems	• Identify regulators and service providers • Identify complementarities • Identify contradictions or challenges emanating from the identified non-traditional actors	Author's constructs

Source: Authors construct, (2023).

Table 2: Research instrument for the non-traditional actors

Construct	Number of questions	Focus	Rationale	Source
Traditional actors	24	• Regulate • Provide services	• Confirm identified actors • Confirm and identify how they are regulated • Confirm and identify complementarities • Confirm and identify contradictions • Confirm and identify challenges	(Marques et al., 2020; Manso et al., 2013; Asamoah et al., 2011; Neuberger, C., & Nuernbergk, 2010)

Source: Authors construct, (2023).

Findings

Table 3a-3d presents a summary of the findings on the non-traditional actors from the interview data. Table 4 presents a summary of the actors, roles and area of contribution in the healthcare supply chain. Finally, table 5 presents a summary of the actors, their activities that causes supply chain disruptions and the area of supply chain they affect.

Table 3a: Summary of findings on the non-traditional supply chain actors

Non-Traditional Actor	Regulates / Render Services	Regulations / Services	Complementarity	Challenges / Contradictions
Food and Drugs Authority (FDA)	**<u>Regulates</u>** 1. Manufacturers 2. Distributors (***including:*** *central, regional and district medical stores*) 3. Wholesalers 4. Retailers 5. Private Hospitals 6. Private Clinics (***includes:*** *dental and eye clinics*) 7. Private Diagnostics and Medical Laboratories 8. Public Hospitals 9. Public Health Centers / Clinics 10. CHPS / Community Post	• Enforce purchases of registered products. • Enforce sales of registered products. • Ensure adherence to SOPs. • Ensure products are well arranged at the warehouses. • Monitor drugs, medicines, product expiry, drug imports and adverse drug reaction (ADR). • Warehouse inspection • Register and renew product license	• Education and training (workshops also mentioned)	• High cost of introducing new products • Delays in getting feedbacks after reporting adverse drug reactions. • Delays in product registration processes.

Table 3b: Summary of findings on the non-traditional supply chain actors

Non-Traditional Actor	Regulates / Render Services	Regulations / Services	Complementarity	Challenges / Contradictions
Pharmacy Council	**Regulates** 1. Manufacturers 2. Distributors (***including:*** *central, regional and district medical stores*) 3. Wholesalers 4. Retailers 5. Private Hospitals 6. Private Clinics (***includes:*** *dental and eye clinics*) 7. Private Diagnostics and Medical Laboratories 8. Public Hospitals 9. Public Health Centers / Clinics 10. CHPS / Community Post	• Licensing • Set pharmaceutical standards • Register practitioners • Monitor pharmaceutical practices • Ensure accreditation for pharmacy programmes	• Education and training (workshops also mentioned)	-
Information Technology Service Providers (3)	**Render Services** 1. Manufacturers 2. Distributors (***including:*** *central, regional and district medical stores*) 3. Wholesalers 4. Retailers 5. Private Hospitals 6. Private Clinics (***includes:*** *dental and eye clinics*)	• Software applications • Communication • Networking and internet • Data analytics and visualizations • Decision supports	• Education and training • Technical assistance	• Server downtimes • Power outages • Cost of technology • Internet connectivity • Availability of IT professionals

Table 3c: Summary of findings on the non-traditional supply chain actors

Non-Traditional Actor	Regulates / Render Services	Regulations / Services	Complementarity	Challenges/ Contradictions
	7. Private Diagnostics and Medical Laboratories 8. Public Hospitals 9. Public Health Centers / Clinics 10. CHPS / Community post 11. FDA 12. Pharmacy Council 13. Private Insurance Firms 14. Public Insurance Firms (NHIS)			
Private Health Insurance Service Providers (4)	**<u>Render Services</u>** 1. Retailers 2. Private Hospitals 3. Private Clinics (***includes:*** *dental and eye clinics*) 4. Private Diagnostics and Medical Laboratories 5. Public Hospitals 6. Public Health Centers / Clinics 7. CHPS / Community posts	• Insurance services or policies • Assessment and Monitoring	• Access to funds • Educations on insurance coverage and policies • Training • Increased customer base	• Delay in cashflows • Patients are not educated on insurance coverage

Table 3d: Summary of findings on the non-traditional supply chain actors

Non-Traditional Actor	Regulates / Render Services	Regulations / Services	Complementarity	Challenges/ Contradictions
Public Insurance Service Providers / National Health Insurance Scheme	**<u>Render Services</u>** 1. Retailers 2. Private Hospitals 3. Private Clinics (***includes:*** *dental and eye clinics*) 4. Private Diagnostics and Medical Laboratories 5. Public Hospitals 6. Public Health Centers / Clinics 7. CHPS / Community posts	• Insurance services or policies • Assessment and Monitoring	• Access to funds • Educations on insurance coverage and policies • Training • Increase customer base	• Delay in payments or cashflows • Patients are not educated on insurance coverage • Reform policies are not communicated on time

Source: Authors construct, (2023)

Table 4: Summary of the actors, roles and area of contribution in the healthcare supply chain

Actor	Role	Area of contribution
FDA	• Enforce the purchases and sales of registered products. • Register and renew product license	Quality
	• Warehouse inspection (e.g., temperature) • Monitor drugs, medicines, and product expiry	Cold chain and Warehousing
	• Organizes workshops • Education and training	Staff training
Pharmacy Council	• Register practitioners • Set pharmaceutical standards • Monitor pharmaceutical practices	Quality
	• Organizes workshops • Education and training	Staff training
Information Technology Service Providers	• Software applications development • Networking and internet • Data analytics and visualizations • Decision supports	Forecasting and planning, Supply chain visibility
	• Education and training • Technical assistance	Staff training
Private and Public Insurance Service Providers	• Access to funds	Supply chain financing
	• Organizes workshops • Education and training	Staff training

Source: Authors construct, (2023)

Table 5: Summary of the actors and their activities that causes healthcare supply chain disruptions

Actor	Activities that cause disruptions	Supply chain area affected
FDA	• High cost of introducing new products • Delays in product registration processes.	• Procurement
Information Technology Service Providers	• Server downtimes • High cost of technology • Poor internet connectivity • Unavailability of IT professionals	• Forecasting and planning • Supply chain visibility • Technology adoption
Private and Public Insurance Service Providers	• Patients are not educated on insurance coverage • Delay in payments or cashflows	• Queueing • Supply chain financing

Source: Authors construct, (2023)

Regulators

Food and Drugs Authority (FDA)

The FDA is "the national regulatory body responsible for the regulation of food, drugs, food supplements, herbal and homeopathic medicines, veterinary medicines, cosmetics, medical devices, household chemical substances, tobacco and tobacco products, blood and blood products as well as the conduct of clinical trials protocols" in Ghana (FDA, 2022). The FDA regulates the operations of ten (10) traditional actors within the healthcare supply chain – manufacturers, distributors, wholesalers, retailers, private hospitals, private clinics, private diagnostic and medical laboratories, public hospitals, public health centers / clinics, and CHPS / Community posts. They register and renew product license, enforce the purchase and sales of registered products, monitor adverse drug reaction (ADR) and inspect warehouses. As a way of complementing and providing operational assistance to the traditional actors, the FDA organizes training workshops and educate them on reporting adverse drug reactions (ADR) and disposables. For instance, the following statements were made to affirm these complementarities by the traditional actors:

"*they [FDA] organize workshops for us based on observations on recent surveillance in the region*" – Wholesale manager;

"…*yes, it's not frequent but they do. I remember they [FDA] organized a workshop on reporting ADR [adverse drug reaction] some time ago.*" – Pharmacist; "*well, they have a lot of information on their website, so I think it is a form of education"* – Pharmacist.

Despite, some operational activities of the FDA present challenges to the traditional actors. The study revealed that, there is a high cost of introducing new products onto the market. In addition, it takes a longer time to get new products registered. One pharmaceutical manufacturer stated:

"…*it takes too long to register a new product. On their [FDA] website, it takes at least three (3) months to receive acknowledgement letter after applying to register a new product. Then at least six (6) months to get feedback from them [FDA] whether your product was accepted or deferred*" – Pharmaceutical manufacturer.

An interview with the Ashanti Regional head, FDA, revealed that the delays are as a result of quality and safety checks.
Moreover, there is a huge gap between the time of reporting ADR and getting feedback. It was opined that; the FDA develop strategies on reducing the time to response on reporting ADR as well as reducing the cost of registering products. Some of the traditional actors stated:

"*in my opinion, they should develop an app that will help us get immediate feedback*" – Pharmacy manager; "*I think we will be glad if they could reduce the charges for registering new drugs*"- Wholesale manager.

Pharmacy Council

The Pharmacy Council "is established by Parts IV & VI of the Health Professions Regulatory Bodies Act, 2013, (ACT 857) as a body corporate with perpetual succession in Ghana. It's core mandate is to secure in the public interest the highest standards in pharmaceutical practices in the country" (PC, 2022). The pharmacy council regulates the operations of ten (10) traditional actors within the healthcare supply chain – manufacturers, distributors, wholesalers, retailers, private hospitals, private clinics, private diagnostic and medical laboratories, public hospitals, public health centers / clinics, and CHPS / community posts. They set pharmaceutical standards and monitor practices, licensing and renewals, registering practitioners and ensuring accreditation for pharmacy programmes. It was opined that; the basic existence of pharmaceutical retailers is as a result of approval issued by the pharmacy council. For instance, the pharmacy council can shut down or revoke the operational license of a retailer for not having the "right" staff. One retailer said:

"…*they [pharmacy council] help us in establishment. They need to certify you before you can operate. You need their certification before you can even proceed to the FDA (Food and Drugs Authority); you know, they can shut your shop*

down for not having the right staff" - Retailer.

Similar to the FDA, the pharmacy council complement the operations of the traditional actors through education and training programs, and organizing workshops. One pharmaceutical manufacturer stated:

"*they [Pharmacy council] collaborate with other agencies to organize trainings and workshops for us*" – Pharmaceutical manufacturer.

Information Technology Services Providers (ITSP)

The information technology service providers are indispensable non-traditional actors within the healthcare supply chain. The study showed that they offer services to all the actors within the healthcare supply chain – manufacturers, distributors, wholesalers, retailers, private hospitals, private clinics, private diagnostic and medical laboratories, public hospitals, public health centers / clinics, and CHPS / community posts, regulators (e.g., FDA, Pharmacy council), private and public health insurance firms. It was revealed that, ITSP offer the services of software applications development, communications, network and internet, decision supports, data analytics and visualization to the actors within the HSC. According to the respondents, information technology allows for easy information access, communication and taking feedback, serving customers, placing requisitions, checking stock levels, inventory management, records keeping and retrieval, tracking expiry dates and providing insight for decision making through analytics. However, server downtimes, power outages, cost of technology, internet connectivity, availability of IT professionals and data security issues require critical attention. One pharmacist stated:

"…*we even use a software at our sales point and warehouse. That explains how indispensable IT is in our business. …yes, my concerns are security issues and cost. Like, it's really expensive and even that, the IT guys are not easy to find. I don't know but those guys want to work part-time and it's a problem because sometimes we need immediate fix and they won't be around*" - Pharmacist.

One registered community nurse (RCM) also stated:

"…*yes, we use phones for calls, NHIS [national health insurance scheme] renewals and sometimes for browsing but this place, our network is bad. So, the internet is always on edge*" - RCM.

Private Health Insurance Services Providers

Private health insurance firms are regulated by the national health insurance authority (NHIA) mandated by the National Health Insurance Act, 2012 (Act 852) in Ghana. The private health insurance service providers assess, monitor and provide insurance services to seven (7) traditional actors (both public and private) – retailers, private hospitals, private clinics, private diagnostic and medical laboratories, public hospitals, public health centers / clinics, and CHPS / community posts. The study revealed that the private health insurance service providers complement the operations of the traditional actors through the provision of trainings and education on health insurance policies and coverages. In addition, private health insurance gives the actors a large customer-base. Despite, most private health insurance firms fail to educate their clients on coverage. One pharmacist indicated that:

"*some private insurance firms do not tell their clients about what the insurance policy cover. So, when the patient comes to our shops requesting for drugs that are not covered, we land in their trouble for asking them to pay*" - Pharmacist.

Additionally, delays in cashflows from the private health insurance firms are key challenges that requires attention. It was

suggested that, private insurance firms educate their clients on insurance policies and as well implement strategies for prompt payment of services as a means of curbing the challenges faced by the actors within the healthcare supply chain.

Public Insurance Service Providers/ National Health Insurance Services (NHIS)

The public health insurance service providers also known as the national health insurance scheme (NHIS) is a social intervention program introduced by government to provide financial access to quality health care for residents in Ghana (NHIS, 2022). NHIS assess, monitor and provide insurance services to seven (7) traditional actors (both public and private) – retailers, private hospitals, private clinics, private diagnostic and medical laboratories, public hospitals, public health centers / clinics, and CHPS / community posts. In complementing the operations of these traditional actors, the NHIS provide trainings and education on health insurance coverage, access to funds and increase health facilities customer base. One pharmacist from a private hospital stated:

"*I would say they [NHIS] assist our operations in many ways like, we get more customers because we accept NHIS. And that is because, the mindset of the people is that private firms deliver better quality of services than the public, so when they get to know that we accept NHIS, they visit our facility. And you know, NHIS is less expensive than the private ones so they have a large customer base. So, I think this is how they [NHIS] assist us in our operations*" - Pharmacist.

In addition, one nurse from a public hospital stated:

"*yes, they [NHIS] offer trainings and education, …like education on changes in price and policies. Just that, they don't inform us on time*" - Nurse.

Despite, the study revealed that NHIS fail to educate their clients on their policies and coverage. Additionally, there are delays in cashflows and communications on reform policies. For instance, one pharmacist said:

"*I don't accept NHIS [public health insurance], it is worst. In those days, we were going for loans to restock*". One nurse from CHPS stated "*they [NHIS] don't educate the patients on what is covered and because of that we often have problems with the patients when they come here. The last time, one patient came here with two complaints that required different diagnosis. In fact, only one of her complains was under NHIS coverage at our level. But when we asked her to pay, she didn't want to even after we explained things to her because she doesn't understand why she has NHIS and still have to pay. So, they [NHIS] must educate them*" – Pharmacist.

It was suggested that, NHIS educate their clients on insurance policies and as well implement strategies for prompt payment of services as a means of curbing the challenges faced by the actors within the healthcare supply chain.

Discussions

The Role of the Non-Traditional Actors in Strengthening the Healthcare Supply Chain Network

The study identified three (3) category of actors that contribute immensely to the successes of the healthcare supply chain - regulators, information technology service providers and insurance firms (Marques et

al., 2020). The regulators consisted of the Food and Drugs Authority (FDA) and the Pharmacy Council. The insurance firms consisted of the private health insurance service providers and the public or national health insurance scheme (NHIS).

The study revealed that, the non-traditional actors contribute to the successes of the healthcare supply chain in the area of quality, cold chain and warehousing, forecasting and planning, staff training, and supply chain financing. In the area of quality, the FDA and the pharmacy council (both regulators) register healthcare practitioners, set and monitor pharmaceutical standards (Hyatt & Johnson, 2016), and enforce the purchase and sales of only registered health products. It was also revealed that, the FDA inspect warehouses to ensure that drugs and medicines are kept under the recommended temperature (cold chain). These enforcements contribute to the preservations of drugs and medicines and the removal of unqualified personnel and counterfeit health products from the healthcare supply chain.

In addition, the information technology service providers (ITSP) contribute to the successes of the healthcare supply chain through the implementation and deployment of software applications, network and internet facilities, data analytics and visualizations and decision support systems to assist the operations of both the traditional and non-traditional actors (Asamoah et al., 2011). Specifically, the services of the ITSP allows for easy information access, communication and taking feedback, serving customers, placing requisitions, checking stock levels, inventory management, records keeping and retrieval, tracking expiry dates and providing insight for decision making through analytics. It was revealed that, these systems have the capabilities of tracking health products from the manufacturer to the final consumer (supply chain visibility) and as well create opportunities for planning through its forecasting capabilities.

Further, the private and public health insurance service providers contribute to the successes of the healthcare supply chain through the provision of funds to finance healthcare supply chain activities (supply chain financing) (Sakyi et al., 2012). It was revealed that, the actors (e.g., private hospitals) request (claims) for funds from the insurance firms for restocking.

Finally, the study showed that the non-traditional actors collaborate with local and international agencies to provide trainings and education to the traditional actors (staff training) which presents an opportunity for strengthening the healthcare supply chain (Hyatt & Johnson, 2016).

The Contributions of the Non-Traditional Actors in Healthcare Supply Chain Network Disruptions

It was revealed that the food and drugs authority, information technology service providers and insurance firms contribute to the disruptions within the healthcare supply chain (Marques et al., 2020).

The study showed that the cost of introducing new product on the market is high and there are delays in the product registration processes which causes disruptions in the healthcare supply chain especially in the area of procurement. For example, the high cost of registering new products and the delay in its registration

during emergency situations may result in patients dying from curable diseases (Sakyi et al., 2012). This is because the regulations of the food and drugs authority permits for the procurement and sales of only registered products.

It was also revealed that, the actors within the healthcare supply chain depends on information technology (e.g., software applications and decision support systems) for inventory management, forecasting and planning, and supply chain visibility (Asamoah et al., 2011). The operational challenges emanating from the information technology service providers including server downtimes, poor internet connectivity, and the unavailability of IT professionals result in supply chain visibility, forecasting and planning challenges. According to Asamoah et al., (2011), IT is a supply chain enabler and its absence result in various delays and disruptions in the healthcare supply chain. The study revealed that, the high cost of technology affects it adoption rate which eventually result in supply chain disruptions.

Further, it was revealed that the delay in cashflows from both the private and public insurance service providers contribute to the disruptions within the healthcare supply chain especially in the area of supply chain financing (Sakyi et al., 2012). The relationship between the insurance policy providers, patients and the traditional actors (e.g., private hospitals, public health centers) is that, the patients or customers buy insurance policies from the health insurance service providers. Then the health facilities provide medical care to the patients and put in claims for payment from the insurance service providers. The study revealed that, it takes longer periods for the insurance firms to pay claims to the health facilities. The delay in these cashflows results in drug and medicines shortage. In addition, the insurance service providers fail to educate their clients on the policy coverage which results in queueing. The problem of queueing arises as a result of health facilities educating patients on why they need to pay for services they enjoyed but their insurance policies do not cover.

Summary

We argued that the non-traditional actors contribute to the successes and failures in the HSC network. Leveraging the snowball sampling technique, we identified and selected five (5) non-traditional and eleven (11) traditional HSC network actors. The study revealed that the non-traditional actors contribute to the successes within the healthcare supply chain in the areas of supply chain quality (regulators), cold chain and warehousing (regulators and IT service providers), staff training, forecasting and planning (IT service providers), supply chain financing (insurance service providers) and supply chain visibility (IT service providers). For instance, it was revealed that the non-traditional actors inspect warehouses, monitor drugs, enforce the purchase and sales of registered products, organize workshops, register practitioners, provide predictive and prescriptive analytical tools for the purposes of predictions and planning and making funds easily accessible to the traditional actors.

Despite the contributions of the non-traditional actors in the successes of the healthcare supply chain, they contribute to the disruptions and failures in the healthcare supply chain. The areas of the healthcare supply chain activities that are

affected include procurement, planning and forecasting, supply chain visibility, technology adoption, queueing and supply chain financing. It was shown that, a greater amount of the disruptions in these areas of healthcare supply chain emanates from the non-traditional actors (regulators, IT service providers and insurance service providers). For instance, it was revealed that there is high cost and delays in registering new products, high cost of technology, poor internet facilities, and delay in payments or cashflows from health insurance firms.

Contributions and Recommendations

Our study contributes to the HSC network literature and practice in couple of ways. We extend the findings of (Carmagnac, 2021; Hyatt & Johnson, 2016; Sakyi et al., 2012) to identify how the non-traditional HSC network actors contribute to the successes and failures on the HSC network. Further, we investigate a wide range of non-traditional actors (e.g., regulators, IT service providers, and insurance firms) through the traditional actors (e.g., hospitals, manufacturers, distributors, etc.) to understand how the non-traditional actors influence the HSC network. In addition, this study responds to a call to examine the HSC network from the non-traditional actors perspectives (Marques et al., 2020).

Over the years, studies have examined the challenges in the HSC and suggested solutions to them from linear perspectives which include the manufacturer, distributor, retailer and patient (Asamoah et al., 2011; Brako et al., 2016; Ibegbunam & McGill, 2012; Manso et al., 2013). However, the HSC is also influenced by the non-traditional actors (Marques et al., 2020). Our findings present a new direction for managers and policy makers to face towards minimizing supply chain disruptions. Specifically, this study will help policies makers to design policies and implement structures to reduce the pressure from regulatory bodies (Marques et al., 2020) and financial institutions like the insurance firm (Sakyi et al., 2012) to minimize the disruptions. In addition, managers will leverage our findings to manage IT service providers and insurance firms to reduce the delays in cashflows.

Direction for Future Research

We propose that future studies empirically test the findings on the contributions of the non-traditional actors to the successes and failures in the HSC network. In addition, future studies should examine the extent to which the non-traditional actors influence the HSC network. Just like any other research activity, we acknowledge potential drawbacks associated with the study. The study was conducted in Ghana and that, key actors in the HSC network may have been left out because they are not available in Ghana.

Disclosure statement

No potential conflict of interest was reported by the authors.

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