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**PHARMACEUTICAL SUPPLY CHAINS IN NIGERIA: A  
FRAMEWORK FOR OUTSOURCING OUTBOUND  
VALUE CHAINS**



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**PHARMACEUTICAL SUPPLY CHAINS IN NIGERIA: A  
FRAMEWORK FOR OUTSOURCING OUTBOUND VALUE CHAINS**

A thesis presented

by

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to

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August, 2019

## DEDICATION

To the Glory of:  
God, Almighty.

To Nepsy, my dear wife and Divine, Shekinah & Ohigbai; my lovely children - you mean so much to me.

To my dear parents – David Aigbavboa (1927 – 1977); Christiana Aigbavboa (1936 – 2018) and father in-law, Jonathan Ojeh Oziegbe (1936 – 2002)



## DECLARATION

I, Aigbavboa Solomon Ohiolei, declare that “**Pharmaceutical supply chains in Nigeria: A framework for outsourcing outbound value chains**” is my own work. I confirm that information and materials used in the study have been duly acknowledged both in the body of the work and in the references.

The thesis is submitted in fulfillment of the requirements of the degree Doctor of Philosophy in Operations Management of the University of Johannesburg, South Africa.

Aigbavboa, Solomon Ohiolei

Date: August 15, 2019



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**Solomon Ohi. Aigbavboa**  
**May 29, 2019**



## ABSTRACT

Effective patients' treatment is predicated on availability of high quality medicines access. The outbound segment of pharmaceutical supply chains is critical to achieving this goal. In this study, the pharmaceutical supply chains management in Nigeria with emphasis on the outsourcing of the outbound value chains was investigated. The objectives were to study the extent of outsourcing of outbound value chain activities in the Nigerian pharmaceutical industry, investigate the rationale for outsourcing outbound pharmaceutical value chains in Nigeria, study the critical criteria for a successful selection and outsourcing relationship with 3<sup>rd</sup> Party Service Providers, identify the desired outcomes of outsourcing outbound pharmaceutical value chains and utilize the study results to develop a framework for outsourcing and improvement of outbound value chain activities in the Nigerian pharmaceutical industry.

In conducting the study, detailed review of literature on pharmaceutical supply chain management in Nigeria, overview of outsourcing in general and pharmaceutical supply chains in particular was undertaken. A sequential exploratory mixed method approach with Delphi study preceding a quantitative survey was adopted. The Delphi technique engaged experts from the pharmaceutical industry in Lagos, South West Nigeria. The Delphi panel was composed of 17 expert members (10 Chief Executive Officers, 3 Country Managers and 4 Executive Directors) drawn from the five categories in the private sector of the industry: multinational manufacturing - 6 (35.3%), overseas' manufacturers' representatives - 2 (11.8%), indigenous manufacturers - 3 (17.6%), importers/distributors - 4 (23.5%) and large pharmacy chains - 2 (11.8%). Open-ended and closed-ended questions in the developed questionnaire were used to conduct two rounds of the Delphi iterations before a consensus was achieved and data analysed. The quantitative survey was conducted with 100 respondents from all the seven categories of the industry. Data analysis was through descriptive and exploratory factor analysis. The findings of quantitative survey were in congruence with the Delphi study. 13 (thirteen) factors extracted from the data were used as the inputs for the development of a valuable outcome of the research – a framework for outsourcing outbound pharmaceutical value chains. Valuable contributions to knowledge, research methodology and policies have been made from the results of this study. Outsourcing in the Nigerian pharmaceutical industry is a relatively new and growing practice. Given the nature of products handled in the outbound value chain and the myriad of infrastructural and systemic



challenges confronting the sector, any outsourcing decision needs to be critically examined and carefully taken. The study has developed a new framework, which will be useful in providing organizations with a handy tool in taking the outsourcing decision.

Keywords: Supply chain management; pharmaceutical outbound value chains; framework for outsourcing pharmaceutical outbound value chains.



## PUBLICATIONS

1. Solomon Aigbavboa & Charles Mbohwa (2019). Going the extra mile: vital third party logistics service providers' pre-selection activities by pharmaceutical organizations.
  - a. **Status:** Full paper peer-reviewed and presented at the SCOPUS indexed International Conference on Sustainable Infrastructural Development, Covenant University, Ota, Nigeria, June 24 – 28, 2019
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  - a. **Status:** Full paper peer-reviewed and accepted for presentation at the 17<sup>th</sup> Global Conference on Sustainable Manufacturing, Shanghai China October 9 – 11, 2019
4. Solomon Aigbavboa & Charles Mbohwa (2019). Reaching the patients with difficulty: a Delphi study on pharmaceutical outbound supply chains in Nigeria.
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## LIST OF ACRONYMS & ABBREVIATIONS

3PL	-	Third party logistics provider
CMS	-	Central Medical Store
CSCMP	-	Council for Supply Chain Management Professionals
DS	-	District Store
FMCG	-	Fast Moving Consumer Goods
HIV	-	Human immunodeficiency virus
LGA	-	Local Government Area
LSP	-	Logistics Service Provider
MDG	-	Millennium Development Goals
NGO	-	Non-governmental organization
OECD	-	Organization for Economic Co-operation and Development
PSC	-	Pharmaceutical Supply Chain
RS	-	Regional Store
SC	-	Supply Chain
SCM	-	Supply Chain Management
SSA	-	Sub-Saharan Africa
UNICEF	-	United Nations Children Education Fund
USAID	-	United States Agency for International Development
WHO	-	World Health Organization
WMS	-	Warehouse management system

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# CHAPTER 1

## BACKGROUND TO THE STUDY

### 1.1: Introduction

This chapter provides contextual background information for the research, touching briefly on the concept of pharmaceutical supply chains, an overview of the Nigerian pharmaceutical supply chains and the practice of outsourcing in the pharmaceutical industry. The chapter further states the research problem, objectives, questions, motivation and significance of the study. An outline for the study is presented as well.

### 1.2: Pharmaceutical Supply Chains

Efficient and effective supply chains for medicines and vaccines are very vital to the delivery of health services. Any functional healthcare system requires amongst others, supply chains which provides sustained flow of medicines and other medical products throughout the system. (Kraiselburd & Yadav, 2014; Yadav, 2015). The supply chain of pharmaceutical products is significant in any healthcare system (Jaberidoost *et al.*, 2013).

Pharmaceutical products are very valuable to health systems as alongside other healthcare services, they contribute to enhance quality of life by reducing morbidity and mortality rates. Pharmaceutical products differ from other commodities, given their form, composition and the purpose for which they are used. People depend on them for their health and sometimes, even for life itself (Kohler *et al.*, 2012). A functional pharmaceutical supply chain is very vital in creating competitive advantages for companies. On the other hand, it has been described as challenging because of its complex nature and the strict government regulations in this field (Yousefi *et al.*, 2015). The primary aim of pharmaceutical supply chains is ensuring timely delivery of good quality medicines to the patients. However, 30 to 50 percent of the population living in less developed countries have not access to basic medicines (Salem, 2015).

### **1.3: Pharmaceutical Supply Chains in Sub-Saharan Africa**

The configuration of the pharmaceutical supply chains in many resource-poor economies like Sub-Saharan Africa (SSA), is linked to the organizational structure of the country both at the public and private sectors. This results in multiple layers of decision points both for stock storage and distribution along the supply chains. (Yadav, 2015). The public-sector supply chains of these countries are historically and mostly managed by the various Ministries of Health who operate through Central Stores and sometimes, a pool of motor vehicles (Watson & McCord, 2013; WHO/Yadav *et al.*, 2011). Subject to the size and number of health facilities, other layers of distribution points may be operational. Various funding and partner partners such as USAID and Global Fund provide additional storage and distribution locations to complement the governments' efforts. These locations work alone in parallel or sometimes, integrated with the existing supply chains of the government. (WHO/Yadav *et al.*, 2011).

The private sector has a different structure comprising of manufacturers (where available), importers, wholesalers and other channel members/players like the pharmacy stores and Patent and Proprietary Medicine Vendors (PPMVs). Importers and sometimes, wholesalers function as the link between the manufacturers and other channel members like retail outlets (pharmacies and PPMVs), doctors and hospitals (Yadav, 2015). Over the years, the pharmaceutical supply chains (PSC) in SSA have faced many challenges, which have impacted negatively on the performance of the chains. These challenges include but not limited to: Stock-outs and product shortages (Odendal, 2013; Gray, 2014; Iyengar *et al.*, 2016; Blanas *et al.*, 2016; Mikkelson-Lopez *et al.*, 2015; Oyekale, 2017; Poyer *et al.*, 2016; Agyare *et al.*, 2017); Fake and counterfeit products (Kohler *et al.*, 2012; Mackey *et al.*, 2013; Cohn *et al.*, 2013; Khan *et al.*, 2015); Disruptions (Zegordi *et al.*, 2012; Kohler *et al.*, 2012; Sayed *et al.*, 2016; Hamisu *et al.*, 2016); Product Expiration (Jahre *et al.*, 2012; Olatunji, 2013; Oluwatuyi *et al.*, 2014; Sauls, 2016). Other challenges include: Corruption (Transparency International, 2015; Mackey *et al.*, 2016; Tormusa *et al.*, 2016; Global Fund, 2016); Poor Infrastructure (Schürenberg-Frosch, 2014; Fowkes *et al.*, 2016; Arewa, 2016; Ettah, 2017; Yakum *et al.*, 2015) and Weak regulatory systems (Preston *et al.*, 2012; Giralt *et al.*, 2017).

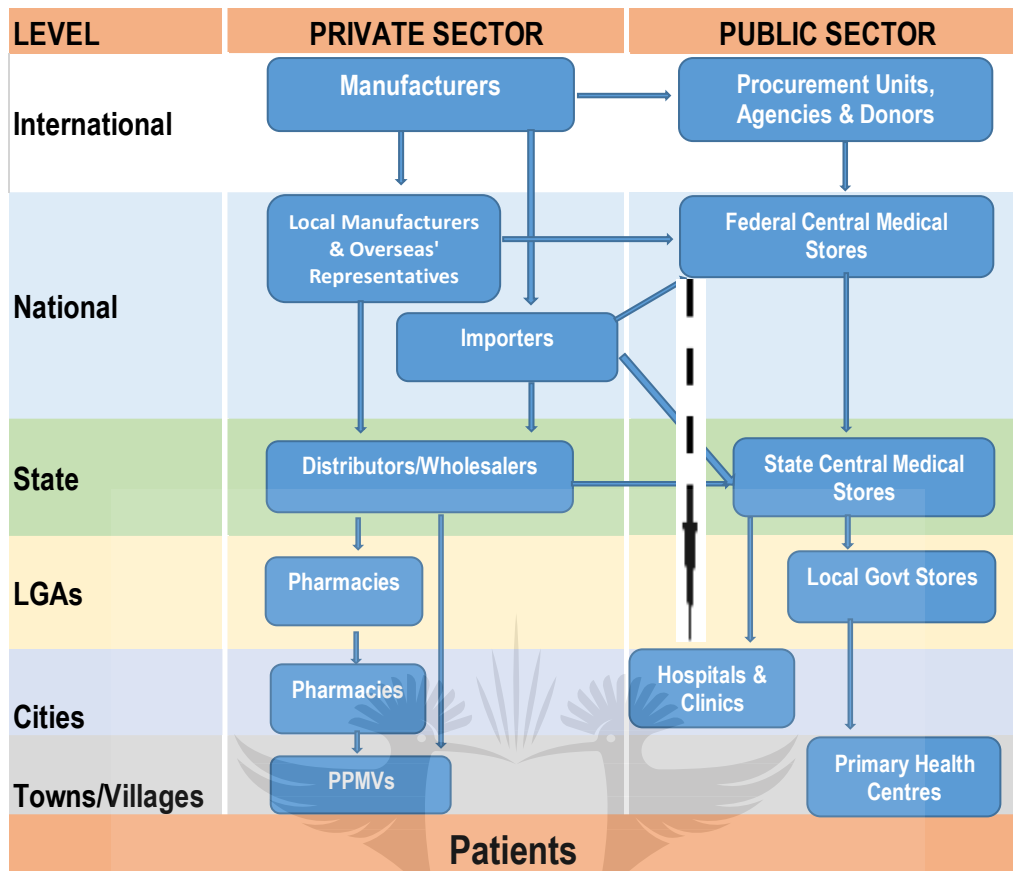


In summary, the pharmaceutical supply chains in both private and public sectors in SSA countries still face several challenges. As a result, they have remained weak and ineffective, threatening the overall success, efficiency and effectiveness of the various chemotherapies. Ultimately, the overall health system fails in its ability to adequately cater for the healthcare essentials of the population. (Yadav, 2015). To varying degrees, these challenges negatively affect the effectiveness and efficiencies of the countries' pharmaceutical supply chains. While some challenges such as weak regulatory systems, poor infrastructure and product shortages/stock-outs may cut across these countries and may be synonymous with the weak political and socio-economic developments in these countries, others like corruption, fake and counterfeit drugs are prevalent to different degrees and a reflection of the values and governance structures obtainable in the countries.

Comparatively, supply chains of the private sector are perceived to be more efficient and effective and are characterized by higher levels of availability of medicines, several daunting challenges still hinder this sector in the distribution of medicines (Yadav, 2015). According to the study, these challenges include: poor availability in rural areas, high prices, poor quality and sub-optimal assortment, shortage of manpower and the menace of unlicensed medicine sellers. (Wafula *et al.*, 2012).

#### **1.4: The Nigerian Pharmaceutical Supply Chains**

With about 186 million people and an area of 923,768 km<sup>2</sup>, Nigeria has the largest population in Africa. By 2016, its Gross Domestic Product (GDP) was estimated at \$485b. Life expectancy is 52 years for males and 53 for females respectively. Nigeria is a major crude oil producer and generates most of its revenue (80%) from the product (Oxford Business Group, 2017).



**Figure 1. 1: The Nigerian Pharmaceutical Supply Chains** (GAVI, 2015 & Yadav, 2015).  
 LGAs = Local Government Areas; PPMVs = Proprietary & Patent Medicine Vendors.

As shown in Figure 1.1, in the Nigerian public sector, the supply chains of medicines is both centralized and regionalized. (Attaran *et al.*, 2012; Iwokwagh, 2013). The procurement, storage and distribution of medicines are done by the various tiers of government and institutions. Each state in all the geo-political zones of Nigeria has its own Central Medical Store and manages the supply chains from these facilities (Onwujekwe *et al.*, 2009). Drugs for some disease and infections like HIV are managed centrally by the Federal government (Erhun & Babalola, 2004).

Wholesalers (both licensed and unlicensed) are significant players in the supply chains (Aisagbonhi & Ilomuanya, 2016; Sieverding & Beyeler, 2016). At the last segment of the chains, the delivery to the patient is through the health facilities and institutions (hospitals, clinics, primary healthcare centres) and the retail outlets (pharmacies & PPMVs).

The Nigerian public health system faces several challenges in delivering services (Abimbola *et al.*, 2014; Abimbola *et al.*, 2015) with public facilities in many states without adequate infrastructure and trained personnel (World Bank, 2010; Abimbola *et al.*, 2015). In the rural areas, the health facilities lack basic services and often experience stock outs and shortages of medicines. Pharmacies are also few in these areas (Sieverding and Beyeler, 2016). Scarcity of some drugs and poor drug regimens further complicate the problems of pharmaceutical supply chains in Nigeria (Akinwande *et al.*, 2009).

In a study of multi-drug resistant tuberculosis treatment in Nigeria, delay in drug delivery was identified as a supply chain limitation. In resource-poor with inadequate transport infrastructure, this, amongst others, contribute to the preponderance of drug stock outs (Jatau *et al.*, 2015). Managing supply chains in countries like Nigeria with expansive geography is often problematic. Sometimes, the storage/distribution points and the various health facilities can be separated by wide geographies (Jatau *et al.*, 2015). These supply chains limitations cause ultimately, poor/sub-optimal health outcomes. Despite the efforts of the government, private sector and foreign donor agencies over the last decade, the status of the public supply chains was summarised as follows: “The Nigerian public sector (national) supply chain for pharmaceuticals and other healthcare products has been plagued over several years with numerous challenges resulting mainly from inadequate funding, infrastructure and coordination. Specific challenges include weak capacity, poor supply and demand management and parallel systems by different programmes and Implementers. These have resulted in stock-outs, damages, expiries, and other forms of wastages, which ultimately lead to sub-optimal health outcomes” (FMOH, 2016:5).

Some of these challenges have been the subject of different researches with many necessitating further studies. Palafox *et al.* (2014) assessed the composition and structure of the private sector distribution chains with focus on anti-malarial drugs in a study conducted in six countries including Nigeria. Their report confirms the presence of multiple layers and channels between the manufacturer and retailers. They concluded that the supply chains of antimalarial medicines vary across countries and any effort aimed at improving these supply chains access to quality treatment should recognise this unique structure. Ubajaka *et al.* (2016) in their article, reviewed relevant literatures published from 2004 to 2015 on drug counterfeiting in Nigeria and analysed the factors promoting the sales and distribution of counterfeit drugs in Nigeria. They found out that poor and

ineffective legislation, chaotic distribution system and lack of cooperation from government agencies, amongst others were the major factors associated with drugs counterfeiting in Nigeria.

Although the study by Isola & Mesagan (2016) provided insights into the relationships and performance of the Nigerian pharmaceutical industry, it did not address the issues of supply chains in the industries. In their findings, they concluded that the market structure was a predominant factor in determining the performance of the pharmaceutical industry in Nigeria. Findings from other studies have highlighted factors such as limited access to drugs (Adebisi, 2013; Obuaku, 2014; Onwuka, 2016) and fake drugs syndrome (Oluwatuyi, 2014) as limitations of pharmaceutical supply chains in Nigeria.

### **1.5: Outsourcing in Pharmaceutical Supply Chains**

Outsourcing as a concept and practice has become key and strategic for many organizations in their quest for costs reduction and focus on their core areas. Many developments have contributed greatly to the practice of outsourcing globally. These include but not limited to such contemporary issues as globalization, perceptive customers, organizational restructuring and various technological advancement (Gerbl *et al.*, 2015). In pharmaceutical supply chains (PSCs), some activities both in the inbound and outbound segments have been outsourced in both sectors of the industry. An extensive investigation by GAVI and Transaid (2015) in some sub-Saharan African countries including Nigeria focused on outsourcing of public pharmaceutical supply chains. The report focused on how to outsource public PSCs to the private sector in SSA. It analysed the existing methods being used, the challenges and lessons learned from the cases with each country under focus.

For Nigeria, they focused on establishing a modern supply chain and noted amongst others, the significant improvement/transition with the public sector outsourcing its supply chains to the private sector logistics service providers.

An older study on outsourcing by Transaid (2010) carried out in Kano, Northern Nigeria focused on understanding the structure, costs of the public PSCs and capacity of the private sector service providers. They concluded that with the adequate in-house management capacity/arrangement for 3PL relationship management and contracting, the public PSCs could be outsourced to the private sector. A review of these studies show that most of the studies focused on only one component or

challenge of pharmaceutical supply chains in one sector (the public sector). Few studies have focused on the private pharmaceutical chains and no comprehensive, simultaneous studies have been conducted on both sectors. Despite the progress recorded in the restructuring of the public supply chains (GAVI, 2015) and the assistance from foreign donor agencies like USAID and the Global Fund, the Nigerian government still acknowledged the existence of some limitations/challenges in managing its pharmaceutical supply chains (FMOH, 2016).

Recently, a Pharmaceutical/Medical Warehouse facility was built and launched in Abuja and Lagos, Nigeria by USAID & Global Fund (Owoseye, 2017) to assist the Federal Government in the storage of pharmaceutical and health commodities. This will no doubt assist in the reducing some of the challenges along the outbound value chain resulting from poor storage of product. The management of this storage facility was outsourced to a private organization, perhaps heralding the beginning of a strategic shift towards outsourcing some aspects of the pharmaceutical supply chains in Nigeria.

By far the greatest challenges of the Nigerian PSC are in the outbound segment of chain – the Pharmaceutical Value Chain (PVC). This consists of activities that occur between the point/time of manufacture or import of any medicine to the point/time it is received by a patient before use (Aitken, 2016). The outbound segment of the Nigerian PSC is weak and uncoordinated. This situation has been a perennial problem to the pharmaceutical sector in particular and to government in general, because of the deleterious effect on the national healthcare system (Chukwu, 2012; Jatau *et al.*, 2015).

Furthermore, preliminary interview sessions with some Chief Executives and other industry captains such as the President of the Pharmaceutical Society of Nigeria (PSN) confirmed that “pain points” in their supply chains lie mostly in the outbound segment of the value chain (Ayebae, 2017; Oyenuga, 2017; Yakassai, 2017). The role of outsourcing in ameliorating or otherwise these “pain points” needs to be further investigated.

In conclusion, the Nigerian outbound pharmaceutical supply chains are sub-optimal, necessitating the need for investigation to identify the gaps and challenges and hence, solutions for their improvement. Using SCOPUS, EBSCO, Emerald Insight, Taylor & Francis, *Ujoogle*, etc., to

search all the databases, no other studies/references could be found that relate to the Nigerian pharmaceutical supply chains or and outsourcing of outbound value chains, other than those considered in this review. This research/literature gap will be addressed with this study.

## **1.6: Problem Statement**

Although there has been a growth in the practice of outsourcing in both public and private pharmaceutical supply chains over time, scholarly, empirical studies on outsourcing of the outbound value chains have been none existent. Few scholarly researches on outsourcing in the Nigerian Health sector have been carried out (Magaji *et al.*, 2007; Transaid, 2010; GAVI, 2015). The limitations of these researches are their main focus on the public sector and States with relatively smaller pharmaceutical/health sectors like Kano and Kaduna states. Limited work has been done or no mention of outsourcing in the private sector as a focus.

Transaid's study was focused on the structure and costs of public PSCs and the capacity of the private sector service providers. It did not focus on the private sector PSCs neither did it evaluate the substantive outsourcing contracts being managed by the state government. Even though by far more comprehensive in scope in its study of some sub-Saharan African countries including Nigeria, the GAVI/Transaid white paper only focused on how to outsource public PSCs and not on the reasons and the framework for such outsourcing decisions.

From the foregoing, the problem is, no holistic empirical study has been carried out on the Nigerian pharmaceutical supply chains using the outbound value chain approach. Almost all of the few in-depth studies that have been conducted, focused on a single element of the supply chains. This study adopts the outbound value chain approach in its investigation. Also, earlier studies focused on only one sector of the industry. This study evaluates both sectors. Furthermore, most of the earlier researches adopted single methods - either the quantitative or qualitative methods to collect data unlike the mixed method used in this study. Finally, no framework presently exists for outsourcing of outbound value chain activities in the Nigerian pharmaceutical industry. This study developed one.

## **1.7: Research Questions**

From the foregoing, the problems and gaps in the previous studies on the pharmaceutical supply chains in Nigeria, the research questions for this study are:

1. What is the extent of outsourcing of outbound value chain activities in both sectors of the Nigerian pharmaceutical industry?
2. What is the rationale for outsourcing outbound pharmaceutical value chains in Nigeria?
3. What are the critical criteria for a successful selection and outsourcing relationship with a 3<sup>rd</sup> Party Service Provider in the Nigerian pharmaceutical sector?
4. What are the desired outcomes of outsourcing outbound pharmaceutical value chains in Nigeria?
5. What framework and future improvement practices can be adopted for outsourcing outbound pharmaceutical value chains in Nigeria?

## **1.8: Objectives of the Study**

The objectives of the study are:

1. To study the extent of outsourcing of outbound value chain activities in both private and public sectors of the Nigerian pharmaceutical industry.
2. To investigate the rationale for outsourcing outbound pharmaceutical value chains in Nigeria.
3. To study the critical criteria for a successful selection and outsourcing relationship with a 3<sup>rd</sup> Party Service Provider in the Nigerian pharmaceutical sector.
4. To identify the desired outcomes of outsourcing outbound pharmaceutical value chains in Nigeria.
5. To develop a framework for outsourcing outbound value chain activities in the Nigerian

pharmaceutical industry.

## **1.9: Motivation of Study**

The achievement of a functional healthcare system in Nigeria depends on, amongst others, the universal access to medicines necessary for the treatment of identified, communicable diseases like HIV/AIDS for those who need it (United Nations, 2015). In line with these targets, it is imperative that the speedy, secure and sustained delivery of health commodities is crucial in the attainment of these goals. The effectiveness and efficiency of the outbound segment of the supply chains of these medicines to patients will be crucial in attaining these goals.

In line with these targets, it is imperative that the speedy, secure and sustained delivery of health commodities to all who need them in a timely manner is crucial in the attainment of these goals.

The involvement and support of donor agencies has contributed to improvements in the distribution and consequently, the availability of these essential medicines in Nigeria due to in part, their support and promotion of the practice of outsourcing in the public sector (Lawson, 2013). Even though outsourcing does not answer all the supply chain questions in the pharmaceutical sector, it does offer some performance improvements. Furthermore, the practice of outsourcing outbound distribution of drugs in both sectors of the industry will be studied.

Finally, the development of a framework for outsourcing pharmaceutical outbound value chains to complement the efforts of health authorities and the donor agencies in Nigeria in effective/efficient pharmaceutical supply chain management will be a valuable outcome of this study

## **1.10: Research Methodology**

### **1.10.1: Study Area**

Nigeria is divided into 3 layers of government with the central federal government supervising the 2<sup>nd</sup> layer – the 36 states who in turn have 774 local government areas under them. Furthermore, the states are aggregated into six geo-political regions. The study was conducted in Lagos, South-West region of the country and with focus on the outbound pharmaceutical supply chains. The pharmaceutical sector in Lagos State government and the private pharmaceutical companies in the



State were used as target population. Lagos State was selected as the target State for this because it is the most populated and industrialized in the country (World Population Review, 2016). Furthermore, out of the over fifty registered foreign pharmaceutical companies' representative companies/importers in the country, 30 are located in the State. Also, out of the 154 registered pharmaceutical manufacturing companies in the country, 45 are based in the State. It therefore provided a good repository of respondents and industry experts whose opinions were very valuable in the study.

### **1.10.2: Sampling Procedure/Technique**

A mixed method was used in this study. The qualitative method was the Delphi technique, while the quantitative method was a survey conducted with the aid of structured questionnaire. This approach (mixed method) has become popular in researches (Bryman & Bell, 2015). Given the challenges of outbound value chains in a developing economy like Nigeria and the debate around the value of outsourcing, Delphi method offers a well-justified methodological approach to gaining expert opinions on the subject of study. An advantage of the Delphi technique is achieving unanimity among a group experts on the subject under investigation (Kache & Seuring, 2017). While the Delphi technique was used to provide an expert ranking of the latent variables investigated, the quantitative study was used to complement the Delphi study and the factors extracted from the data analyses used to develop the outsourcing framework.

### **1.10.3: Sample size**

Seventeen (17) panel members/experts selected from the pharmaceutical industry were used for the Delphi study to enhance the success rate for the study. This ensured the final number at the final round of iteration did not drop below a critical number. The sample size for the quantitative survey was determined with the Krejcie & Morgan (1970) table. The table contains standards for determining sample size from a finite population.

#### **1.10.4: Data Collection Instruments**

This study made use of structured questionnaires for data collection in both methods. The details of the structure and contents of the questionnaires are given in chapter four. The Delphi technique consisted of a panel of experts drawn from the pharmaceutical industry in Lagos, South West Nigeria. The Delphi panel was composed of 17 expert members (10 Chief Executive Officers, 3 Country Managers and 4 Executive Directors) drawn from the five categories in the private sector of the industry: multinational manufacturing - 6 (35.3%), overseas' manufacturers' representatives – 2 (11.8%), indigenous manufacturers - 3 (17.6%), importers/distributors - 4 (23.5%) and large pharmacy chains – 2 (11.8%). Questionnaire containing closed and open-ended questions was used to conduct two rounds of the Delphi iterations before a consensus was achieved and data analysed. The quantitative survey was conducted with 100 respondents drawn from all the seven categories of both sectors of the industry which in addition to the five (5) listed above, include the State level and Local Government Area level pharmaceutical services categories of the public sector.

#### **1.10.5: Data Analysis Technique**

The Delphi data was analysed with spreadsheet, calculating the group means and median values, which were the measures of consensus adopted. The quantitative results were analysed with the software, SPSS version 25. Outputs were descriptive measures like means, standard deviations and exploratory factor analysis (EFA). The tests for reliability of data were done in all cases prior to the EFA.

#### **1.10.6: Specific Delphi Research Objectives**

The specific Delphi research objectives this study set out to achieve include:

1. To identify the level of outbound supply chain outsourcing in the last decade in Nigeria.
2. To determine the age of the outsourcing relationships
3. To identify the main factors influencing the decision to outsource outbound pharmaceutical supply chains

4. To identify the main roles of outsourcing in outbound pharmaceutical supply chains
5. To identify the level of satisfaction of the outbound supply chain services currently being outsourced by the Pharmaceutical companies
6. To determine the underlying risk factors in the outsourcing relationship
7. To determine the criteria for a successful selection and outsourcing relationship with a 3rd Party Service Provider
8. To evaluate the vital pre-engagement activities by the outsourcing organizations
9. To determine the challenges in the pharmaceutical outbound value chains

### **1.10.7: Study Scope**

Study took place in Lagos State, South-West Nigeria. It involved a cross section of both sectors of the pharmaceutical industry in the State. All the five categories in the private sector of the industry (multinational manufacturing, overseas' manufacturers' representatives, indigenous manufacturers, importers/distributors and large pharmacy chains) and the two categories in the public sector (State and Local Government Pharmaceutical Services) as earlier described in section 1.10.4 above, were sampled. While the qualitative study (Delphi technique) used experts from the five categories of the private sector, the quantitative survey was conducted with respondents drawn from all the seven categories of the industry.

### **1.11: Study Outline**

**Chapter One:** This chapter provides contextual background information for the research, touching briefly on pharmaceutical supply chains concept, general, Nigerian overview and the practice of outsourcing in the pharmaceutical industry. The chapter further states the research problem, research aim, research objectives, questions, motivation and significance of the study.

**Chapter Two:** This chapter was focused on logistics and supply chain management (SCM) – theories, concepts, role, current trends and the concept of value chain.

**Chapter Three:** Focuses on pharmaceutical supply chain management, pharmaceutical value chain, concept and components of the pharmaceutical outbound value chain, the state and challenges of outbound pharmaceutical logistics and supply chains in Nigeria & sub-Saharan Africa, the concept of outsourcing and outsourcing of pharmaceutical supply chains.

**Chapter Four:** Describes the research method adopted. It contains details about the design, tools collection of data, treatment of the data, research technique used, population and the sampling design and the interpretation of results.

**Chapter Five:** Presents findings and discussions of the Delphi study, with results presented as statistical measures and tables.

**Chapter Six:** Contains the results of the quantitative study, presented as statistical measure, tables and graphical plots.

**Chapter Seven:** Contains discussions of the quantitative study and overview of both the Delphi and quantitative studies. It also contains the development and comments on the framework for outsourcing outbound value chain developed from the output of the EFA conducted from the survey findings.

**Chapter Eight:** Contains a summary the outcomes of the study, contributions and value, recommendations for policy, research, practice and recommendations for further studies further studies.

## CHAPTER 2

# THEORETICAL UNDERPINNING ON SUPPLY CHAIN & SUPPLY CHAIN MANAGEMENT

### 2.1: Introduction

Supply Chain Management (SCM) has undergone rapid evolution in the last two decades not only to involve the traditional role of managing the functional logistic activity, but now; includes the management and co-ordination of activities across the supply chain. These activities include amongst others, Planning, Managing supply and demand management, warehouse Management, inventory control, transportation and distribution. Furthermore, we have also seen the increased use of some terminologies hitherto used in production and operations management. Such terminologies as JIT (Just-In-Time) and others have now been included in the concept and processes (Acharya, 2016). This chapter reviews the concepts of logistics, supply chain - management, theories and value chain concept.

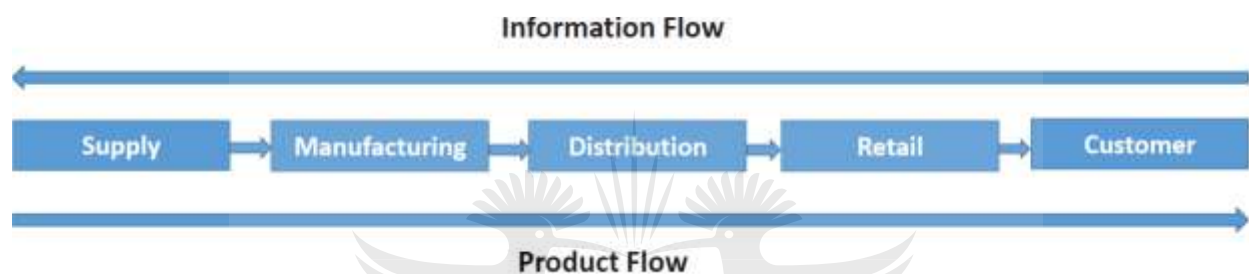
### 2.2: Logistics

Logistics is defined as “the process of planning, implementing, and controlling the efficient, effective flow and storage of goods, services, and related information from point of origin to point of consumption for the purpose of conforming to customer requirements” (CSCMP, 2013:117) The resources managed and by implication, the flows in logistics include the intangible items such as products and goods or the intangibles such as time and information. Based on the flows, logistics is divided into three, namely: inbound, outbound and reverse logistics.

Even though logistics has been largely associated with third-party operations (3PL), it also includes such internal operations as transport, warehousing, retail and wholesale distribution (Shepherd & Tamanaka, 2015).

## 2.3: Supply Chain

The term ‘supply chain’ (SC) was introduced by a team of management experts (Oliver & Webber, 1982) who referred to it as “a network of organizations involved in the different processes and activities that deliver value in the form of products and services in the hands of the ultimate consumer” (Asgari *et al.*, 2016). Since then, many studies have been carried to gain more insight into how the integration of material, information and money flow can be achieved for greater market support and competitiveness of the chain (Stadtler & Kilger, 2011; Hill & Hill, 2012).



**Figure 2. 1: The Basic Supply Chain (Adapted from Desmukh & Vasudevan, 2014)**

Many definitions of “supply chain” have emerged and been advocated. Though different in language and scope, these definitions still retain the essence and refer to the same core principles (Vlok & Du Toit, 2014). Whitley and Ulmer (2013:123) define supply chains to encompass “all activities that are associated with the flow and transformation of goods and services from raw materials to the end-users, as well as the associated information flows”. It has also been also been defined as “a set of facilities, suppliers, customers, products and methods of controlling inventory, purchasing and distribution” (Chen & Gong, 2013:1003).

The typical supply chain has been described as potentially more complex than the simple flows earlier stated, and in some instances, may include other enterprises and organizations (Casson & Wadson, 2013). Many factors now force organizations to ensure both supply chains/product quality improvement and manufacturing costs reduction (Arawati, 2013).

## **2.4: Supply Chain Management**

Supply chain management is defined as “encompassing the planning and management of all activities involved in sourcing and procurement, conversion and all logistics management activities” (CSCMP, 2013:187). This definition “also includes coordination and collaboration with channel partners, such as suppliers, intermediaries, third-party service providers, and customers”. It has two main constituents - the logistical activities on one hand and the coordination of the parties that form the entire chain on the other.

Since its advent, SCM has now become a major source of organizational competitiveness (Ellram & Cooper, 2014; Anand & Grover, 2015). It cuts across the boundaries and management of single entities, and in practice, harnesses the resources of business partners to achieve organizational goals and competitive edge in the marketplace (Zhang *et al.*, 2015). Furthermore, it involves the integration of the operations management with the flow of material and information (Beh *et al.*, 2016). Companies have realised the critical role and benefits of SC management (SCM) and nowadays, pay more attention to its effective design and execution even in the face of some inherent and obvious challenges (Palma-Mendoza *et al.*, 2014; Trkman *et al.*, 2015).

As business processes grow in complexity, so also are the difficulties in managing the supply chains. These difficulties include amongst others, sharing of information, integration, visibility and flexibility along the chain (Palma-Mendoza *et al.*, 2014). Despite the challenges and volatility associated with and along the supply chains, organizations and companies with well-managed supply chains ultimately achieve optimum value creation, system-wide effectiveness, efficiency and competitiveness (Arawati, 2013; Lambert, 2014; Gilling *et al.*, 2016).

### **2.4.1: Existing Conceptual Framework for Understanding Supply Chain Management**

One of the most comprehensive frameworks for the understanding of supply chain management is that developed by Vlok & Toit (2014). This framework is used in this study to explain further, the

concept of Supply Chain Management (SCM). As shown in Figure 2.2, they illustrated SCM using the organizational supply chain strategy, which directly derives from the overall organizational strategy.

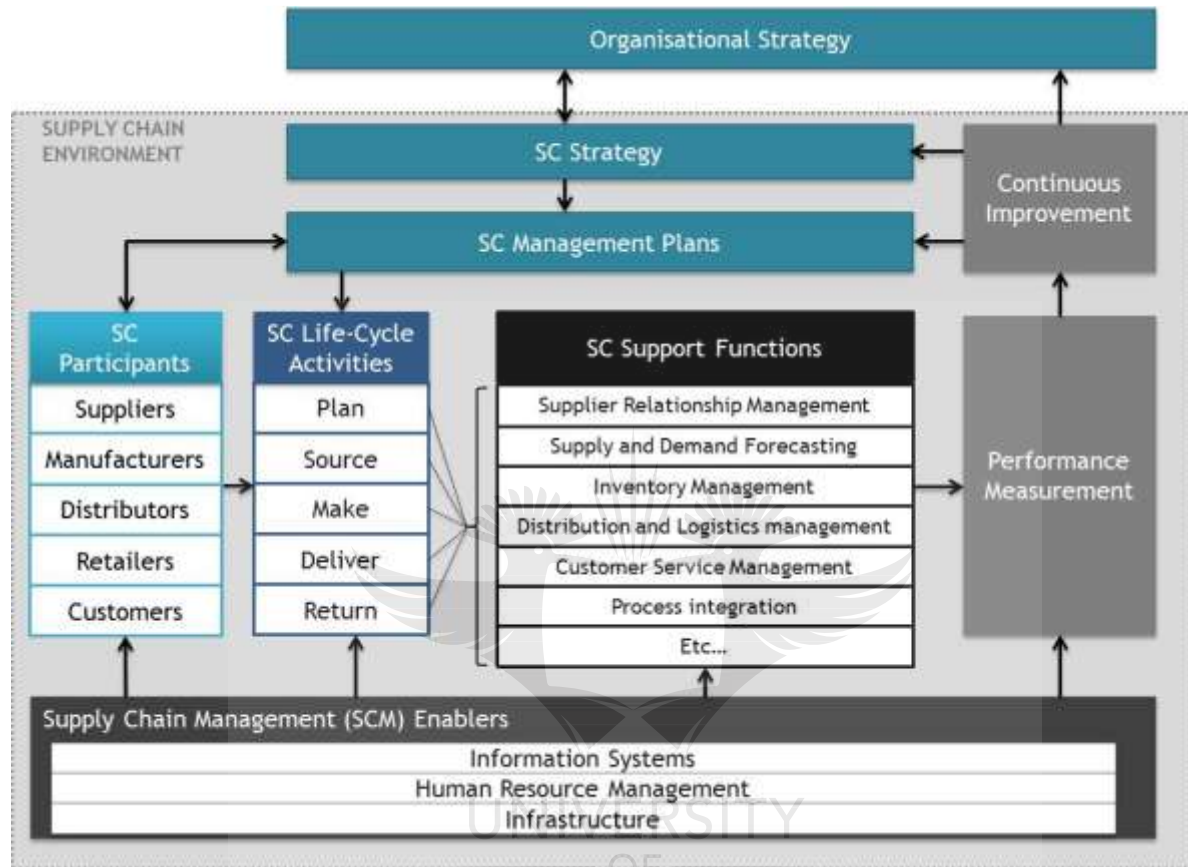


Figure 2. 2: Framework for understanding SCM (Vlok & du Toit, 2014)

As shown in the framework, the organizational strategy are SCM strategy and SC management plans. They explained that SCM consists of three main components: participants, lifecycle activities, and support functions. They further added that SC participants link directly to SCM plans and are involved in the life-cycle activities. The other parts of the framework are the enablers - the internal organizational resources, systems and structures such as the IT, Human Resources and infrastructure. Performance measurement is included in the framework as a source of feedback for continuous improvement, which affects the overall SC strategy and management.



### **2.4.2: Participants in SCM**

As explained by Vlok and Toit (2014), the Participants in SCM are both internal and external parties/enterprises who play one role or the other along the supply chains stretching from the inbound, through the core/internal processes of the organization, to the external and channel members. They include suppliers to the organization from the inbound segment, the organization/company itself, (sometimes a manufacturer), distributors, wholesalers, retailers and finally, the customers. In their architecture, Vlok & Toit (2014) position the participants next to the other part of the framework called the life cycle activities, which are described next.

### **2.4.3: Activities in Supply Chain Management**

The activities in the SC according to Vlok & Toit (2014) are categorized into the primary and the support functions. They referred to the primary activities as the lifecycle activities, and as the name suggests, these are the activities involved all through the supply chain. The lifecycle activities are those also listed as the basic process of the Supply Chain Operations Reference (SCOR) model of plan, source, make, deliver, and return (Jothimani & Sarmah, 2014). In essence, these are the basic supply chain activities in the product conceptualization from the raw material stage/sourcing, through the conversion/manufacturing stage, to when the end product reaches the ultimate customer and sometimes, the process for returning finished product(s) through the same (but reverse) process to the organization/manufacturer. The lifecycle activities support the product throughout its “lifetime”. The other activities in the SC are the support functions, which are internal management functions, needed to support and manage the various lifecycle activities and may be needed at particular stages of the “lifetime” of the product.

### **2.5: The Supply Chain Operations Reference Model**

The Supply Chain Operations Reference (SCOR) model now widely acclaimed worldwide as valuable supply chain management tool, was introduced in 1996 by the then Supply Chain Council (SCC). It is very useful framework for supply chain business processes and performance measurement. It has five different activities/processes (*Plan, Source, Make, Deliver and Return*) and three levels. The model can be used for the design, configuration and performance measurement of supply chains (Tsay, 2014; Jothimani & Sarmah, 2014).

## **2.6: Supply Chain Concepts and Theories.**

Over time, and in response to some emerging dynamics like technology, scope and complexity of businesses, supply chains have changed and evolved. This evolution, correspondingly, has a direct impact on how the supply chains are controlled and managed (Russo *et al.*, 2012; Lee & Cheng, 2013; Hahn, 2015). Supply chains can also become obsolete when the technology and/or process for supported products becomes obsolete (Fritz, 2014; Wang *et al.*, 2015). In addition to technology, economic, political, strategy and regulations are the other exogenous factors that can influence the changes in supply chain over time (Woody, 2012; Casson, 2013; Gereffi, 2014; Jia *et al.*, 2014; MacCarthy *et al.*, 2016).

Many researchers have explained and propounded supply chain definitions, concepts & theories from different perspectives and focus areas. In their review, LeMay *et al.* (2017), reviewed the various development works on SCM processes, definitions, concepts & theories by different authors over a period of about fifteen years from 1992 to 2015 beginning from studies on supply chain processes (Cox *et al.*, 1992) to more recent studies on the broader areas of definition, concepts and theories (Ellram and Cooper, 2014; Carter *et al.*, 2015). They concluded that a global consensus on the definition of SCM was still lacking unlike the definitions of its sub-disciplines (LeMay *et al.*, 2017).

In supply chain management, there is no unified theory. By about decade ago, more than 180 theories, mostly adapted from other management fields have been used both directly/explicitly and indirectly/implicitly in various researches in logistics and SCM (Defee *et al.*, 2010; Halldórsson *et al.*, 2015). The basis of this study is on some of these theories, which also underpin other previous researches in the fields of supply chain management and outsourcing. These include the Transaction Cost Economics (TCE), the Core Competency (CC); Resources Based View (RBV) and the Value Chain theory (VCT). By far the most popular theories used in SCM are four inter-organizational theories first outlined by Halldorsson *et al.* (2007) and then revisited in a succeeding article Halldorsson *et al.* (2015). These theories are outlined below:

### **2.6.1: The Principal Agent Theory**

The theory primarily deals with the relationship between two contracting organizations - the principal, outsourcing tasks to the other (the agent), who is the provider. (Selviaridis, & Norrman, 2014). This theory is now well established in field of SCM and most of the researches in this field based on the PAT focus on the buyer-seller relationship (Fayezi *et al.*, 2012). Selviaridis & Norrman (2014) have used this theory in the study of performance-based service supply chain.

### **2.6.2: Transaction Cost Economics**

Developed by Williamson (1975; 1985), TCE is a valuable theory in the studies of outsourcing, logistics and SCM (Schermann *et al.*, 2014; Grimm *et al.*, 2015; Pomponi *et al.*, 2015; Liang *et al.*, 2016). TCE and RBV are often used together in outsourcing researches/decision as TCE assists to clarify why organizations exist, while RBV explains why the organizations may perform differently. For instance, outsourcing may be worthwhile from the perspective of TCE, but, for competitive reasons, based on RBV, the function may be performed in-house. (Halldórsson *et al.*, 2015).

### **2.6.3: The Resource-Based View (RBV)**

Developed by Barney (1991), this theory recognises the organization as possessing resources and assets that are valuable in the creation of the organizational competitive advantage if utilised in distinctive ways. RBV has been used in outsourcing decision studies as it makes up for the limitation in using TCE as the only basis for study. This limitation stems from the fact that TCE mainly covers the parameters, which relate to transaction economics and costs (Hanafizadeh & Ravasan, 2018). The RBV is essential in the study of outsourcing and is a strategic management theory which emphasises how an organization employs its resources and capabilities (Gerbl *et al.*, 2015; Mandal *et al.*, 2016).

### **2.6.4: Core Competency Theory**

Propounded by Prahalad and Hamel (1990), this theory is popular in various management studies of supply chain and outsourcing. (Mubarik *et al.*, 2012; Hanafizadeh & Ravasan, 2018). In many

supply chain studies and application, the use of these theories are combinatory and complementary (MacCarthy and Jayarathne, 2013).

## **2.7: Supply Chain Integration**

Supply Chain Integration (SCI) refers to how all the various processes and activities (both internal and external) in an organizational supply chain are linked and seamlessly managed to achieve an efficient and effective flow of the different components of chain in order to ensure a seamless value delivery to the final customer (Liu *et al.*, 2013). It involves inter-organizational collaboration and partnership (Huang *et al.*, 2014), and in some instances, may involve technological and information systems' integration of the different players across the entire chain. (Lee *et al.*, 2016)

## **2.8: Green Supply Chain Management (GSCM).**

Recently, compelling factors such as societal awareness and commitment towards the conservation of the environment, various public legislation and the ever-increasing need for, and global campaigns for sustainable development have influenced a number of researchers and professionals into more focus on the concept of GSCM. (Lau, 2011). GSCM incorporates various environment-friendly practices into the different aspects of SC activities from the beginning, through to final users and various reverse logistic activities in the chain (Min & Kim, 2012; Cosimato & Troisi, 2015). The incorporation of the practice of GSCM in the concept and practice of SCM has seen it evolve into a system that is now more cognizant of our environment and the potential hazards our activities have on it. However, despite the trend in awareness, some organizations are yet to fully embrace the practice due to some factors such as ignorance on its implementation, lack of government regulation and some misconceptions about it. Hence the commitment of both the government and organizations in private and public sectors will be needed if GSCM must be fully incorporated into the various SC activities of the various sectors (Jaggernath & Khan, 2015). Due to increasing government regulations and increasing public awareness and campaigns, many organizations are now undertaking steps to incorporate GSCM practices into their SCM strategies (Zhu *et al.*, 2013; Mirhedayatian *et al.*, 2014; Singh & Trivedi, 2016).

## 2.9: The Role of Supply Chain Management

Globally, SCM is very critical in the economic growth of many nations. At the organizational level, the lack of SCM expertise hinders processes effectiveness (Aniki, 2014). Correspondingly, SCM has become widespread among researchers, practitioners and organizations in search of competitiveness (Sundram *et al.*, 2011; Truong *et al.*, 2017). Organizations who successfully implement the practices can now expect to have successful and effective SCM (Gorane & Kant, 2015).

## 2.10: Supply Chain Management in Sub-Saharan Africa (SSA)

Owing to factors such as the state of development, governance structure and infrastructural deficits, the management of supply chains in SSA is very challenging. Accordingly, businesses and products produced/distributed in this sub-region face a lot of challenges in competitiveness. These and are other nation-specific challenges have been studied and confirmed in South Africa, arguably the most developed country in the region (Badenhorst-Weiss & Waugh, 2015).

## 2.11: The concept of Value Chain

The value chain concept introduced by Michael Porter (1985), illustrates the various activities in the internal and external space of an organization, and relates them to its competitive strength. He postulates that the ability of the organization to carry out these activities confers competitiveness.

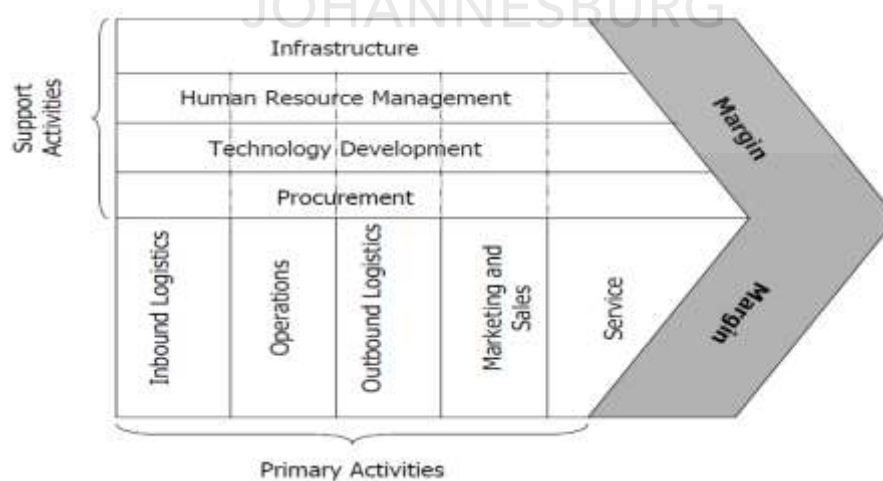


Figure 2. 3: Illustration of Michael Porter's Value Chain

In this concept, the organizational competitiveness is directly related to resources within the chain (Arya & Lin, 2007; Prajogo *et al.*, 2016). Porter further differentiates between the activities and designates them as primary activities and support activities. As shown in Figure 2.3, the primary activities are those directly associated with the production of the products and services (inbound logistics, operations, outbound logistics, marketing and sales, and service) while the support activities (procurement, technology development including research and development, human resource management, and infrastructure) which the primary are linked to, help to ensure the overall success of the primary activities.

Generally, the value chain concept considers the role performed by the various players and stakeholders in processes involved in products transformation. Specifically, it also comprises the internal activities within the organization combining together to deliver a product (Ojadi & Walters, 2015).

### **2.11.1: Primary Activities of the Value Chain**

In the primary activities in the Porter's value chain model, value is added at every level of the continuum in the chain, which ultimately creates the organizational competitiveness.

As shown in figure 2.3, the primary activities include the following:

- **Inbound logistics:** This includes all the activities concerned with the receipt, storage and inventory management of raw materials preparatory for production.
- **Operations:** This comprises all processes required to convert the inputs into finished products or services.
- **Outbound logistics:** This critical activity of the value chain takes the output of operations (production) to the end-user (customer).
- **Sales and Marketing:** All efforts and strategies deployed by the organization to draw the attention of potential customers to its products and services are categorised under this part

of the value chain. It includes such activities as advertisement and promotion, channel management and pricing.

- **Service:** Service is the final part of the primary activities of the value chain of the organization and it encompasses activities that ensure the customer experiences delight during and after sales. One of the several ways that organizations create and win with this segment of the value chain is to achieve significant cost efficiencies along the chain and ultimately pass the savings to the end-user through competitive pricing.

### **2.11.2: Support Activities**

Also called “overhead costs” of an organization, these activities enable the functionality of the primary activities the value chain and include such activities as the organizational structure, Technology, Human Resources, etc. Achieving productivity in any of these activities ultimately passes the advantage to one or more of the five primary activities.

### **2.11.3: Applying Value Chain Analysis**

The use of value chain analysis (VCA) broadens the investigation and documentation of the various activities within an organization and its supply chains. It helps in looking at the organizational systems from the perspective of their capacity to produce and ensure value delivery as required by the final customers (Taylor & Fearn, 2009), thereby unfolding the significant drivers of consumers’ demand for products within the chain. Peterson et al. (2015) have used the VCA to study the drivers and sustainability of traditional medicine in South Africa. VCA is a useful tool in the understanding of both organizational behavioural and policy patterns in the global economy (Peterson *et al.*, 2015). It also helps in identifying organizational supply chain improvement opportunities internally and in the policy environment (Fearn *et al.*, 2012).

### **2.12: Conclusion**

The construct of supply chain enables organizations to see the overall web/networks of inter-organizational relationships relating to their activities, and their linkages to those networks. It has helped to widen organizational view of their systems from the various individual activities to a

broader perspective. Supply chains and its management play major part in individual organizations and national economies. The main goals of supply chain are to seamlessly supply products and services in their right forms to the final consumer.

The value chain approach has moved the emphasis organizations put on their various activities to the external perspective of the value that the end-user, the customer, derives from its products and services. How effective and efficient an organization does this, will have a critical effect on its overall success and competitiveness.





## CHAPTER 3

### OVERVIEW OF PHARMACEUTICAL SUPPLY CHAINS

#### 3.1: Introduction

The pharmaceutical sector plays major role in healthcare delivery system (Shabaninejad *et al.*, 2014). On account of its peculiar products, demand/supply architecture, it is closely controlled in most countries of the world (Mehralian *et al.*, 2014; 2015). The developing role and use of medicines in healthcare systems globally, advances in research, increasing investments and the rising access to these products have all accentuated the need for a greater focus and attention on the pharmaceutical value chain (Aitken, 2016). Understanding this unique chain entails a comprehensive understanding of the elements and components of the chain from its origin at the manufacturers' end, to the terminating point of the end-user; the consumer/patient. Sometimes, this understanding includes tracking the course of the medicines, treatment plan and the backward journey (reverse logistics) that the medicines sometimes make back to the source.

#### 3.2: The Pharmaceutical Value Chain

The Pharmaceutical Value Chain has three main components.



**Figure 3. 1: Major Constituents of the Pharmaceutical Value Chain (Aitken, 2016)**

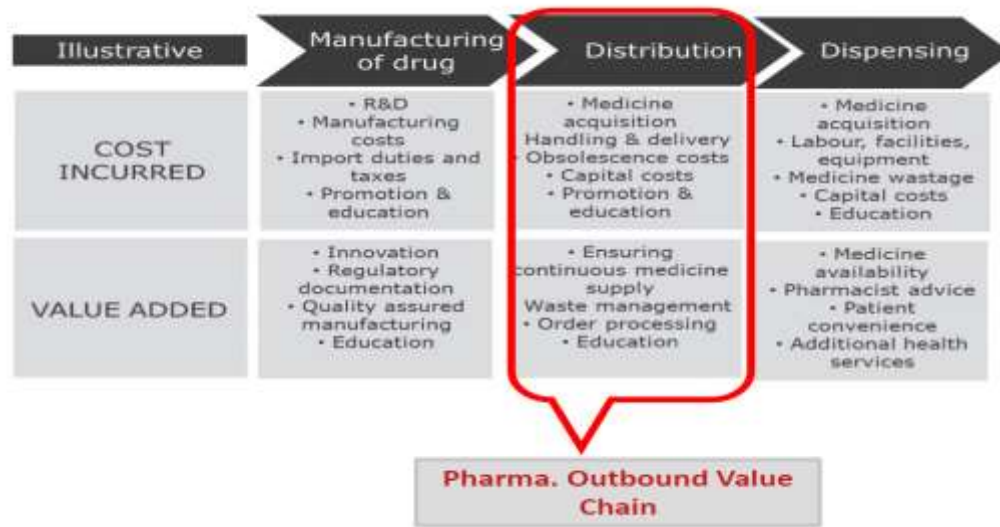
**1. Manufacturing of the medicine:** The manufacturing of medicine differs from other manufacturing both in processes and regulatory approvals. Based on the type of medicines and country involved, the typical process commences at an earlier stage with research and other pre-approval processes such as clinical trials before the actual manufacturing process can commence. The next phases of commercialization, which may include sales and advertisement also come under the purview of the regulatory bodies.

**2. Distribution to the dispensing point:** Distribution of medicines is affected various factors such as location of manufacturer and/or importer, the nature of the medicine and the location/distance of the dispensing point. Special handling protocols and vehicles may be required for some medicines like vaccines to preserve their potency along the supply chain.

**3. Dispensing to the end-user:** The ultimate value a consumer/patient gets from any medicine is a successful treatment outcome. This critical value is a product of the final steps undertaken to provide the patient with the right medicine, correct dosage form timely. The latter (timing) is more critical in pharmaceutical supply chain than other chains as it may determine the survival or otherwise of the final user, the patient. Right usage of medicine is assured through counselling by specialised personnel like Pharmacists.

### **3.3: The Pharmaceutical outbound value chain**

In this study, we define outbound value chain as the outbound logistics (distribution) segment of the value chain. Accordingly, the following illustrations – from the modification of Aitken's model, are presented as follows:



**Figure 3. 2: The Pharmaceutical Outbound Value Chain (adapted from Aitken, 2016)**

As shown in Figures 3.2, the components of the Outbound Value Chain (OVC) are as follows:

### **3.3.1: Haulage (Long distance transportation)**

Long distance transportation (haulage) is a significant end-point activity in supply chain, as it is the logistical activity which ensures physical movement of products through different locations, sometimes across long distance geographies. This is a value-adding activity (Kwateng *et al.*, 2014). A functional transport system is a significant part of an effective supply chain strategy. Hitherto regarded as peripheral, transportation has become very critical to strategic management, and is nowadays, a source of competitive advantage to organizations who manage it efficiently and effectively (Mubarik *et al.*, 2012).

A major problem for healthcare systems developing countries like Nigeria is in the delivery of medicines to locations in rural areas separated from the points of origin, mostly in the urban areas by vast geographies and maintaining the potency of the medicines along the chain. Harsh environmental and weather conditions of high temperatures and humidity can negatively affect the potency of medicines if the resources for maintaining controlled temperature and humidity are limited.

### **3.3.2: Warehousing (Storage)**

From the beginning, warehousing was seen as an integral part of physical distribution or business logistics (Ackerman, 1990). Like transportation, warehousing plays a vital role in pharmaceutical supply chain. Serving as significant storage activity, warehousing ensures a consistent supply of medicines along the chain especially at the point of need. Modern challenges facing the warehousing of pharmaceutical products include: variety of store-keeping units (SKUs), increasing demands by customers (patients) and information management. These and other challenges can be effectively addressed with the right mix of personnel training, warehouse information and performance management systems (USAID/Deliver, 2014).

### **3.3.3: Distribution**

The final logistical transport activity in the pharmaceutical supply chain is distribution. This activity, sometimes called “last mile distribution” ensure that all efforts across the entire supply chains are not wasted. In the pharmaceutical industry, efficient and effective drug distribution contributes to the overall success of the healthcare delivery systems. Many organizations and persons are involved in this critical activity of the value chain at various stages and scope. Some may be restricted to single segment while others may be involved in multiple segments of the distribution processes (Oyamo & Mburu, 2014). The distribution system is also the critical link between the points of prescription of the medicine, to the consumption by the final user, the patient. It also includes other processes that ensure that the right quality and quantity of medicine prescribed is administered to the patient. Preventing dispensing error of a prescription, which can be very deleterious is a very important feature of high quality healthcare system. (Jahantigha & Malmirb, 2015).

Based on the set-up of a drug distribution system, many channel players act as a critical link between drug manufacturers (especially the overseas-based) and retailers. Some of these players include importers, distributors and wholesalers. The number and layers of these players active in each market/country differ and will in most cases, depend of the complexity of the markets, the geographies of the country and to some extent, the nature of the medicines being distributed. Like in other supply chain activities, drug distribution is also subject to strict regulatory procedures to ensure that the appropriate and applicable standards are maintained (Aitken, 2016).

Indeed the importance of an optimal distribution model as a means of making and improving corporate profitability has never been greater than in this era of inflation, rapid technological change, globalization, competitive market and recession. These have combined to produce an environment in which the options for corporate strategy are much constrained. Yet at the same time, for many organizations, these same conditions have provided a major opportunity for growth and improvement in performance through revised approach to the distribution strategy (Sumaila, 2014).

### **3.3.4: Cold Chain**

Some categories of medicines are very thermolabile (highly temperature-sensitive) and can be destroyed if not properly stored and/or handled. Vaccines and some medications like insulin and other biological products fall into this category. For these pharmaceutical products, the supply chain is termed “cold chain”, with products stored at temperatures as low as +2°C to +8°C. Cold chains are very critical in ensuring proper storage, transport and handling for these drugs to maintain their potency at the point of administration to the patient (Chiodini, 2014; Sharma & Pai, 2015). The cold chain is a critical component for the various immunization programmes in developing countries with high temperatures (Yakum *et al.*, 2015).

Given the state of infrastructure especially roads, transport and power, the management of pharmaceutical cold chain has always been a critical problem in Nigeria and other developing countries. This problem is heightened by the limited resources at the disposal of these countries. The cold chains for vaccines and other related, thermolabile products in such countries are often sub-optimal, with inadequate storage and transport facilities (Chen *et al.*, 2015). Making vaccines readily available at the final delivery point is critical measure of successful healthcare supply chains. For a country of Nigeria’s size, the challenges posed by the geography of the country, funding, information management, etc, make this goal a daunting one (Sarley *et al.*, 2017)

### **3.4: The Nigerian Pharmaceutical Supply Chains**

In Nigeria, PSC structure is both centralized and decentralized (Attaran *et al.*, 2012; Iwokwagh, 2013). While most drugs can be procured and stored by the various healthcare institutions,

supply chains for drugs for some diseases like HIV, malaria and tuberculosis are centralized. For this category of drugs, the storage and distribution points is Federal Central Medical Store (CMS). (Erhun & Babalola, 2004). All the States in the country maintain their respective pharmaceutical supply chains, which are similarly managed from their own Central Medical Stores (Onwujekwe *et al.*, 2009).

The Nigerian Private Sector pharmaceutical distribution is mostly managed through a network of channel players such as distributors and wholesalers. Widely-known, although unacceptable, is the fact that many other unlicensed wholesalers and players are very prominent at this level of the national private sector pharmaceutical supply chain (Aisagbonhi & Ilomuanya, 2016; Sieverding & Beyeler, 2016).

Much of the documentation on the Nigerian health sector SCM has been carried out by Non-Governments Organizations (NGOs) and donor agencies like USAID and TRANSAID. Furthermore, these reports have focused mainly on the public sector. This study will offer a unique opportunity for a simultaneous research into both sectors (public and private) and specifically, the practice of outsourcing in the outbound segment of the supply chains.

### **3.5: Challenges of Pharmaceutical Supply Chains in Nigeria and Sub-Saharan Africa**

Over the years, the PSC in Nigeria and SSA have faced several obstacles with negative impacts on the performance of the chains. These challenges include but not limited to:

#### **3.5.1: Stock-outs and product shortages**

Stock-outs and product shortages in the pharmaceutical sectors have become a worldwide phenomenon and not restricted to countries of low- income levels in recent years. This trend can be a consequence of several causes, including, but not limited to procurement and supply chain management-related issues (Iyengar, *et al.*, 2016). In Senegal, stock-outs of anti-malaria medications have been reported in over half of the sites used for a new community study in the district of Saraya, South East Senegal (Blanas *et al.*, 2016). In the result from a study by

Mikkelson-Lopez *et al.* (2015) a significant number of health facilities in Tanzania were totally out of stock of first line anti-malarial drugs. The stock-outs were reported to have been caused by insufficient and irregular supplies amongst others. In a study to assess Primary Health Centre (PHC) facilities' service readiness with focus on availability of essential drugs and medical equipment covering 2480 healthcare facilities from all the 6 geopolitical zones of Nigeria, Oyekale (2017) reported availability of some basic drugs as low as between 10.48 and 25.2%. Nigeria also recorded low availability of malaria test kits in its health facilities in a study in 8 sub-Saharan African countries (Poyer *et al.*, 2016).

In Nigeria, stock-outs of basic medicines in rural healthcare facilities have been reported (Sieverding and Beyeler, 2016). In Ghana, periodic shortages of anti-malarials in the supply chain system of the nation's ministry of health has been attributed to why some public hospitals procure medicines from the open market (Agyare *et al.*, 2017). Similarly, in South Africa, stock-outs of drugs have been reported not only in the critical Human Immuno-Virus (HIV) and Tuberculosis (TB) supply chains, but also in the supply chains for other diseases (Odendal, 2013). Shortages of basic drugs are becoming a global challenge with attendant impact on healthcare quality and costs. (WHO, 2015). In the health sectors of sub-Saharan Africa including the more developed countries like South Africa, there is a shortage of not only drugs, but also on information about the trend, which can be accessed by the public (Gray, 2014).

### **3.5.2: Fake and counterfeit products**

Similar to the issue of the shortage of medicines, availability of good quality medicines has become a global problem (Kohler *et al.*, 2012). The issue of fake and counterfeit drugs has become a global challenge and is now endemic in the various drug supply chains (Mackey *et al.*, 2013). Falsified antiretroviral medicines have been found in Kenya (Cohn *et al.*, 2013). Statistically, between 13 to 35% of worldwide sales of fake and counterfeit drugs come mainly from India, Nigeria and Pakistan (Khan *et al.*, 2015).

### **3.5.3: Disruptions**

Supply chains are exposed to disruptions consequential from various sources, factors and risks that hinder the performance of one or more of their constituent entities (Sayed *et al.*, 2016). Some of these risks are disruptions that physically prevent product flows and even in end-product failures across the supply chains (Zegordi *et al.*, 2012). PSC management in disrupted regions where there are severe sectarian, tribal, religious conflicts and overall weak systemic governance can be very challenging (Kohler *et al.*, 2012). The security challenge of the Boko Haram Islamic terrorists' group in Nigeria has had massive negative impact on the regional pharmaceutical supply chains and healthcare delivery systems as destruction of facilities, and sometimes, killing of personnel, are typical outcomes (Hamisu *et al.*, 2016).

### **3.5.4: Expired Drugs**

Medicines are unlike some products, which have no expiry dates. Medicines expire and lose potency. Accordingly, any incidence of expiration of medicine poses a critical problem across the pharmaceutical supply chain (Sauls, 2016). In Uganda, expired drugs have been found at all levels of the health facilities especially the rural areas of the public sector chains (Jahre *et al.*, 2012). The chaotic drug distribution system in Nigeria allows for easy occurrence of expired drugs in the pharmaceutical supply chains (Olatunji, 2013). Some unscrupulous drug traders have been reportedly found re-packaging foreign expired drugs for re-sale in Nigeria (Oluwatuyi *et al.*, 2014).

### **3.5.5: Corruption**

Corruption has been likened to an infectious illness. Corruption in any aspect of the global healthcare system is deleterious and a big threat to all aspects of human health, economic developments and international safety (Mackey *et al.*, 2016). The efficiency of healthcare delivery in any country involves judicious management of both human, financial and other resources in serving the sick population (Tormusa *et al.*, 2016). Corruption is a big threat to all aspects of national development.



At a rank of 144 out of 180 countries by 2018; Nigeria is classified as one of the most corrupt nations in the world (Transparency International, 2019). According to Transparency International, “corruption is everywhere: even the health and medical services, considered the least corrupt government institution, are considered very corrupt by 41 per cent of Nigerians” (Transparency International, 2015:1). Only recently, the Global Fund for the control of HIV/AIDs in Nigeria found widespread of corruption involving program funds running into millions of US Dollars (Global Fund, 2016).

### **3.5.6: Infrastructure**

Despite the various laudable economic developmental strides and growth that have been recorded by many sub-Saharan African countries, persistent infrastructure deficits still pose a number of challenges (Arewa, 2016). Poor infrastructure has been identified as one of the significant structural barriers in the health systems of sub-Saharan African countries (Fowkes *et al.*, 2016). In comparison with other economies like the middle- and high-income countries, sub-Saharan Africa has poor road networks, with approximately 200 metres of roads per km<sup>2</sup> paved compared to 1400 metres in developed economies (Schürenberg-Frosch, 2014).

In some SSA countries like Nigeria, one of the problems that continue to plague the productive sector and businesses generally is, the continuing acute electricity supply deficits (Ettah, 2017). This is particularly worrisome in the supply chains of pharmaceuticals where steady, uninterrupted electricity is required for the storage and potency of thermolabile products like vaccines and antibiotics. The absence of a stable source of power also negatively affects certain aspects of the pharmaceutical supply chains especially the cold chains (Yakum *et al.*, 2015). The Nigerian public health system faces several challenges in delivering services (Abimbola *et al.*, 2014; Abimbola *et al.*, 2015) with poor infrastructure in a number of public facilities (World Bank, 2010; Abimbola *et al.*, 2015).

### **3.5.7: Weak regulatory systems**

Weak regulatory systems in many SSA impact negatively on the pharmaceutical supply chains. Many regulatory bodies and agencies in these countries lack adequate resources for effective control of medicines in their respective markets (Preston *et al.*, 2012). This is not only a challenge in itself, it also gives rise to a critical problem of poor quality medicines in the pharmaceutical

supply chains (Giralt *et al.*, 2017). As high as 90% of national drug regulatory bodies in SSA are unable to effectively discharge their basic regulatory functions (Giralt *et al.*, 2017).

In summary, drug distribution system of Nigeria still suffers a lot of setbacks ranging from un-coordination (Chukwu, 2012), weak distribution and transportation, amongst others (Jatau *et al.*, 2015).

### **3.6: The Concept of Outsourcing**

Denicolai *et al.* (2015:4) define outsourcing as “the procurement by a focal firm of goods and/or services from independent outside suppliers, when those goods and/or services had previously been provided internally within the firm”. Globally, organizations have been increasingly been embracing outsourcing – the externalisation of work activities traditionally performed in-house; to enhance their competitiveness and improve business operations and performance. This trend is not surprising, given the purported benefits of outsourcing that have been touted in both academic and professional circles over the years (Adeleye, 2011). The major factor that has led to increased outsourcing is focus on core competencies by organizations, while freeing up other valuable resources and capabilities (Musau, 2016; Cheng *et al.*, 2014). The practice of outsourcing has been adopted by the Nigeria public sector for over a decade now. The gains from the adoption have however not been confirmed as realised, *vis-à-vis*, the intentions and reason for the outsourcing strategy in the first instance (Acti & Ekezie, 2014). Outsourcing as a concept has evolved over time in the same way as supply chain management (O’Riordan & Sweeney, 2007). With more advanced technologies and infrastructure, the developed countries have embraced the practice, especially in the private sectors while the developing countries have seen an increasing rate of adoption of the practice even by the public sectors where traditionally, many services are still being provided by the government (USAID/DELIVER PROJECT, 2010). With increased globalization and economic developments across borders, many organizations have adopted the concept of outsourcing in their supply chains. In public health systems and supply chain management, several potential functional areas can be outsourced. Many developing countries such as Cambodia, Madagascar and Senegal have outsourced certain aspects of their public healthcare systems. (Loevinsohn, 2008).

### **3.6:1: Outsourcing in Pharmaceutical Supply Chains in Nigeria and SSA.**

Outsourcing practice is becoming increasingly widespread throughout SSA and the low and medium income countries (LMICs) for various supply chains activities, which were hitherto undertaken by the government agencies and institutions. Nigeria is one of the countries where this practice has been adopted, studied and documented (Watson & McCord, 2013; Bornbusch *et al.*, 2014). Despite this positive trend, there is a high degree of reluctance by the public sector to outsource its supply chain activities, with factors of higher costs, loss of control, other motives, lack of expertise cited as possible reasons for this reluctance (UNCoLSC, 2014).

There has been a growth of the outsourcing in the public sectors of various African countries in the last decade. Private logistics services providers have been engaged, with improved performance in countries like Senegal, South Africa, Nigeria, etc (Gavi & Transaid, 2015; Lydon *et al.*, 2015). In the private sector, outsourcing has been beneficial to the pharmaceutical companies, with significant improvements in their supply chains (Mubarik *et al.*, 2012).

The scope and role of outsourcing in pharmaceutical supply chains have been the subject of some studies. Although many aspects of the pharmaceutical supply chains can be outsourced, the services that are mostly outsourced are the outbound logistics services of storage and distribution services (Lydon *et al.*, 2015; Aman & Khan; 2015). In South Africa, the outsourcing of storage and transport of vaccines by the government improved efficiency and speed of delivery (Lydon *et al.*, 2015). It has been reported that outsourcing distribution is an obvious example where substantial efficiency gains could be made in pharmaceutical supply chains, especially in developing and resource-weak countries, where the last mile distribution is weak (VillageReach, 2012). As a way of overcoming their supply chain challenges, outsourcing is increasingly becoming a common strategy throughout developing countries. (Bornbusch *et al.*, 2104).

In December 2014, the Nigerian government, through the Federal Ministry of Health (FMOH), launched the Nigerian National Drug Distribution Guidelines, which provides a 2-channel approach to drug distribution with the establishment State Drug Distribution Centers (SDDCs) and Mega Drug Distribution Centers (MDDCs) by the private sector (FMOH, 2014). This new policy set the stage for a national strategy towards the streamlining of drug distribution in the country and

an incentive and promotion of the practice of outsourcing in the private sector on one hand, and Public-Private Partnerships (PPP) in the management of the SDDCs on the other hand.

### 3.6.2: Existing Frameworks for Outsourcing Process, Capability & Relationships

Alongside the studies into the various aspects of outsourcing since its evolution in the last three decade, there have been studies into the development of frameworks for the practice of outsourcing. While many frameworks have been theoretical, others have been empirical and evidence-based. Furthermore, some have been generic while others have been specific to certain functions, industries and sectors. Some of the developed frameworks are considered in the next section.

#### 3.6.2.1: Bolumole *et al.*, Framework

Bolumole et al. (2007) developed a framework for logistics outsourcing using some social science theories.

DIMENSIONS	Factors Influencing Logistics Outsourcing Decisions	The Supply Chain Role of 3rd Party Logistics Providers
		<i>Transaction-costs</i> <i>Resource-based</i> <i>Control-issues</i>
	<b>1. Reasons for Outsourcing</b> <i>Cost reduction, Resource Acquisition, Value Creation</i>	
	<b>2. Strategic Orientation of Client Firm:</b> <i>Internal, External</i>	
	<b>3. Extent of Logistics Outsourcing (<i>In-house vs. Outsourced resources</i>)</b> <i>Operational, Tactical, Strategic</i>	
	<b>4. Nature of the Client - 3PL Relationship:</b> <i>Arms-length, Contractual, Relational, Partnership</i>	

Figure 3. 3: A framework for evaluating logistics outsourcing strategies (Bolumole et al., 2007)

In their framework (figure 3.3), they draw from the multiple theories such as TCE, RBV and the network theory (NT). From these theories, which underpin the framework, various factors which influence logistics outsourcing were identified. In line with TCA, TCE and RBV perspectives, these factors are categorised as external or internal, resource or transaction cost-based.

They further posit that at the heart of the decision by organization to outsource are two underlying principles. The first, which is the internal principle is the acknowledgement that it lack the domestic competencies to achieve a competitive advantage and therefore must seek for external resource with which the internal resources/competencies can be combined to achieve the maximum value in the marketplace. Furthermore, this framework posits that the availability of resources is not enough to attain competitive advantage, but the optimal exploitation and deployment of these resources as critical components in the organization’s decision-making processes. Conversely, the external principle takes cognisance of the organization’s external competitive environment and the need to deliver products and services at an optimal minimal costs through access to external resources (Bolumole *et al.*, 2007).

### 3.6.2.2: Vitasek & Manrodt’s Framework

The Vitasek & Manrodt’s (2012) framework is called “vested outsourcing”. As the name suggests, the framework is founded on the principle of collaboration between the contracting parties – the outsourcer and the service provider (3PL). The core principle governing the framework is establishing a win-win collaboration with mutual or “vested” commitment to achieving the pre-set goals of the engagement. It is a deviation from the traditional transactional outsourcing relationship contracted at arm’s length. It is a dynamic model designed to be a successful, long-lasting relationship based on shared values and outcomes (Figure 3.4).

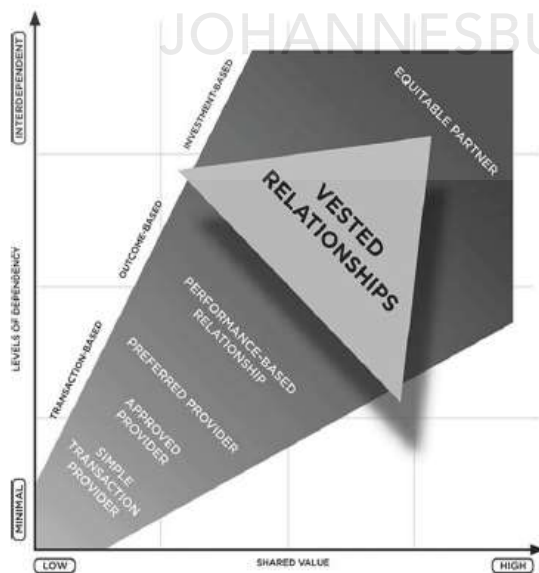


Figure 3. 4: The Vested Relationship Framework (Vitasek & Manrodt, 2012)

They then went ahead to outline five rules and ten elements for achieving a vested relationship centered on governance, pricing, operating principles and defined and measurable outcomes. The elements give details to the rules and include such critical components as shared vision, business objectives, performance, relationship and exit management. They opine that with this framework, organizations can move from transactional/adversarial to a truly collaborative relationship in practice (Vitasek & Manrodt, 2012),

### **3.6.2.3: Qureshi *et al.*'s Framework**

In this framework, Qureshi et al. (2013) developed a model for use in developing countries for outsourcing decisions. It is best suited for use in a manufacturing organization and is based on a series of steps in which the decision to outsource is appraised. The steps in logical sequence are decision matrix, core competency check, balance scorecard and cost equations models. The entire framework is depicted in flowchart in Figure 3.6.

In this model:

- A) In this first step, the core competency check seeks to consider if the organization has core competency for the activity. Furthermore, it checks if the decision to outsource is marginal or negative. This step is further explored by series of questions used to determine if the activity is specialised, critical, strategic, and easily-sourced, etc. Depending on the outcome of this step, the next step of decision matrix is undertaken.

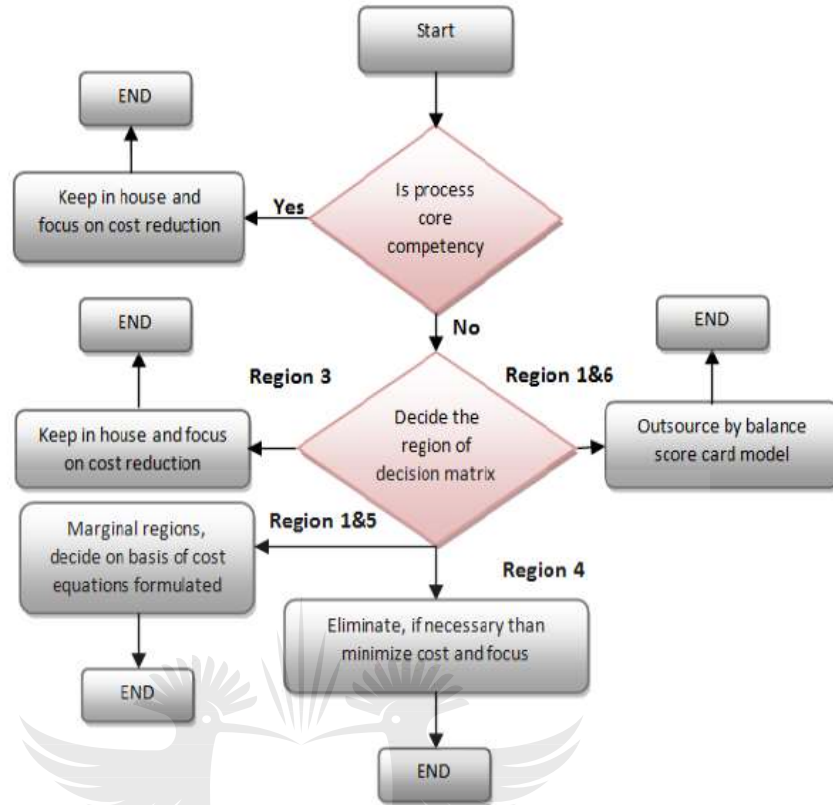


Figure 3. 5: Qureshi *et al*'s Framework/Flowchart for Strategic Outsourcing

A. **Decision Matrix:** If the check produces a marginal or negative outcome, the decision matrix is applied. This is a graphical chart (Figure 3.6) that uses the impact of two main factors to make a reliable and easy outsourcing decision.

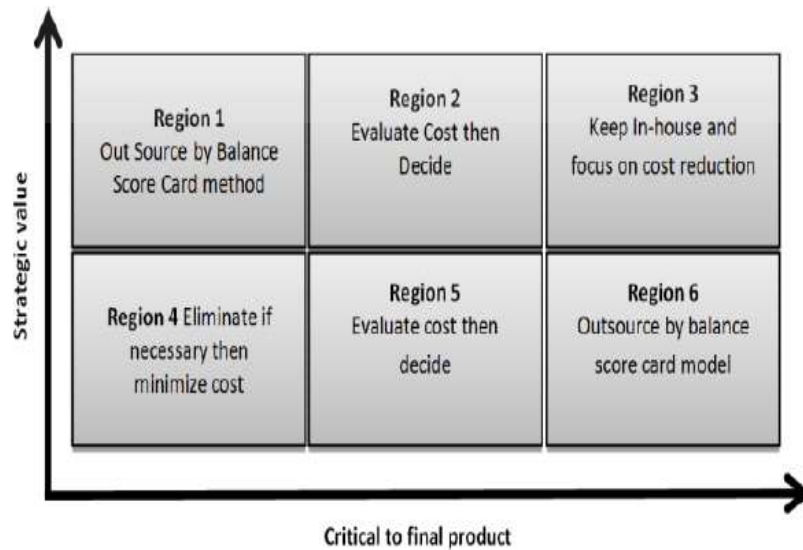


Figure 3. 6: Qureshi *et al*'s Decision Matrix for Outsourcing

The two factors in the decision matrix are “strategic value” (y – axis) and “critical to final product” (x – axis). In essence, these factors check if the activity under consideration is of strategic value and or critical to the final product. As shown in the figure, the intersection/interaction of these two factors give rise to 6 regions, which are decision zones for the organization.

**Region 1:** The activities in this region are those of high strategic value to the organization but not critical to the final product. For these activities/services, keeping them in-house will not be ideal, hence outsourcing will be the best decision taken under careful consideration using the balance scorecard approach since a successful outsourcing decision can have an impact on the competitiveness of the organization.

**Region 3:** In this region, the activities are of high strategic value to the organization and are also highly critical to the final product. Because of this, the decision outcome is not to outsource but to adopt an in-house sourcing approach.

**Region 4:** This region has the activities or components which are neither of any strategic value nor critical to the final product of the organization. The approach is either to totally eliminate it or minimise the focus on it to avoid waste of organizational resources and energy.

**Region 6:** The activities and or components in this region are of low strategic value to the organization but are very critical to the final product. As in region 1, a careful outsourcing decision using the balance scorecard approach is proposed by Qureshi et al.

**Region 2 and Region 5:** Finally, in the Qureshi et al model, the two regions 2 and 5 have activities and or components that average contribution to the final product. They however differ in being either of high strategic value (region 2) or low strategic value (region 5) to the organization. The final decision to outsource or not is taken after cost evaluation and further investigation using the cost equation models (Qureshi *et al.*, 2013)

#### **3.6.2.4: Pratap’s Framework**

Developed by Sankalp Pratap (2014), this framework seeks to go beyond the traditional debate in outsourcing – the outsourcing decision and “What to outsource”. The main emphasis of this framework is the evaluation of “outsourcing capability” as a tool for optimal management of



outsourcing relationships. It proposes that failures from outsourcing relationships can be prevented if organizations do not see outsourcing as a one-off transactional engagement but as a strategic continuous one requiring management.

This framework classifies the firm’s internal processes into four different classes requiring different skill sets for their management.

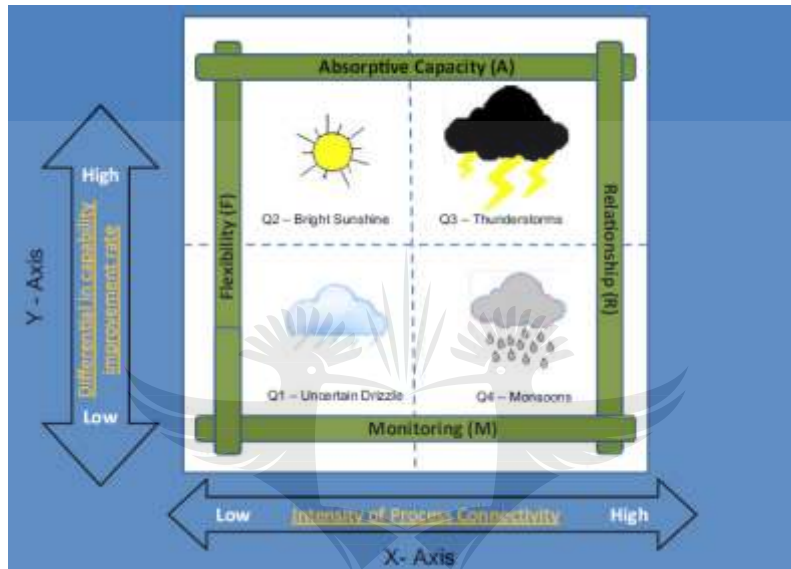


Figure 3. 7: The Pratap’s FARM’s framework for outsourcing capability

This framework is based on an analogy with a typical farmland where the farmer deals with varied conditions using various skills and techniques to optimise farmland output. Similarly, organizations have to use varied strategies for different classes of outsourced processes. The analogy **FARM** is the outsourcing matrix and is derived from the various capabilities of Flexibility (**F**), Absorptive Capacity (**A**), Relationships (**R**) and Monitoring (**M**).

**Quadrant 1:** This quadrant (see Figure 3.8) also called the “uncertain drizzle” quadrant contains the processes and activities that are not deeply entrenched and connected with other processes in the organization. Furthermore, the differential capability of suppliers of the services do not improve at a rate faster than that of the focal organization. Conversely, the approach is to expend minimal energy on the arrangement with systems and incentives schemes put in place to monitor the suppliers to ensure a commitment to continuous performance improvement. On account of the

moderate benefits accrued, the organization keeps only short-duration contracts to allow room for other suppliers with better capabilities to be signed on in the future. Finally, in this quadrant, flexibility and effective monitoring systems are critical skills the organization requires to ensure an effective information feedback system (Pratap, 2014)

**Quadrant 2:** This quadrant is called “bright sunshine” and contains marginal activities and processes where the differential capability of suppliers of the services improve at a rate faster than that of the focal organization with processes and activities that are not deeply entrenched and related to other internal processes. Because of the autonomous nature of the processes in this quadrant, the possibility of the organization exploring/entering into contracts with several suppliers exists. This is possible because of the relatively low switching costs involved. Critical skill required by the organization to be able to effectively identify new development/knowledge is its “absorptive capacity” – referring to its internal base of knowledge.

**Quadrant 3:** This quadrant also referred to as “thunderstorms” contains processes and activities, which are both deeply entrenched and connected with other processes in the organization and have suppliers whose differential capabilities improve at a rate faster than that of the focal organization. Because of these deep connections and capability of the supplier, the competitiveness of the organization could be impacted in various ways, hence effective collaboration with the supplier, involving close relationship management at both the shop-floor and top management levels. This arrangement is more than a short-term transaction and spans for a longer term with deeper commitment and collaboration from both contracting parties - similar in format to the vested outsourcing relationship propounded by Vitasek & Manrodt (2012). In some cases, there are exchange programmes involving the employees of both organizations. Suppliers’ selection in this arrangement is a more careful process which considers such long term, mutually-strategic issues as vision and values (Pratap, 2014).

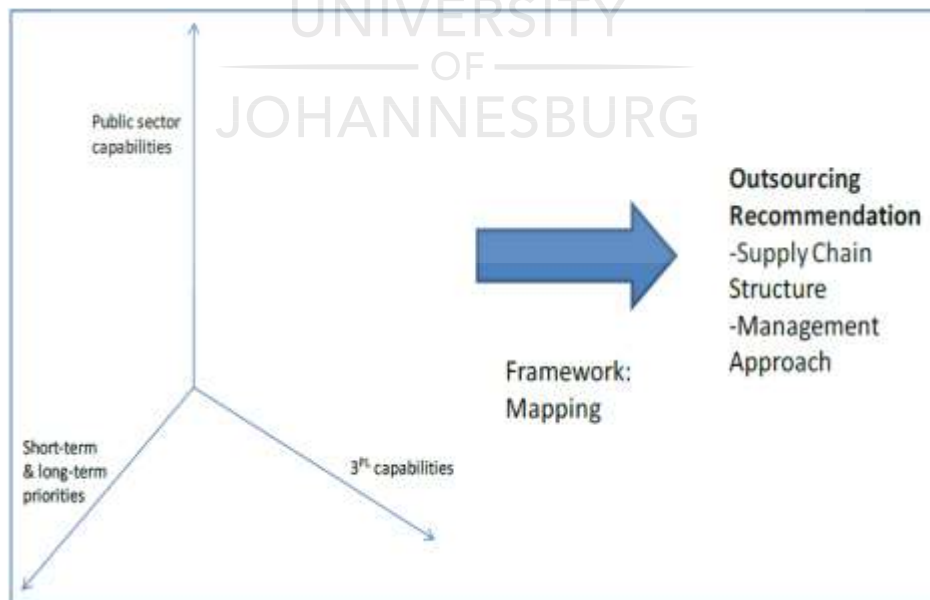
**Quadrant 4:** Also referred to as “monsoons”, this quadrant contains the processes and activities which are both deeply entrenched and connected with other processes in the organization but with suppliers whose differential capabilities and innovative capacities are not different from that of the focal organization. The approach here is to outsource such processes so as to reduce the administrative burden on the outsourcing, focal organization. In some instances, the process is

spun off as a separate business unit to achieve optimum solution to its management. Under this arrangement, the focal organization still maintains a close watch over the process/business unit for development and performance while its employees are encouraged to excel in their new roles of management the process as a core activity. Close monitoring and relationship management are critical for the success for this arrangement (Pratap, 2014).

### 3.6.2.5: The MIT - Zaragoza’s Framework

In conjunction with Transaid & VillageReach, the MIT-International Zaragoza Logistics Centre developed perhaps the most extensive framework for the outsourcing of Public distribution services and thereafter, applied the framework in Kano State, Northern Nigeria.

In the framework, in emphasizing the latent benefits that third party service providers can give, they first highlighted the key factors that underpin supply chain performance. These key factors include the structure, management approach and the individual capabilities of the SC actors/decision makers. The competence of both parties in the public distribution system and potential 3PLs are necessary for supply chain performance, and hence given considerable attention in this framework (Figure 3.8).



**Figure 3. 8:** The MIT-Zaragoza’s Framework for Outsourcing Public Sector Pharmaceutical Distribution (MIT-Zaragoza Logistics Centre, 2011)

According to this framework, the best approach in the successful determination of the suitable outsourcing decision with the involvement of 3PL providers or not, should be a series of step-by-step analyses instead of a system of complex mapping. These steps include amongst others, the generation and validation of various potential solutions. This approach is needed because of the implications of the probable changes in the supply chain especially those orchestrated by the use of 3PL providers. Technical, resources and politics may be the constraints of these implications.

In this framework, they first classified the opportunities for improvement in supply chain using the key drivers of supply chain performance they earlier identified. Next, they considered constraints earlier outlined, and thereafter, they then examined the consequences of the use of 3PLs and the performance simulation model. Finally, they described the step-by-step process of the analyses required to determine the most appropriate outsourcing decisions.

### **3.6.3: Value Chain-based studies and frameworks**

Since the development of the value chain model by Michael Porter (1985), several studies have been carried out utilizing the model. While researchers adapted the components of the model for further studies, others based their studies and or framework on some aspects/components of the model.

Horne (2014), adapted the model to develop a framework based on value and performance for use in the identification and prioritization of process improvement projects, while Prajogo et al. (2016) adapted it to develop a research model that explores the interconnectivity between supply chains integration and operational performance based on the RBV theory. McPhee (2014), made a modification of the model, renamed some of the primary and secondary activities and a model which helps to incorporate sustainability in business strategies for competitive advantage. On their part, Koc and Bozdog (2017) used the model to study the association between innovation and operations.

One of the earliest and most comprehensive frameworks in the field of outsourcing using the Porter's value chain approach is that of McIvor (2000). This framework helps in the assessment the decision to outsource, utilizing a four-step approach in analysing organization's costs and integrating other constituents of the value chain into the framework process.

### **3.7: Gaps in Existing Literature and Frameworks**

Apart from the reports of foreign donor agencies (USAID, MIT-Zaragoza, Transaid, VillageReach, etc.), there is little or no academic literature on the framework and scope of outsourcing in the pharmaceutical supply chains in Nigeria. One of the most recent researches in outsourcing in the Nigerian healthcare sector only investigated the effect of outsourcing peripheral services on delivery of healthcare (Arisi-Nwugballa, 2016).

In Mozambique, Beale *et al.*, (2015) reviewed transport practices within the Ministry of Health (MISAU) and highlighted existing trends in commercial transport with a view to presenting considerations in which the two sectors could collaborate to achieve improved reliability and increased efficiency of the distribution of medical commodities. The authors found that MISAU recognized the mounting challenges it would face in continuing to support the current model and are now pursuing a path of decentralization and private sector engagement. In Kenya, Muthoni (2016) investigated outsourcing of supply chain processes and performance of manufacturing firms including 6 pharmaceutical firms. He concluded that primary supply chain processes outsourcing improves performance for manufacturing firms. Similar studies on SC and outsourcing have been conducted in other African economies including major economies like South Africa and Kenya. Some of these studies include logistics outsourcing in the private sector (Kujawa, 2003; Githinji, 2010; Waugh & Luke, 2011; Mulama, 2012; Mugo, 2013; Ngonela *et al.*, 2014; Gakure *et al.*, 2014; Mwelu *et al.*, 2014). Conversely, in Nigeria, available data have come mostly from the few scholarly researchers in the field of outsourcing on one hand (Okolie, 1998; Akewushola & Elegbede, 2013; Okeudo & Uche, 2013; Kolawole & Agha, 2015) and logistics management by private sector on the other hand (Ojadi, 2001; Aniki *et al.*, 2014; Somuyiwa & Adebayo, 2014; Sumaila, 2014). None focused on pharma logistics and SC outsourcing.

In developing outsourcing frameworks, process, capabilities and relationships, all the frameworks considered in the literature here focused on one aspect of the industry – either the public or the private sector. Neither considered both sectors simultaneously as will be considered in this study nor employed a panel of experts from the respective sectors as will be done with the Delphi approach of this study. The added value of this study is in its consideration of both private and

public sectors in this same study, whilst also developing a framework that can be used in either sectors, to outsource the outbound value chains.

### **3.8: Conclusion**

The goal of any organization is value creation for its customers. Given the present and emerging socio-economic environment, organizations should constantly seek ways of improving their operations and delivering value to their customers. Efficient and effective SCM strategies are not only valuable to the overall organizational competitiveness, they have been become very critical to achieving the value creation goals of the organizations. This may be achieved by various management options including outbound value chain outsourcing.



## CHAPTER 4

### RESEARCH METHODOLOGY

#### 4.1: Introduction

As spelt out earlier, this study aims to study the extent of outsourcing of outbound value chain activities in the Nigerian pharmaceutical industry; the rationale, critical risk factors, 3PL selection criteria and the desired outcomes of outsourcing outbound pharmaceutical supply chains Nigeria. This chapter contains details of the research methodology employed to achieve these objectives. It contains, among others, the research design, the basis and justification of the mixed methods (qualitative and quantitative) used, the sample selection, administration and analysis of the research instruments.

#### 4.2: Quantitative versus qualitative research methodology

The successful management of supply chains entails synchronizing several activities across the spectrum of the chain. Over the years, there has been an increasing consciousness that issues related to and associated with SCM are becoming complicated and complex and accordingly, require more diversity in the approaches to studying these paradigms. In this way, more reliable outcomes are ensured (Craighead *et al.*, 2007; Golicic & Davies, 2012). According to Stewart (2007:2), multiplicity in research methods “is a healthy characteristic and suggests an intellectual vitality in a discipline”. In this and other recent studies, more than one research method have been used.

Customarily, earlier researchers in supply chain management depended greatly on procedures involving quantitative methods (Boyer and Swink, 2008). On the other hand, Qualitative methods have been predominant of recent and in particular among European researchers (Craighead *et al.*, 2007). Use of mixed methods in the same study has been less common until recently (Golicic & Davies, 2012). A mixed method consisting of a Delphi technique (qualitative) involving pre-

qualified and selected industry experts and a quantitative study (a survey) involving respondents from the industry was adopted for this study.

#### **4.2.1: Quantitative methodology**

Quantitative research is as “a research strategy that emphasizes quantification in the collection and analysis of data and that: entails a deductive approach to the relationship between theory and research, in which the emphasis is on the testing of theories; has incorporated the practices and norms of the natural scientific model and of positivism in particular, and takes a view of the social reality as an external, objective reality” (Bryman & Bell, 2015:37). It has been stated that “a researcher using quantitative methodology has to follow a number of steps in conducting their research which usually include, generating the research problem, coming up with expectations based on reality, generating hypothesis, defining variables, sampling, data collection, analysis of data, report of findings and relating findings to the theory” (Kent 1999:11). The predominant use of only quantitative methodology in studies weakens the versatility of the frame of supply chain investigations in several ways. First, depending on a single method restricts investigation to only the research enquiries that can be investigated by the method alone. It is agreed that a multiple approach is vital in studying a field as multidimensional as SCM (Golobic & Davies, 2012). Second, using only one method can incorporate some biases (Spens and Kovacs, 2006).

In this study, the two methods employed complemented each other, making up for the inherent gaps and deficiency in using either method alone, especially against the background of the relatively limited respondents (100) used for the study.

#### **4.2.2: Qualitative methodology**

Qualitative research is “a research strategy that usually emphasizes words rather than quantification in the collection and analysis of data and that: predominantly emphasizes an inductive approach to the relationship between theory and research, in which the emphasis is placed on the generation of theories; has rejected the practices and norms of natural scientific model and of positivism in particular in reference for an emphasis on the ways in which individuals interpret their social world; and takes a view of the social reality as a constantly shifting emergent property of individuals’ creation” (Bryman & Bell, 2015:38).



It is the preferred method in researches involving humans and their environment, enabling the researcher understand the perspectives of the subject (Bryman, 2001). Despite the seeming advantages and impact of qualitative methodology in research procedures, it has some drawbacks which include deficiency in efficacy and precision (Sarantakos, 2005), occurrence of subjectivity in observation, interpretation and the difficulty in generalizing the outcomes of the research easily as the smaller number of sample sizes used in comparison with quantitative studies makes the outcomes likely to be controlled. Accordingly, it is difficult to reproduce and (Bryman, 2001). The dilemma therefore becomes how the number of cases can be considered as representing bulk of the population being considered. However, supporters of qualitative research posit that generalizing the outcomes of qualitative research are acceptable considering the fact that they are based and supported by solid fundamental theoretical reasoning (Mitchel, 1983).

#### **4.2.3: Mixed method – combined quantitative & qualitative methodology**

Mixed methods research design makes up for the inadequacy of either Quantitative or Qualitative method by encouraging the application of both approaches within a single study to create several viewpoints (Golicic & Davies, 2012). Mixed methods research involves “the collection or analysis of both quantitative and qualitative data in a single study in which the data are collected concurrently or sequentially, are given priority, and involve the integration of data” (Creswell *et al.*, 2003:29). In this study, data collection was done sequentially. Qualitative method used was the Delphi Technique (more details later on in this chapter), utilizing experts in the Pharmaceutical industry of Lagos, Nigeria. Considering, the focus of the research, it was desirable to get the consensual opinions of the industry experts as they constitute the body of knowledge, policy makers and strategic decision makers of the sector. Decisions on the supply chain and outsourcing in any organization is a strategic one which derives from the overall corporate strategy of the organization. Strong linkages exist between supply chain initiatives and the organizational strategic goals (Okongwu *et al.*, 2014). The Quantitative method used was closed questionnaires to a wider target respondents drawn from the various categories of pharmaceutical organizations of the industry. The respondents to the quantitative questionnaires were the functional role players with knowledge and direct/indirect involvement in the supply chain and outsourcing practices of their respective organizations.

### 4.3: Research design and procedure

The design of the procedure and detailed structure adopted to guide and conduct the research are explained in this section. Two types of mixed method designs and procedures have been developed and used, with each differing according to the timing of data collection. These include **concurrent mixed method**, where there is a simultaneous or concurrent form of data collection and the **sequential mixed method** where the data collection is done in sequence with one form (e.g., qualitative data) following the other (e.g., quantitative data) (Creswell and Plano Clark, 2007).

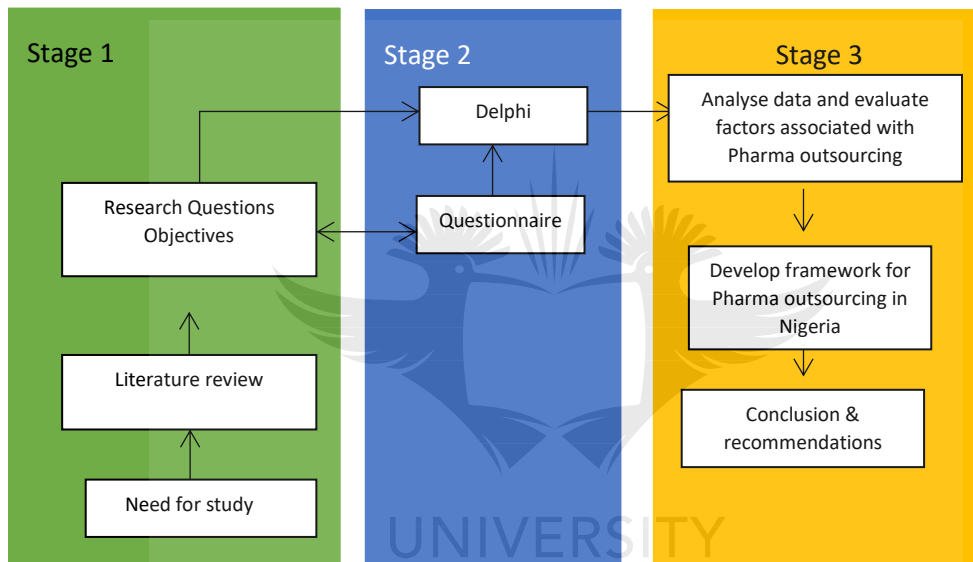


Figure 4. 1: Research Design Outline (Manu, *et al.*, 2010; Musonda, 2012)

Creswell et al. (2003) further categorize both sequential and concurrent mixed methods into three types, giving a total of six (6) types of mixed method designs that can be employed in mixed method research, according to the design and focus of the study. The six (6) types are: (a) Sequential Explanatory (b) Sequential Exploratory (c) Sequential Transformative (d) Concurrent Triangulation (e) Concurrent Embedded and (f) Concurrent Transformative Design. **Sequential Exploratory Design** was adopted with the quantitative method following the Delphi (qualitative) method in this study.

### **4.3.1: The Delphi method**

The Delphi technique is an extensive and established method for collecting data from participants in a field of expertise. It is “designed as a group communication process which aims to achieve a convergence of opinion on a specific real-world issue” (Ab Latif *et al.*, 2017:91). Since its introduction in 1950s, many researchers have adopted many variations of this method (Okoli & Pawlowski, 2004). It is used to elicit unanimity among experts on a particular subject in focus (Miller, 1993). Even though it is majorly considered as qualitative, the Delphi method is also able to yield quantitative results, with some degree of explorative and predictive elements (Cuhls, 2003). It is generally accepted that Delphi is a comparatively controlled process where hitherto unknown facts are unraveled by experts (Häder & Häder, 1995).

In its basic form, the procedure requires the experts to contribute their opinions and answers to structured questions put forward by the researcher who centrally coordinates the process. The coordinator analyses each round of responses to check for common and extreme tendencies (Grisham, 2008). The procedure is repeated in 2 or more stages until a unanimity of opinions is achieved. Despite unanimity achieved, at the end of the exercise, the identities of the participants are veiled from each other in order to remove biases in their responses. A commonly used variant of the Delphi technique is the “ranking-type” Delphi (Okoli & Pawlowski, 2004). Notwithstanding the advantages of the Delphi method, it has its drawbacks. But despite the shortcomings, the Delphi Technique has come to be widely accepted as veritable tool for carrying out insightful qualitative studies in many fields of research.

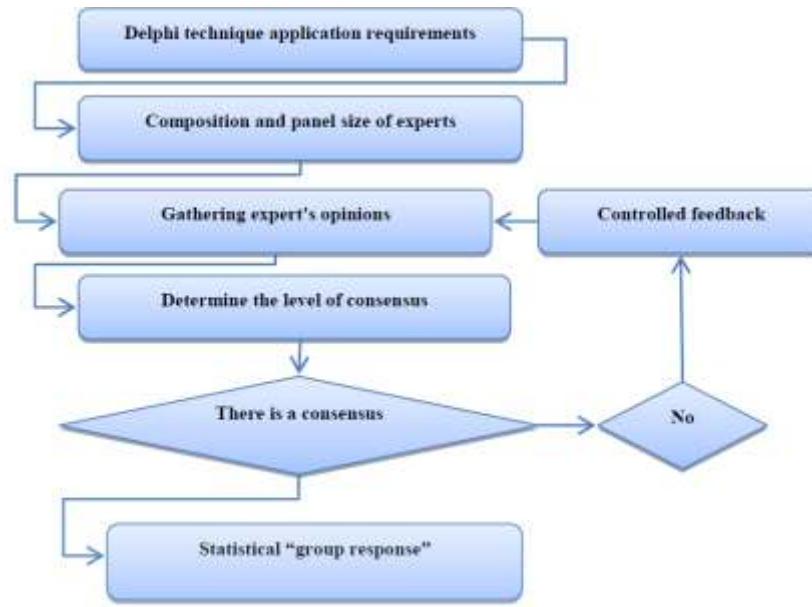


Figure 4. 2: Theoretical Framework of the Delphi Technique (Habibi *et al.*, 2014)

#### 4.3.1.1: Components of the Delphi technique

The main components of the Delphi Technique which were also adopted in this study are the five listed below:

- i. A panel of judiciously selected experts with deep insights and experience on the subject matter. The experts are usually anonymous.
- iii. The researcher who coordinates and conducts the process and rounds
- iv. The iterative process also called “rounds” which may involve 2 or more rounds of questionnaires and feedback
- v. The output, which sums up the results of the study.

In the data analysis, some researchers have suggested a goal of 60 – 80% consensus or when a stability of the data occurs. (Green *et al.*, 1999; Crisp *et al.*, 1997). 60% was used as the threshold of the panelists’ consensus for this study.

#### 4.3.1.2: Panel Selection and size

A crucial aspect of the Technique is selection of panel members (otherwise called panelists or participants). The selection process is very critical success of the technique and study (Hasson *et al.*, 2000). The panelists must show a high degree of expertise, commitment and interest (Hasson *et al.*, 2000).

Two critical criteria have been established for the experts to be selected. First, is the possession of a high degree of relevant knowledge and expertise and secondly, they must be representatives of the profession in which the study is being carried out to enhance the extrapolation and generalization of the findings to the wider population (Rodgers and Lopez, 2002). Furthermore, Adler and Ziglio (1996) posit that the experts, in addition to the criterion of knowledge, must possess good communication abilities and adequate time for the study.

In selecting the panelists for this study, the following criteria were used:

- I. **Residency:** Must be based and manage a Pharmaceutical operation in Lagos
- II. **Knowledge:** Has sufficient knowledge of Pharmaceutical sector policies, regulations and current dynamic issues in the outbound value chain.
- III. **Academic Qualification:** Has a university degree or its equivalent in Pharmacy or related field
- IV. **Experience:** Has a proven experience or currently managing a pharmaceutical operations, services and/or SC role of the organization at the strategic level.
- V. **Employment:** Currently in employment in a pharmaceutical organization in Lagos
- VI. **Membership:** Must belong to a professional body where extrapolation of the results of the study can easily be done.
- VII. **Willingness:** Should have willingness to full participate in the study

In the selection process, the target panelists from across the various categories of the Pharmaceutical Industry were contacted through emails and telephone. A pre-selection scrutiny of their curriculum vitae to ensure they all met the seven criteria set out above was done. Thereafter a physical visit was made to them to explain the study objectives. Those who gave their consent were thereafter given the questionnaire for the Delphi Study (See Appendix A).

### 4.3.1.3: Delphi questionnaire

In research, the questionnaire is a commonly used and versatile data collection instrument. It's a common phenomenon to associate questionnaires with research. Given their popularity, it may be easy to assume, albeit wrongly, that the design and use of questionnaires is easy. The contrary is the case, as a lot of skill and inputs go into the design of a good questionnaire that will attract commensurate response in effective research procedures (Rowley, 2014). Prior to the conclusion of the questionnaire, interview sessions were conducted by the researcher with the key stakeholders in the Private Pharmaceutical Sector. Notable among these were the National President of the Pharmaceutical Society of Nigeria (PSN), Executive Secretary of the Pharmaceutical Manufacturing Group (PMG-MAN), some CEOs of Pharmaceutical Companies including Multinational and Indigenous, Publicly quoted and privately-owned, the Chairman of the Pharmaceutical Manufacturing Group of the Manufacturers' Association of Nigeria (PMG-MAN). The responses from these industry players and leaders were helpful in re-enforcing the focus of the study. The questionnaire used in both the Delphi and quantitative methods were similar, differing only in the impact scale used, number of questions and iterations in the data collection processes. Whereas the Delphi study had an impact scale of 1 – 10, the impact scale used for the quantitative study was the Likert scale of 1 – 5.

The Delphi questionnaire had three sections, A, B & C.

- ✓ **Section A** had three questions designed to gather preliminary information about the respondent's organization as follows:
  - Q1: The status of the organization
  - Q2: The products' portfolio
  - Q3: The number of employees & value of products sold and/or handled in a year
  
- ✓ **Section B** contained the main questions. In this section, there were 98 closed-ended questions under 10 major questions and 3 open-ended questions as follows:
  - Q1: Had 5 questions on the degree of outsourcing
  - Q2: Had 5 questions on the satisfaction level
  - Q3: Had 5 questions on the age of outsourcing relationship
  - Q4: Had 12 questions on the rationale for outsourcing

- Q5: Had 16 questions on the critical success factors
  - Q6: Had 15 questions on the critical risk factors
  - Q7: Had 15 questions on the pre-selection activities
  - Q8: Had 6 questions on the challenges of outbound value chain
  - Q9: Had 12 questions on the desired outcomes of outsourcing
  - Q10: Was an open-ended question on critical issues affecting the outsourcing of pharmaceutical outbound supply chains that may have been omitted from the questions above
  - Q11: Was an open-ended question on what they envisage will be future pivotal context of the pharmaceutical distribution.
- ✓ **Section C** was to gather the personal information of the respondent - gender, qualification, years of experience, membership of professional bodies, current employer and position.

A total of 24 target panelists were invited/contacted. Of this number, 21 (87.5%) consented to participate, out of which 17 (81%) finally participated in the study. The ideal number of panelists for ranges from 3 to 80 (Delbecq *et al.*, 1975; Rowe & Wright, 1999; Okoli and Pawlowski, 2004; Hallowell & Gambatese, 2010). No system exists for fixing Delphi panelists (Habibi *et al.*, 2014; William & Webb, 1994). Despite this seeming non-agreement on the size of panelist, a prevailing pattern can be easily noticed as earlier stated above. Over time, the factors that have influenced the composition of the panel and size include the skills set of the members, the duration, topic, scope and money available for the study. (van Zolingen & Klaassen, 2003). The choice of members with diverse specialties and skills in favour of those with homogenous skills has been supported (Powell, 2003; Somerville, 2008). It is expected that “Delphi subjects should be highly trained and competent within the specialized area of knowledge related to the target issue” (Hsu and Sandford 2007:42). Most panels’ composition range from less than 10 to 100 (Malone *et al.*, 2005; Strasser *et al.*, 2005; Kelly & Porock, 2005; Meadows *et al.*, 2005). Therefore, at 17, the number of the panelists used for this study was considered adequate.

The panel had 2 females and 15 males. The respondents were all University degree holders. The panelists were mainly pharmacists – 13 (76.4%). Others were specialists in supply chain management - 1 (5.9%), operations management - 2 (11.8%). 1 was a civil engineer (5.9%). This

functional diversity in the background of the panelists was an advantage. Furthermore, of the 17 experts chosen as panel members, 10 were CEOs of their organizations, 3 were Country Managers (a title mostly used by multinational companies to designate their head of in-country operations) and 4 were Supply Chain Executive Directors of their organizations. With an average experience of 26 years, the panel was considered very experienced. There were five (5) categories covering the entire private pharmaceutical sector where the panelists were drawn from and have past experience and/or current experience. Predictably, the private sector provided more diversity in line with the structure of the industry. Furthermore, the panelists were drawn from all the categories of pharmaceutical products being handled and/or sold in the pharmaceutical industry. The least handled and/or sold is the vaccine category which is well known to require facilities and specialized skills in the storage and handling of the products. All the categories of drugs are widely and evenly sold by all the organizations.

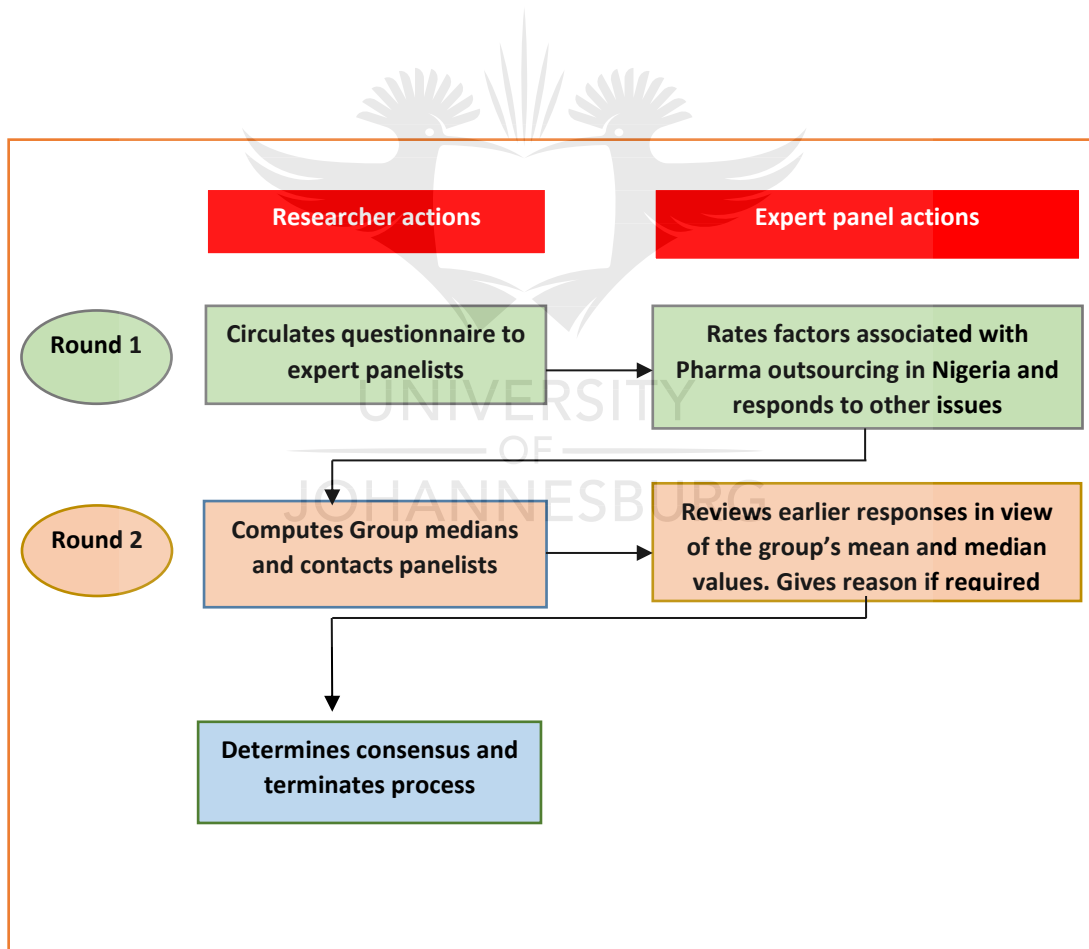
#### **4.3.1.4: The Delphi Process**

The Delphi study consisted of two rounds conducted over 6 months. The questionnaire designed and used for round 1 had 91 structured closed-end questions grouped under nine major questions (Q1 – Q9) and two open-ended question (Q10 & Q11). (See Appendix A). The output of the first formed were input into the second round. The selection of Delphi experts was from the private sector only. This is because the practice of outsourcing in pharmaceutical industry in Nigeria is primarily pursued by the private sector that have attained a maturity in the practice of outsourcing. Besides, little to no outsourcing is practiced in the public sector considering the regularized supply chain processes available through the various government entities. Also, the open-ended questions in the questionnaire were analysed using the principal content analysis methodology.

By the first round, a clear pattern of consensus was achieved for most of the questions by the panelists. Therefore, in the second round, the panelists were contacted by phone for them to review their round one responses and state/justify their final responses/positions. Over the two rounds, agreement was achieved on most of the questions and factors investigated. The Delphi study was carried out through hard-copy questionnaires personally delivered by the researcher, with face-to-face discussions for clarifications and follow-up telephones calls where needed by some panelists.



The panelists were required to respond to an impact scale from 1 – 10 in ascending degree of agreement and/or impact for the question(s) under consideration. The group mean and median values of all the responses received from the panelist were calculated from each question. This is the prescribed procedure for determining the measure of central tendency and arriving at the consensus by the panelists. Okoli & Palowski (2004:6) states that “the Delphi study is flexible in its design, and amenable to follow-up interviews. This permits the collection of richer data leading to a deeper understanding of the fundamental research questions”. After the second round, the medians and mean values were calculated. Consensus was reached after the second round and the process concluded as there was no need to proceed to the third round.



**Figure 4. 3: Delphi Outline (Thangaratinam & Redman, 2005:124)**

A high degree of anonymity was maintained all the entire Delphi Process. As stated earlier, this was done to remove bias and undue influence on other members. This was critical to enhance the credibility of the process. Figure 4.8 shows a schematic diagram of how the entire study data was conducted.

#### **4.3.1.5: Computation of Data**

Computation of the median and mean values of the various responses was carried out using Microsoft Excel. The results are presented in chapter 5. The findings and summary of consensus show the various factors associated with the outsourcing and challenges of pharmaceutical outbound value chains in Nigeria in ranking order of impact.

#### **4.3.1.6: Consensus**

Several methods exist which have developed and used by researchers in determining consensus in Delphi studies. Some have proposed the number of rounds as a basis, with 2 to 10 rounds reported in several articles (Windle, 2004; Habibi *et al.*, 2014). Some others have used frequency distribution as a measure to establishing consensus, setting the 51% mark as the threshold for agreement (McKenna, 1994).

In this study, the group mean and median values were employed in calculating and determining consensus. Other methods which have been developed and used include: percentage agreement & convergence of importance ranking (Holey *et al.*, 2007), Kendall's coefficient of concordance, with values ranging from zero to one in ascending order of consensus/agreement (Schmidt *et al.*, 2001). The various studies/method cited above confirm the established fact that there is no unanimity in a single method for determining consensus. However, it is recognised that for consensus to be determined, there must be a common agreement. In this study, the measures of the common agreement and convergence were the mean and median values of the responses, with 60% as threshold values for both measures.

In this study, consensus was determined through the following:

1. A threshold of at least 60% agreement of responses on any question.

The degree of consensus used for this study are the mean and median values listed as follows:

1. Strong - 9-10

2. Good - 7-8.99
3. Weak -  $\leq 6.99$

#### **4.4. Quantitative study**

The quantitative survey conducted in this study followed the Delphi as required in the sequential exploratory technique of mixed method.

##### **4.4.1: Quantitative Study Population & Sample Size**

The sample of respondents for the quantitative survey was drawn from the same population (the pharmaceutical industry of Lagos, South West Nigeria) that produced the Delphi panelists. However, unlike the Delphi panel which were drawn from the private sector alone, the respondents for the quantitative were drawn from both sectors of the Industry. The following criteria were pre-determined for a respondent to meet:

- I. **Residency:** Must be based in Lagos
- II. **Knowledge:** Has sufficient knowledge of the outbound value chain processes of the Pharmaceutical organizations that produce the Delphi panelists
- III. **Academic Qualification:** Has a university degree or its equivalent in Pharmacy or related field
- IV. **Experience:** Has a proven experience or currently managing a supply chain or related role in the pharmaceutical industry at a functional level.
- V. **Employment:** Currently in the employment of the pharmaceutical industry.

In determining the population, preliminary interviews were conducted to determine the number of qualified potential respondents are outlined above and accordingly, the questionnaires were administered to them. Determination of the adequate size of the respondents in the survey was through the use of the Krejcie & Morgan (1970) table.

**Table 4. 1: The Krejcie & Morgan (1970) Determining Size of sample for given population.**

<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	100000	384

Note.—*N* is population size.  
*S* is sample size.

A cross sectional non-random sampling using the Krejcie & Morgan model was used. The population from which the respondents were sampled consisted of a cross section of both sectors. The public sector had 28 Heads of Pharmaceutical services in the 28 General Hospitals and also 28 Head Pharmacists covering the 288 primary healthcare centres in the State. Of this, 23 primary healthcare centres and 8 General Hospitals were sampled since both layers of the government facilities had the same standardized processes. In the private sector as listed earlier in chapter 1, Lagos has 75 companies as manufacturers and importers of pharmaceutical products. Together with the 3 large pharmacy chains, the total population of organizations was 134. From the Krejcie and Morgan's table, the adequate size was 97. Accordingly, 68 organizations containing 34 each

from both sectors were sampled and given an average of 2 questionnaires each, depending on the size of the organizational structure. In total, 133 questionnaires were given out to the respondents.

#### **4.4.2: Quantitative questionnaire**

As earlier stated in chapter four, the questionnaire used in both research methods were similar, differing only in the impact scale used, number of questions/latent variables and iterations (rounds) in the data collection process. Whereas the Delphi study had an impact scale of 1 – 10, the impact scale used for the quantitative study was the Likert scale of 1 – 5. Furthermore, whereas the Delphi questionnaire had 10 close-ended questions, 98 latent variables and 2 open-ended questions, the quantitative instrument had 9 close-ended questions and 91 latent variables, with no open-ended questions. A cover letter addressed to the respondent contained brief summary of the survey process and the contact details of the researcher.

#### **4.4.3: Validation of Questionnaire**

Before the administration of the instrument, the questionnaire was sent to the statistical department of the University for validation and confirmation of its amenability to statistical analysis after completion and collection of data.

#### **4.4.4: Data Collection**

After determining the sample size as illustrated earlier, the questionnaires were personally administered to all the respondents that were targeted. Considering the likelihood of not getting 100% completion rate and running the risk of not getting enough responses to meet up with the determined sample size, a total number of 133 questionnaires were administered. In some instances, especially in the public sector, the researcher had to sit in with the respondents to complete the questionnaires, giving further clarification to some areas as appropriate. 103 questionnaires (77%) were completed and returned. The instrument administration and collection took a total of four (4) months from October 2018 and January 2019. The summary of the preliminary information about the respondents' organizations and their personal information as given in Sections A & C of the questionnaire are given in chapter 6.

Respondents from all the various categories of sub-sectors in the pharmaceutical industry completed the questionnaires. There were 5 categories in the private sector (Multinational Manufacturing, Overseas' Manufacturers' Representatives, Indigenous Manufacturers, Importers/Distributors and Large Pharmacy Chains) and two categories in the public sector (State General hospitals and the primary health care centres) of the State.

The categories of the products' portfolio of the respondents' organization were over the counter (OTC), ethical/prescription drugs and vaccines, which account for the least on account of the specialization in their storage and handling. All the respondents met the minimum requirement for educational qualification with 65% & 35% having Bachelor's and Master's degrees respectively. All the survey respondents in the public sector were Pharmacists with 12 as average years of experience. Given their functional roles and positions in their organizations, this value is quite adequate and sufficient for them to be knowledgeable enough to respond to the issues and questions raised in the questionnaire.

#### **4.4.5: Data Analysis**

Before data, the responses were inputted into a Microsoft excel sheet before being transposed into a format for use by SPSS version 25, the software used for the analysis. The statistical analyses that were done include descriptives like frequencies, means and distribution. Inferential statistical and exploratory factor analyses using the principal components analysis and principal axis factoring.

#### **4.4.6: Missing Values**

There were some missing values in the data which though not desirable, but was and is inevitable in a research like this involving many questions. On closer investigation, it was found that this occurrence may not only be because of limited knowledge about some of the questions being asked, but because some of the questions were not applicable to the respondents' situation and operations. For instance, many whose organizations are not involved in a particular area or category of pharmaceutical operations and/or the outsourcing of same, may choose to refrain from responding.

#### **4.4.6: Data reliability & validity**

To ensure data reliability and validity, the results of previous/similar studies were considered in the design of the questionnaires as this measure enhances the quality and validity of surveys (Olson, 2010:313). Furthermore, a formal approval was obtained from the Department of Quality and Operations Management, University of Johannesburg to conduct the research. The reliability of the scale was tested and confirmed using the Cronbach's alpha coefficient as this is the most frequently used measure of internal consistency of scale. Principal axis factoring and component analysis were used for the data extraction method while data rotation was with varimax with Kaiser Normalisation and Oblimin with Kaiser Normalisation respectively. Prior to the discussion of the results, the factors extracted were grouped and named based on their commonalities.

#### **4.5: Delimitations of the study**

These refer to those features that explain the limits of the research study. Respondents for this were most pharmacists with strategic role in the pharmaceutical services and supply chain functions in Lagos State, Nigeria. The choice of Lagos as the study area was due to the highly industrialized status and number of pharmaceutical organizations in the State. This study investigated the state of pharmaceutical supply chains in the State and the various factors associated with the outsourcing of the outbound value chains.

#### **4.6: Ethical consideration**

In this study, no ethical challenges were encountered. The works of previous researches referred to in the study were properly cited and acknowledged. The confidentiality and anonymity of the respondents were protected. Formal letters from the Lagos State government and the Department of Quality and Operations Management, University of Johannesburg were obtained and affixed to the survey instruments used in the study.

#### **4.7: Conclusion**

The design and methodologies adopted in this study have been detailed in this chapter. It described the methodology adopted, with details of the design of both the Delphi technique and quantitative survey. Furthermore, it explains the Delphi process – selection, composition, method for consensus

and computation of data. The quantitative study population, sample size, data collection and analytical techniques utilized have also been outlined. Finally, the delimitation and ethical consideration of the entire study are included.





## CHAPTER 5

### RESULTS & DISCUSSIONS OF DELPHI STUDY

#### 5.1: Introduction

In this study, the Delphi technique was adopted in exploring the Nigeria pharmaceutical supply chains in general and specifically, to request experts' opinions on the various factors associated with the outsourcing of the pharmaceutical outbound value chains in Nigeria. The technique solicited from the panel of experts, critical issues relating to various aspects of outsourcing pharmaceutical outbound supply chains in Nigeria. Also, tested through this were their views on the critical success and risk factors associated with outsourced relationships and finally, to determine from their views, the challenges of the pharmaceutical outbound value chains and their prediction of the future landscape of the pharmaceutical distribution system in Nigeria. Two rounds of iterations were conducted before the Delphi panelists achieved unanimity.

This chapter summarizes the output of the iterations. Calculations were done for each question as they relate to the different factors that are associated with the outsourcing of the outbound pharmaceutical value chains. The analysis of the results from the different computations described above are presented in this section. Finally, the discussions of the results based on the earlier set objections are also presented.

#### 5.2: Specific Delphi Research Objectives

The objectives set to be achieved with the Delphi study as early stated in Section 1.7.6 are as follows:

**DSO1:** To identify the level of outbound supply chain outsourcing in the last decade in Nigeria.

**DSO2:** To determine the age of the outsourcing relationships

**DSO3:** To identify the main factors influencing the decision to outsource outbound pharmaceutical value chains

**DSO4:** To identify the level of satisfaction of the outbound value chain services currently being outsourced by the Pharmaceutical companies

**DSO5:** To determine the underlying risk factors in the outsourcing relationship

**DSO6:** To determine the criteria to a successful selection and outsourcing relationship with a 3rd Party Service Provider

**DSO7:** To evaluate the vital 3PL pre-selection activities by the outsourcing organizations

**DSO8:** To determine the challenges in the pharmaceutical outbound value chains

**DSO9:** To identify the desired outcomes of outsourcing outbound pharmaceutical value chains

The philosophy guiding the objectives stated above was to investigate various aspects of the outsourcing of outbound pharmaceutical value chains in Nigeria and to develop a framework for a successful outsourcing process. Upon the completion, the responses of the experts to the questions in round one were analysed, with the outcome forming the basis for round two. The intention of this round was to allow the panelists review their responses in round one against the background of the substantive position of other panelists. After the second round, the panelists were in agreement on almost all the factors investigated, hence achieving consensus and completion of the technique. The various statistical values (median & mean) were computed for each question responded to by the experts. Finally, content analysis approach was used to analyse the various experts' answers/responses to the open-ended questions.

In general, a perfect consensus which is rare in practice is achieved only when all (100%) the experts are in agreement on the various issues. However, a two-thirds consensus is considered

acceptable and adequate (Stitt-Gohdes & Crews, 2004). A minimum of 60% agreement was considered as acceptable consensus for this research. From the findings of the Delphi study, a summary and ranking of the various latent variables/factors associated with outsourcing of outbound pharmaceutical supply chains was made. The table of results from Delphi Study as they related the specific Delphi objectives are presented in the next section.

### 5.3 Delphi Study Results.

#### 5.3.1: Section A – Preliminary information about respondents & organizations

This section contains the key information about the respondents and their organizations.

##### 5.3.1.1: Gender Distribution

The gender distribution of the respondents is presented in Table 5.1 It shows the panel was made up of 15 males and 2 females representing 88.2 and 11.8% respectively.

**Table 5. 1: Gender distribution of panelists**

Gender	No	%
Male	15	88.2
Female	2	11.8
Total	17	100

##### 5.3.1.2: Educational Qualification of Respondents

From the results shown in Table 5.2, the respondents were all University degree holders at different level including Master’s and Doctorates degrees.

**Table 5. 2: Educational qualification of panelists**

Qualification	No	%
Bachelor	3	17.6
Masters	12	70.6
Ph.D	2	11.8
Total	17	100

##### 5.3.1.3: Years of experience of Respondents

Table 5.3 shows the years of relevant professional experience of the respondents. It shows that the respondents have an average of 25.9 years as experience.

**Table 5. 3: Years of experience of panelists**

Years of experience	No	%
0 - 5	0	0
6 - 10	1	6
11 - 15	0	0
16 - 20	3	17
21 - 25	1	6
26 - 30	9	53
above 30	3	17
Total	17	100
	<b>Mean</b>	<b>25.9</b>
	<b>SD</b>	<b>7.4</b>

**5.3.1.4: Areas of specialization of respondents**

As shown in Table 5.4, the panelists were mainly pharmacists – 13 (76.4%). Others were specialists in supply chain management - 1 (5.9%), operations management - 2 (11.8%). 1 was a civil engineer (5.9%).

**Table 5. 4: Areas of specialization of panelists**

Area of Specialization	No	%
Pharmacy	13	76.4
Supply Chain	1	5.9
Accounting	0	0
Operations	2	11.8
Sales & Marketing	0	0
Others (civil engineering)	1	5.9
Total	100	100

**5.3.1.5: Categories of Respondents' Organizations**

The respondents were drawn from all the categories in the Pharmaceutical sector. As shown in Table 5.5, the categories and the panelists from them are multinational manufacturing - 7 (41.1%), overseas' manufacturers' representatives - 3 (17.6%), indigenous manufacturers - 5 (29.4%), importers/distributors - 8 (47.1%) and large pharmacy chains – 2 (11.8%)

**Table 5. 5: Categories of Respondents' Organizations**

No.	Category	Responses	%
1	Multinational Manufacturing	7	41.1
2	Overseas' Manufacturer's Representatives	3	17.6
3	Indigenous Manufacturer	5	29.4
4	Importer/Distributor	8	47.1
5	Large Pharmacy Chain	2	11.8

### 5.3.1.6: Employees' number of panelists' organizations

Table 5.6 shows the employees' number of the panelists' organizations. 1 (5.9%) had less than 50; 6 (35.3%) had between 51 – 200 employees; 6 (35.3%) had between 201 – 500 employees while the largest of the organizations - 4 of them (23.5) had between 501 – 1000 employees. None of the organizations had more than 1000 employees.

**Table 5. 6: Employee number of panelists' organizations**

Number	Frequency	%	Cumulative %
501 – 1000	4	23.5	23.5
201 – 500	6	35.3	58.8
51 – 200	6	35.3	94.1
Less than 50	1	5.9	100.0

### 5.3.1.7: Portfolio of products handled by panelists' organizations

Table 5.7 is a summary of the categories of pharmaceutical products being handled and/or sold by the organizations from which the panelists were drawn. The least handled and/or sold is the vaccine category which is well known to require facilities and specialized skills in the storage and handling of the products. All categories of medicines are widely and evenly sold by all the organizations.

**Table 5. 7: Portfolio of products handled by panelists' organizations**

S/N	Products' portfolio	Number	%
1	Over the Counter Products	14	35
2	Ethical/Prescription Drugs	16	45.7
3	Vaccines	5	14.3

*Note: Some of the panelists' organizations handle more than one product portfolio, hence the number (35) are not equal to 17. Same explains why the % don't add up to 100*

### 5.3.1.8: Turnover/value of products handled by panelists' organizations

In Table 5.8, the values of the annual turnover or products handled by the panelists' organizations are presented. It shows 1 (5.9%) had less than N100m and between N100m – N500m each, respectively; 7 (41.1%) had between N1b – N5b while 8 (47.1%) had more than N5b as annual turnover or value of products handled.

**Table 5. 8: Turnover/value of products handled by panelists' organizations**

Value (Naira)	Frequency	%	Cumulative %
More than N5b per annum	8	47.1	47.1
N1b - N5b per annum	7	41.1	88.2
N100m - 500m	1	5.9	94.1
Less than N100m	1	5.9	100.0

#### **5.4: Section B – Results from the responses to the questionnaire and Delphi specific objectives**

Results of the responses and computed consensus of the panelists on the various questionnaire questions (Q1 – Q11) and the Delphi specific objectives are presented in this section.

##### **5.4.1: DSO1 - To identify the level of outbound supply chain outsourcing in the last decade in Nigeria.**

Table 5.9 shows the level of outsourcing of the outbound supply chain services examined in this study (Transportation, Warehousing, Distribution, Cold Chain & Reverse logistics) by the responding experts' organizations.

**Table 5. 9: Level of outsourcing**

Function	Median	Mean	Ranking
Transportation	9.0	8.1	1
Distribution	8.0	7.1	2
Reverse Logistics	8.0	6.4	3
Warehousing	7.0	6.4	4
Cold Chain	2.0	3.7	5

The assessment of the responses of the experts was based on the ordinal scale of 1 – 10 in increasing order of impact or influence of the variable being considered. Furthermore, the level of consensus was rated as weak with mean values at less than 7, good at 7, strong at 8 and very strong at 9 – 10. In this study, the services mostly outsourced with the highest degree of mean value & median (8 & 9 respectively) was Transportation, (otherwise called Haulage or long-distance transport in Nigeria), followed by Distribution (mean & median values of 7 & 8 respectively) and Warehousing (mean & median values of 7 & 7 respectively). Cold chain services with both mean and median values of 6 and Reverse Logistics (with mean & median values of 4 & 3 respectively) were the least outsourced services.

#### 5.4.2: DSO2 - To determine the age of the outsourcing relationships

Table 5.10 shows the feedback on the age of outsourced relationships by the responding experts' companies.

**Table 5. 10: Age of outsourcing (years)**

Function	Median	Mean	Ranking
Transportation	12.0	11.9	1
Distribution	11.0	10.4	2
Reverse Logistics	7.0	9.6	3
Warehousing	8.0	8.7	4
Cold Chain	5.0	5.6	5

The responses are the absolute number of years these outbound supply chain functions have been outsourced by the organizations and not subject to any consensus as the data represents information of facts. This table is similar to Table 5.9 as Transportation came out as the function with the oldest outsourced function at a mean & median values of 12 years. Distribution which usually refers to secondary transport or last-mile distribution services ranked second on the age with mean and median values of 10 & 11 years respectively. Closely following the Distribution services is the reverse logistics service (with mean & median values of 10 & 7 years respectively) which in form and format is a type of transport services employed by these organizations for product recall and other forms of “out-in” movements of products along the outbound value chains. Once again, cold chain services comes out as the newest outsourced service by these organizations, predictably because of fewer number of players, scope and the technicality of the storage/handling involved. The mean & median values for these specialized service were 6 and 5 years respectively.

#### 5.4.3: DSO3 - To identify the main factors influencing outsourcing of outbound pharmaceutical value chains

In Table 5.11, responses on the critical factors that influence the outsourcing of outbound pharmaceutical value chains are presented. The list of these factors were generated from comprehensive literature of the various studies on outsourcing in Nigeria and elsewhere and the few that have been carried out in the pharmaceutical sector in both sub-Saharan African countries and the more developed countries. The most critical factors as reflected in this table with both the

mean and median values of 9, showing a very strong consensus are focus on core competence and cost savings.

**Table 5. 11: Factors influencing outsourcing decisions**

Function	Median	Mean	Ranking
Focus on core competence	9.0	8.8	1
Cost savings	9.0	8.5	2
Improvement in Customer service	8.5	8.3	3
Flexibility	8.0	8.3	4
Lack of Capacity	8.0	8.1	5
Corporate Strategy	8.0	7.9	6
Market expansion	8.0	7.0	7
Lack of in-house expertise	8.0	6.9	8
Transfer of risks to 3PL	8.0	6.9	9
Industry best practice	7.0	6.9	10
Access to Specialised skills	7.0	6.9	11
Technological advancement	6.0	6.5	12

The other factors of influence with strong consensus among the experts are *flexibility of operations by the 3PL, market expansion, improvement in customer service, lack of capacity* (by the outsourcing organization) and *corporate strategy*. Other factors (*Access to Specialised skills, Transfer of risks to 3PL, Lack of in-house expertise, Industry best practice and Technological advancement*) were considered of less critical influence judging from the moderate consensus by the experts.

#### **5.4.4: DSO4 - To identify the level of satisfaction of the outbound value chain services currently being outsourced by the Pharmaceutical companies**

Table 5.12 contains the satisfaction level the organizations have derived from the outsourced services



**Table 5. 12: level of satisfaction from outsourced services**

<b>Function</b>	<b>Median</b>	<b>Mean</b>	<b>Ranking</b>
Warehousing	8.0	7.7	1
Distribution	7.5	7.0	2
Transportation	7.0	6.9	3
Reverse Logistics	7.0	6.3	4
Cold Chain	7.0	4.9	5

A closer look at the responses shows a reversal of ranking between these services in terms of satisfaction levels shown here and the degree of outsourced services presented in Table 5.9 earlier. In this table, the organizations derived the highest degree of satisfaction from warehousing services than Transportation and Distribution services which were the most outsourced services. The positions occupied by the reverse logistics and cold chain services (4 & 5 respectively) were similar to those reported earlier in Table 5.9. The satisfaction levels recorded by these organizations may not be unconnected with the nature and vicissitudes associated with these mobile components of the outbound supply chains.

#### **5.4.5: DSO5 - To determine the underlying risk factors in the outsourcing relationship**

Table 5.13 shows the list of risks associated with outsourcing, their mean and median values and the ranking.

**Table 5. 13: Underlying risk factors in the outsourced relationship**

<b>Function</b>	<b>Median</b>	<b>Mean</b>	<b>Ranking</b>
3PL Underperformance	9.0	8.9	1
Service levels not achieved	8.0	7.9	2
Corporate governance	8.0	7.8	3
Value misalignment	8.0	7.6	4
Loss of confidentiality	8.0	7.4	5
Loss of flexibility	7.0	7.3	6
No continuous improvement by 3PL	7.0	7.2	7
Cost reduction not realised	7.0	6.9	8
Obsolete Technology	7.0	6.9	9
Undertrained vendor's employees	6.0	6.7	10
Hidden costs	6.0	6.7	11
Loss of control of outsourced function	7.0	6.5	12
Internal HR issues	6.0	6.4	13
Vendor employee turnover	6.0	6.4	14
Loss of expertise	6.0	6.3	15

Several studies have reported various risks associated with outsourcing of supply chain activities. The degree of risks which vary according to the service being outsourced, sector and country were listed for the expert panelists to evaluate in this study. Their responses are presented in the Table 5.13. Attaining a very strong consensus level (mean & median values of 9 respectively) is the risk of the *underperformance of the 3PL Service Provider* which the experts rated/ranked very high. This is followed by a closely-related risk of *service levels not achieved*. These two risks topped the list of risks the panelists accord the outsourcing process as they represent a failure of this critical strategic decision. Other risks rated high but in order of descending criticality are *corporate governance & Value misalignment*. All other risks were rated as moderate to low as reflected in the levels of consensus (mean values of 6 to 7) recorded for these risks. This is probably so because of the ease and availability of mitigating plans against these risk factors.

#### **5.4.6: DSO6 - To determine the criteria for a successful selection and outsourcing relationship with a 3rd Party Service Provider**

Table 5.14 contains the criteria for the selection of 3PL service providers, mean, median scores and the ranking of the criteria.

**Table 5. 14: Criteria for successful selection of 3PL service provider**

Function	Median	Mean	Ranking
Speed of service delivery	10	9.5	1
Service reliability	9.0	9.2	2
Operational flexibility	9.0	8.9	3
Pedigree/history of performance	9.0	8.9	4
Financial strength	9.0	8.7	5
Quality policies and procedures	9.0	8.7	6
National/geographical spread	8.5	8.7	7
Management structure & expertise	8.0	8.2	8
Customer orientation	8.0	8.1	9
Stable industrial relations	8.0	8.1	10
Flexible payment regimen	8.0	8.1	11
Innovation	8.0	7.9	12
Organizational culture	8.0	7.9	13
Corporate values	8.0	7.9	14
Availability of latest ICT tools	8.0	7.7	15
Indemnity	8.0	6.7	16

Many criteria for selecting 3PL service providers have been documented by many experts and authors. While some may be peculiar to certain industries and sectors, others are common criteria which cut across sectors and industries and are considered both fundamental and critical to the success of any outsourced relationship. These criteria have been listed and formed the basis for the results in Table 5.14 which summarizes the responses of the expert panelists to their ranking of these criteria.

As shown in the table 5.14, the most critical of the factors with the highest ranking and strongest consensus is *service reliability*. Next in order of consensus and ranking by the experts is another service-related factor – service reliability. Other critical factors showing very strong consensus are service reliability, financial strength, operational flexibility, pedigree/history of performance and operational flexibility; which, when examined closely are factors closely associated the service provider’s the ability or otherwise to deliver on their service. All the other factors - innovation, organizational culture, customer orientation, operational flexibility, corporate values,

flexible payment regimen and indemnity were considered to be of moderate to high importance in the selection process and successful outsourced relationship with a 3PL service provider. At the lowest ranking by the expert panelists was availability of latest ICT tools. Considering level of ICT infrastructure in the country and scope of the outsourced functions, it is easily understandable while these experts place the lowest emphasis on this criterion.

#### **5.4.7: DS07 - To evaluate the vital pre-selection activities by the outsourcing organizations**

Table 5.15 contains the list of pre-selection activities engaged in by the outsourcing organizations

**Table 5. 15: Pre-selection activities by the outsourcing organizations**

<b>Function</b>	<b>Median</b>	<b>Mean</b>	<b>Ranking</b>
Analysing present costs of function(s)	10.0	9.2	1
Adequate due diligence	10.0	9.2	2
Visiting 3PLs' locations	10.0	9.0	3
Developing service levels agreement (SLA)	10.0	9.0	4
Contract preparation	9.0	9.0	5
Contract negotiation	9.5	8.8	6
Corporate governance checks	9.0	8.7	7
Developing critical proactive Corrective And Preventive Action (CAPA) plans	9.0	8.4	8
Preparing an exit plans/provisions	8.5	7.9	9
Verification of listed references	8.5	7.9	10
Developing a back-up plan	8.0	7.9	11
Engaging present clients of potential 3PL partner	8.0	7.6	12
Appointing a relationship manager	8.0	7.6	13
Developing a transition plan	8.0	7.5	14
Advertising a Request for proposal (RFP)	7.0	6.2	15

Depending on the structure and operational system of an organization, many processes are available and documented on the various pre-selection activities they engage in before the appointment of a 3PL service provider. In table 5.16, these various activities and the results of the expert panelists' responses are presented. Topping the list of these activities is the assessment of their present cost structures. This activity is considered critical and uppermost in the list of pre-selection activities as comparative analysis of the costs of in-house performed and outsourced

functions will be crucial in determining if the outsourcing decision will deliver on one of the pre-determined goals of costs reduction or not as earlier listed. Following this activity are adequate due diligence & visiting 3PL locations; two activities which are critical in evaluating the capacity of the potential 3PL Partner. The other activities in order of importance are: contract preparation and negotiation, developing service levels agreement (SLA) and developing critical proactive and corrective and preventive Action (CAPA) plans. These are the next activities these organizations engage in after ascertaining the competence of the service provider and have scaled through the earlier evaluation stages. These activities are those related to how the newly-contracted relationship will be governed and administered. Other activities, although important in the pre-selection processes were considered less critical than those listed above.

#### 5.4.8: DSO8 - To determine the challenges in the pharmaceutical outbound value chains

Tables 5.16 contains the challenges of outbound pharmaceutical value chains

**Table 5. 16: Challenges of outbound pharmaceutical value chains/outsourcing**

Function	Median	Mean	Ranking
Road Infrastructure	9.0	8.8	1
Power Infrastructure	9.0	8.7	2
Absence of competent 3 <sup>rd</sup> Party Service Providers	7.5	7.5	3
Inadequate Policy & Regulation	7.5	7.1	4
Lack of skilled personnel	7.0	6.7	5
Pilferages along the chain	6.0	5.5	6

The outbound pharmaceutical value chains in Nigeria like most resource-limited countries are bedeviled by a myriad of challenges which are both external and internal to the sector. Apart from information from literature review, in compiling these challenges peculiar to the Nigeria environment, interviews were conducted with Industry leaders and experts in addition to those engaged later as Delphi panelists. As shown in Table 5.16, the most critical of these challenges with very strong consensus and mean/median values of 9 are two factors that are environmental – road & power infrastructure. These factors reflect succinctly, the nature of the products in the supply chain – pharmaceutical and thermolabile products, which require regular power for storage. Road infrastructure is critical for the smooth delivery of these products. The other factor

next in the list of critical challenges is the absence of competent 3PL service providers with the capacity to handle pharmaceutical products. Lastly, among the challenges listed by the panelists are the inadequate policy & regulation, lack of skilled personnel and pilferages along the chains.

#### **5.4.9: DSO9 - To identify the desired outcomes of outsourcing in outbound pharmaceutical value chains**

In Table 5.17, the expert panelists were asked to state the desired outcomes of their outsourcing decisions as a reflection of the accrued benefits listed out in the variable factors compiled from extant literature. The rating of these outcomes as in other questions, was 0 to 10 based on the discrete level of benefits. The mean and median consensual values are presented in the table. These responses also reflect how much of the pre-determined reasons/rationale for outsourcing as listed in Table 5.11 these outsourcing organizations desire as outcomes of their outsourcing decisions.

**Table 5. 17: Desired outcomes of outsourcing outbound pharmaceutical value chains**

<b>Function</b>	<b>Median</b>	<b>Mean</b>	<b>Ranking</b>
Focus on core competency	9.0	8.8	1
Reduced Capital expenditure	9.0	8.0	2
Geographical representation	8.0	8.0	3
Speed & Agility	8.0	7.8	4
Improvement in Customer service	8.0	7.7	5
Market expansion	8.0	7.7	6
Cost advantage/benefit	8.0	7.6	7
Reduced manpower	8.0	7.5	8
Efficiency	8.0	7.4	9
Market share	7.0	6.9	10
Access to Specialised skills	7.0	6.8	11
Indigenous expertise	7.0	6.5	12

Achieving strong to very strong consensus values are 8 out of the 12 possible benefits from the outsourcing process. Focus on core competency received the highest and very strong consensus with mean & median values of 9 each. The other seven benefits (reduced capital expenditure,

geographical representation, improvement in customer service, speed & agility, cost advantage/benefit and reduced manpower) followed in the ranking with good consensus and mean values of 8. The other benefits (efficiency, access to specialised skills, market share and indigenous expertise) were ranked of least importance.

#### **5.4.10: DSO10 - To determine the future pivotal context of the pharmaceutical distribution in Nigeria**

In this open-ended question, the expert panelists were asked to forecast, what will be the ideal pivotal context for an effective pharmaceutical distribution in the next decade in Nigeria. The following were the responses received:

1. Control of access & implementation of good distribution practice.
2. The current chaotic drug distribution system needs to be sanitized with long lasting solution.
3. Enforcement & implementation of the National Drug Distribution policy
4. Provision of infrastructure & enforcement of policies towards a structured and better regulated distribution system that will include operations of wholesale outlets in the distribution chain.
5. Government-driven national distribution centres, FDI increase, completion and erosion of margins, improvement of governance.
6. More integrated approach with greater government oversight
7. Mega drug distribution centers and closure of open drug markets
8. Specialization in line with the new drug distribution guidelines
9. Full implementation of the National Drug Distribution Guidelines (NDDG) integrated with an IT platform. This will lead to emergence of specialised and definitely resourced distribution companies with capacity to provide demand fulfilment on behalf of its clients( importers& manufacturers)
10. Streamlining the chaotic drug distribution with medicines delivered to consumers with intact integrity

#### **5.4.11: Other Critical Issues affecting Pharmaceutical Supply Chains in Nigeria**

Furthermore, when the expert panelists were asked to identify any critical issues affecting the pharmaceutical outbound supply chains and the outsourcing, that have been omitted from the questions above, they listed the following:

1. Lack of credible industry data for planning & accurate forecasting to help implementing of outsourced services
2. Enhanced regulation of the distribution system to a more regulated structure
3. Few reliable and structured 3PL service providers (may be one). There is need for healthier competition to lift up/expand the industry.
4. Soft infrastructure (human resource) , insurance, unregulated markets, financing
5. Sustainability/Environmental considerations
6. Law enforcement agencies e.g. the National Drug Laws Enforcement Agency (NDLEA) and the Police cause unnecessary harassment/ delays.
7. Regulatory compliance by the outsourcing company
8. Compliance by the 3PL staff to our business ethic, need for training and retraining of staff in the face of high staff attrition, know-how/control of products enter or leave the supply chain, getting through the last mile in good condition.
9. Multiple taxation on roads by various states local government, insecurity issues
10. The fragmented nature of the Pharma distribution sector, working capital issues- credit industry, issues handling temperature controlled substances

### **5.5: Section C - Discussions of the Delphi Results**

#### **5.5.1: Delphi objective DSO1 - To identify the level of outbound supply chain outsourcing in the last decade in Nigeria.**

The first objective of the Delphi study was to identify the level of outsourcing of the outbound pharmaceutical value chains in Nigeria. The focal services of the study were the logistic services of long distance transportation, off-site warehousing, distribution (also called secondary distribution), cold chain & reverse logistics.



As reflected in the results of the feedback/responses of the expert panelists, there was a very strong consensus about the high level of outsourcing of transportation, followed by distribution, warehousing, reverse logistics & cold chain services in decreasing order. These outbound logistics services are part of the value chain primary activities that Porter (1985) says must be performed more efficiently by an organization if it hopes to achieve competitiveness in the marketplace. The import of Porter's model is that organizations must conduct a reality assessment of every activities in the outbound segment of the value chain and consider if they have competitiveness, keeping the activity internally performed. Otherwise, he recommended that such activity should be given to a third party who can provide both the cost and value advantages that can give the organization an edge in the marketplace. This is widely acknowledged as one of the early drivers of the practice of outsourcing which is now a widely-practiced management principle in almost every industry and sector today.

According to Christopher (2011:24) *“Whilst there is often a strong economic logic underpinning the decision to outsource activities that may previously have been performed in-house, such decisions may add to the complexity of the supply chain. Because there are by definition more interfaces to be managed as a result of outsourcing, the need for a much higher level of relationship management increases”* A critical and significant component of the outbound logistics services currently being outsourced by the pharmaceutical companies is the mobile segment of transport & distribution. Transportation is a major enabler in the movement of products to the final customers. As most finished products are rarely consumed at the same location of origin, transport costs account for significant SC costs (Aniki *et al.*, 2014; Meindl & Chopra, 2009). Studies have shown that manufacturing companies outsource their outbound transportation services at a significant level fast pace (Mubarik *et al.*, 2012) to achieve overall costs reduction, effectiveness and agility in their supply chains and customer satisfaction (Mubarik *et al.*, 2012; Hwang *et al.*, 2016; Somuyiwa *et al.*, 2015). According to annual survey on third party logistics, *“the most outsourced logistics processes are local (domestic) transportation (80%), warehousing (66%), international transportation (60%), freight forwarding (48%), customs brokerage (45%) and reverse logistics (34%)”*. (Langley & Capgemini, 2016; Bulgurcu & Nakiboglu, 2018). Transportation enhances the efficiencies and effectiveness of many companies, helping most importantly, flow of finished products, reducing the lead times production and the final customer,

on one hand, and order-delivery cycle time on the other hand. This accounts for the growing requirement for transport services even if, in the assessment of most companies, a non-core competence (Ciesla, 2015).

The low degree of outsourcing of cold chain services recorded in this study is not a reflection of an alternative in-house management system for these specialized services, but a reflection of the few companies that are engaged in the manufacturing and/or sales & distribution of vaccines and cold chain products in the private sector, from which the expert panelists were drawn. All over the world, vaccines cold chain management are largely public sector-driven. Nevertheless, outsourcing of the storage and distribution services have been on the increase and successful in the last two decades. Before 2008, the vaccine cold chain of the US was ineffective until the government outsourced the management to the private sector (WHO/PATH, 2012). Similar success stories have been recorded in Thailand, South Africa and Nigeria (WHO/PATH, 2011; WHO, 2011).

### **5.5.2: Delphi objective DSO2 - To determine the age of the outsourcing relationships**

This objective was to determine the average length of time the pharmaceutical companies in Nigeria have been outsourcing their outbound pharmaceutical value chains with particular reference to the logistics services of transportation (both haulage and distribution), warehousing, cold chain and reverse logistics services. The mean ages for the outsourced relationships were as follows:

- Transport - 12 years
- Warehousing - 9 years
- Distribution - 11 years
- Cold chain - 6 years
- Reverse logistics - 10 years

The mobile components of the value chain (transport, distribution & reverse logistics) are the oldest outsourced services by these companies. A closer look at the individual responses and ages of these relationships showed the oldest relationship at 23 years and the newest at just one year

old. This indicates that outsourcing these services started more than two decades ago and is still an industry practice and preference with more companies outsourcing these functions over the years. This reflects the practice by most companies in the private sector, the pharmaceutical sector inclusive (Meindl & Chopra, 2009; Ciesla, 2015; Bulgurcu & Nakiboglu, 2018). The outsourcing of the warehousing and cold chain functions are relatively more recent than those of the transport-based ones.

### **5.5.3: Delphi objective DSO3 - To identify the main factors influencing the decision to outsource outbound pharmaceutical value chains**

This objective was to identify the main factors influencing the decision by pharmaceutical companies to outsource their outbound value chains. In results shown in Table 5.11, of the twelve reasons (12) compiled from extant literature on studies in other countries and industries/sectors, the panelists had a very strong consensus and ranked focus on core competence & reduction of costs as the most significant reasons while they outsource their outbound value chains comprising the logistic functions under consideration in this study with mean scores of 9 on each variable/reason. In the last two and half decades, outsourcing has developed into one of the most significant strategies organizations use to manage their supply chains (Akbari, 2018; Akbari & Hopkins, 2016).

Due to the complexities and speed of service delivery in businesses nowadays, outbound logistics is crucial to achieving organizational competitiveness. (Konig and Spinler, 2016). Furthermore, and as confirmed in this study, organizations have progressively focused on their core competencies and give this as one of one the underlying reasons while they outsource their non-core outbound value chain activities to third-party providers (Paltriccia, & Tiacci, 2016; Konig and Zhao *et al.*, 2014; Spinler, 2016; Marasco, 2008; Awe *et al.*, 2018; Gazley, & Simmonds, 2018). According to Awe *et al.* (2018:371), “most global firms are outsourcing various functions of their firms to save time, cost, and intellectual resources, thus utilize their core competencies for their primary competitive strategies. Outsourcing secondary activities have primarily enabled companies into rechanneling their energies toward focusing on the primary value chain activities and strengthening their core strategies”. Cost reduction as reflected in this study, is a popular

reason while organizations outsource their supply chains. According to various studies, there are other several drivers and reasons behind outsourcing by organizations, but cost optimization is one of the most considered (Iqbal & Dad, 2013; Ndubisi & Nygaard, 2018). Other reasons given in this study while the pharmaceutical companies outsource their value chain is flexibility, market expansion and customer service with mean values of 8. Whether in operations or in staffing, outsourcing has been found to accord organizations some degree of flexibility as it provides the outsourcing companies the flexibility to hire only when the need arises, in addition to avoiding the payment of expensive employees' benefits (Jiang *et al.*, 2006). Furthermore, several studies reports that outsourcing can also provide greater flexibility in the ability of the outsourcing company to cope with the various dynamics in the marketplace (Power *et al.*, 2006; Somuyiwa *et al.*, 2015; Gazley, & Simmonds, 2018). Flexibility seems to be a major driver in terms of scope and nature of product or service. Hrušecká *et al.* (2015) noted that while organizations outsourcing at the international level have achieving cost advantages as a key rational, those outsourcing domestically, have as a key motivation, capacity flexibility. Companies need quicker ways of addressing customers' needs and one of the ways of accomplishing this is through outsourcing. Viewed from another angle, outsourcing may also be regarded as a means of reducing the risks of the company through sharing them with the 3<sup>rd</sup> parties and in the process, attain the positive elements of the third party suppliers (Kremic *et al.*, 2006). Some regard the improvement in their operational and supply chain flexibility as a rationale for outsourcing (Gobble, 2013; Yeo, & Saboori-Deilami, 2017; Gazley, & Simmonds, 2018). One of the pros of outsourcing, which also drives the process as reflected in this study, is customer service. Gazley and Simmonds (2018) noted that the access to 24/7 customer service for a fraction of the price is an incentive for outsourcing by organizations.

Nigeria, like many other African countries has undergone several difficulties and instabilities arising from political and social changes. However, reforms in the economies with the attendant increase in development and direct foreign investments have had positive impact on these economies. As a result, market expansion and improvement in their attractiveness to foreign investors have been recorded (African Economic Outlook, 2015; El Baz *et al.*, 2019). The positive side of this development is that for both local and international companies, outsourcing their outbound value chains has been a means of achieving the expansion of their markets. This has

also been confirmed from the results of this study. To a lesser extent, the other reasons the pharmaceutical companies outsource their outbound value chain in addition to the ones already discussed are lack of capacity and in-house expertise. This is the practice in many countries and companies as validated by earlier studies (Hrušecká *et al.*, 2015). This is often the case with most sectors including the pharmaceutical as enormous capital will have to be deployed if the companies acquire the requisite capacity to deliver on its outbound value chain execution strategies. Furthermore, the expert panelists gave corporate strategy as another reason while they outsource their outbound value chain. Even though this reason doesn't rate as high as the earlier ones, it has been established that the decision to outsource the value chains is neither operational, tactical nor functional but strategic. Nowadays, companies do not compete directly, but through their supply chains (Christopher, 2011). On account of this, most companies take the decisions on outsourcing as a strategic one which derives from the overall corporate strategy of the organization.

Finally, in this study, the expert panelists rated lowly and with a lesser consensus (mean valued of 7), other factors and reasons driving their outsourcing decisions as industry best practice, technological advancement, access to specialised skills, and transfer of risks to 3PL. These reasons though important, do not count as very critical and most of them are embedded and accommodated in the earlier most critical reasons while these organizations outsource their outbound pharmaceutical value chains.

#### **5.5.4: Delphi objective DSO4 - To identify the level of satisfaction of the outbound supply chain services currently being outsourced by the Pharmaceutical companies**

This objective was to determine from the user's perspective, the level of satisfaction experienced by those who outsource their outbound pharmaceutical value chains. The specific services being surveyed here are the logistics functions of Transport - both long-distance haulage and distribution and reverse (logistics) services, warehousing and cold chain services. The results showed a higher satisfaction level from warehousing services higher than those of the mobile elements (transport) and cold chain services. This is a reversal of the degree of outsourcing of these services especially between transport and warehousing services which showed transportation as the most outsourced

services. In all, they expressed satisfaction with the outsourced services, albeit to a varying degrees and levels.

Positive satisfaction levels by users of outsourced service in developed economies like the US and Australia have been reported in other studies (Bhatnagar *et al.*, 1999; Lieb, 1992). Comparative studies on logistics outsourcing in Mexico, Europe and the US showed a difference between the status in these countries with the firms in Mexico placing more emphasis on focus on core competency and customer service while those in US and Europe were more concerned with the tactical and integration of the logistics services (Arroyo *et al.*, 2006). Only few studies have been carried out in developing countries on the degree/usage of 3PL services from the perspectives of the user as is being done in this study. The results of studies in Ghana and South Africa showed that the logistics services in these countries are less integrated like those obtainable in US & Europe but more operational in nature (Cilliers & Nagel, 1994; Sohail *et al.*, 2004). Studies in Malaysia by Sohail and Sohal (2003) concluded that users of 3PL services in that country were generally satisfied. Rahman (2011) found a high level (86%) of satisfaction among users of 3PL services in Australia.

#### **5.5.5: Delphi objective DSO5 - To determine the underlying risk factors in the outsourcing relationship**

This objective was to assess the level of risks associated with the outsourcing of outbound pharmaceutical value chains. From the results of this study, out of the total of fifteen (15) possible risks compiled from literature, the top two (2) identified by the expert panelists as the most critical are 3PL underperformance and service level not achieved. This reflects the fears these companies express in their outsourced relationship as these risks have the potentials of causing the strategic decision to outsource fail with negative consequences on the companies' performance. In spite of the benefits in outsourcing, there are potential risks associated with it. According to El Mokrini *et al.* (2016:1239), "Outsourcing functions such as logistics has become an industry trend towards cost-effectiveness and high service level performance. Many firms have acknowledged the benefits of relying on external experts in a need to empower their abilities. The pharmaceutical industry in particular is challenged by constant evolution of their development and manufacturing processes. Outsourcing logistics becomes then an attractive option for firms to focus on their core

competencies. However, alongside the numerous benefits of outsourcing, various risks arise with the implementation of this option". Enyinda et al. (2009) in their study classified the risks associated with outsourcing pharmaceutical supply chains into four - regulatory, operational, technical and corporate social responsibility risks. Later study by Li-Jun (2012) five types of risks to include: contract risk, associated with the inability of the 3PL to fulfil its contractual obligations; management risk, which arises from differences in management styles of the two organizations; information risk, arising from poor information management by the 3PL; market risk from changes in market dynamics and financial risk when the financial deliverables from the outsourcing process are unmet. Furthermore, other risks that have been reported include relationship, asset and competence risks (Hrušecká *et al.*, 2015).

Other risks from this study with moderate to high level of impact and consensus among the expert panelists are corporate governance structure of the 3PL organization, value misalignment, loss of confidentiality and loss of operational flexibility. These are potential risks associated with the structure and operating system and culture of the 3PL organizations that will impact on their ability and capacity to deliver on their contractual obligations. Given that most of these outsourcing companies are multinational and publicly quoted companies with high ethical, corporate governance and value systems, the rating and ranking assigned to them by the expert panelists is understandable. As shown and confirmed in this result, data security, increased compliance risk and loss of control are risks that have been reported in other studies involving pharmaceutical supply chain outsourcing (Kamath *et al.*, 2014). Relph & Parker (2014) in their studies identified the loss of direct customer interface as obtainable in the outsourcing of transportation of products to the final customers and competency gap by the outsourcing companies as potential risks that are associated with outsourcing. This study ranks loss of flexibility as a moderate risk. Conferment of flexibility or lack of it are opposite sides of an attribute that can manifest as either a benefit (as has been reported in this and other studies) or a risk. Sandhu et al. (2018) report that outsourcing diminishes the overall flexibility of an organization especially when there is fixed-time contract to be executed. They opine that the architecture of an outsourced relationship will not be quick enough to address the requirements of such contracts and engagement.

Other risk factors with lower consensus/impact in this study are vendor employee turnover, undertrained vendor's employees, obsolete technology, loss of confidentiality, 3PL internal HR issues. At the lowest rating of the risks considered by the panel members are the risks of loss of expertise and control over the outsourced function. The low ranking of these risks are probably due to the mitigating policies that the outsourcing companies have in place and the probable impact on their organizations. In a similar dimension analogous to loss of expertise, Sandhu et al. (2018) reported in their study, diminishing innovation as a major with the outsourcing organization's dependency on the 3PL service provider with the consequence of their inability to address ever-increasing requirements of customers (Min *et al.*, 2013).

There is a level of risk associated with every form of business tasks but the risk increases with outsourced tasks due to the complexity involved with SC and the increasing number of stakeholders in the chains (Gandhi *et al.*, 2012). In summary, there is no outsourcing relationship that is risk-free. A careful and comprehensive cost-benefit analysis is recommended before the strategic decision to outsource a customer-facing part of the company's supply chain like the outbound value chain (Schmeisser, 2013)

#### **5.5.6: Delphi objective DSO6 - To determine the criteria to a successful selection and outsourcing relationship with a 3rd Party Service Provider**

This objective was to determine which criteria the outsourcing organizations use to select their service providers. The decision to outsource outbound SC activities to 3PL service provider who will deliver effective and efficient service is regarded as a strategic one. Hence, a decision to undertake outsourcing without due consideration to the overall strategic objectives of the outsourcing company cannot produce the expected benefits of the decision (Alkhatib, 2017). Unlike the classical outsourcing process which is short-term and restricted in scope and outlook (Ho *et al.*, 2015), SC outsourcing is strategic, long-term and multi-dimensional (Chai & Ngai, 2015; Ho *et al.*, 2015). Different selection criteria and methods have been employed by several organizations and are the subject of various studies (Alkhatib, 2017).



In this study, sixteen (16) selection criteria were investigated and considered by the expert panelists. Of this list of criteria, two – speed of service delivery and service reliability were considered very critical and rated very high with a perfect consensus and mean of 10. This is in sync with the earlier consensus on the anticipated benefits from the outsourcing in their responses for the rationale behind the outsourcing decision. Diverse criteria have been used for 3PL service providers' selection (Jian-Jun *et al.*, 2015). Over time and from different studies and literature, the most prominent of them are price, quality, flexibility and services. (Alkhatib, 2017). In this study, other criteria with very strong agreement among the expert panelists are financial strength, operational flexibility, pedigree/history of performance, quality policies/procedures and geographical spread. All except geographical spread have been reported as selection criteria in many studies. Studies show variances in the criteria used by companies from different industries to select their 3PL service providers (Hwang *et al.*, 2016). The inclusion of geographical spread in this study as a criterion instead of geographical location (Sandhu *et al.*, 2018) brings a unique dimension to the peculiarity of the operating environment. In Nigeria, unlike some other countries, the road infrastructure imposes a constraint in the delivery of products across the country and hence the physical presence of a 3PL service provider as seen in network of warehouses and depots is a unique selling proposition and competitive advantage. Every organization should set benchmarks for the selection of their 3PL service providers to guarantee present and future requirements (Humphreys *et al.*, 2011; Kumar *et al.*, 2011; Min *et al.*, 2013). Sandhu *et al.* (2018) report that, before selecting a 3PL partner, it is necessary for organizations to first determine the critical success factors for the outsourced relationship. These factors will contribute significantly to the selection process. Coming out from this study as the selection of least importance are availability of latest ICT tools, corporate values, flexible payment regimen and indemnity. These criteria though important, but not as critical as the ones earlier listed and discussed given the roles they play in the delivery of service by 3<sup>rd</sup> parties, vis-à-vis the other more critical selection criteria.

Selecting service providers is multidimensional and more systematic than just scanning a list of prices and quotes from potential partners. It involves several factors which impact on the selection process in different ways (Ho *et al.* 2012). Conventionally, the selection process has often relied on the knowledge and understanding (though sometimes limited) by the decision-makers and the subjective judgment that emanate from such understanding. More often than not, such

understanding lacks the depth of system consideration and the theoretical support it requires to make a rationale decision and conclusion on the selection process (Xu, 2000). The outcome of this approach may not produce optimal decisions in the selection process. Traditional approaches for the selection of 3PL service providers have been predominated by the consideration of costs elements (Robinson *et al.*, 2013; Weber *et al.*, 1991). Nowadays, as more organizations engage in strategic relationships with 3PL service providers and treat them as strategic partners with long-term contracts, a set of more wide-ranging quantitative and qualitative selection criteria have been adopted. Some of these criteria include dimensions that incorporate customer satisfaction, political and social elements apart from the traditional and conventional costs, service delivery and quality considerations (Liu & Wang, 2009; Robinson *et al.*, 2013).

#### **5.5.7: Delphi objective DS07 - To evaluate the vital pre-selection activities by the outsourcing organizations.**

This objective was to evaluate different activities engaged by the outsourcing organizations prior to selecting a 3PL service provider. This is a further step in the selection process. It contains activities compiled from previous studies and the researcher that the expert panelists responded to, giving an indication of the type and scale of the activities listed here. Out of the 15 listed activities, the experts rated and ranked highest, 5 activities - analysing present costs of function(s), contract preparation & preparation, adequate due diligence and visiting 3PLs' locations. These activities are the most critical steps taken by the organizations to assure themselves that every caution has been taken to enter into a well-thought relationship with the right partner, considering the strategic nature of these relationships.

These activities contain two major initiatives: the internal - to ascertain the “as is” position of the company with respect to the costs and other dynamics of the logistics functions being outsourced, and the external – to conduct a comprehensive due diligence, including physical visits to the potential 3PL service providers' locations with a view to confirming the facts and claims that may have been made by them in responding to the advertised RFQ (request for quotes) for the logistics services. Studies have shown that outsourcing companies go through these rigorous activities and steps, painstakingly and sometimes spending about 6 to 12 months in the whole process, engaging/involving different cadres of people in the organization (Bhattacharya *et al.*, 2013).

These activities are proactive in nature, designed to mitigate the outsourcing risks before the final decision is made (Andersson & Norrman, 2003).

One of the most comprehensive articles on the framework for pre-selection activities and steps for pharmaceutical logistics outsourcing is that by USAID (2014). Even though the framework was developed for use by the public sector, it nonetheless contains useful steps that are applicable to the private sector. After the preliminary internal assessment of the organization's internal strength, capabilities and regulatory environment, the framework lists the following critical pre-selection activities prior to the final outsourcing decision:

- I. Identification of the organization's core competencies
- II. Conducting a cost-benefit analysis that is realistic.
- III. Design and negotiate a balanced contract with the requisite partners' alignment and provision for transition to the new relationship
- IV. Establishing a project implementation group saddled with the responsibility of managing the service procurement
- V. Building or hiring the capacity to manage contract
- VI. Recruiting the 3PL service provider.

It is obvious that the pre-selection activities for selection of pharmaceutical 3PL service providers is more rigorous than for other sectors, on account of the nature of the products (medicines) and the regulatory issues around them. Following the above most critical pre-selection activities, the expert panelists also had a high consensus (8) on the these activities below, even though they rank lower in terms of importance and criticality than the earlier discussed ones. They include:

- I. Developing service levels agreement (SLA)
- II. Preparing an exit plans/provisions
- III. Developing a back-up plan
- IV. Engaging present clients of potential 3PL partner
- V. Corporate governance checks

Once again, a look at the above activities puts them into two main categories, internal tasks – designed to develop some proactive risk mitigation and back-up plans and the external tasks – to conduct a deeper due diligence on the potential 3PL service provider.

The next set of activities are actually very close to the earlier ones. The expert panelists ranked and rated them very close to the last set of activities and hence can be accorded the about the same degree of importance and materiality to the outsourcing process and decision. This list contains three (3) activities: appointing a relationship manager; developing critical proactive corrective & preventive action (CAPA) plans and verification of listed references. These activities are designed to establish the internal capabilities for managing the transition and on the side of the potential 3PL partner, go a step further to conduct another due diligence about their innate ability to deliver their services from the experiences testimony and references from their present credible (and sometimes, past) service users/customers.

The last set of pre-selection activities - developing a transition plan and advertising a request for proposal (RFP) were ranked/rated least by the expert panelists. The first activity (developing a transition plan) was probably rated least because of their earlier high ranking of appointing a relationship manager who for most organizations will be saddled with the responsibility of birthing a comprehensive transition plan. Concerning the issue of RFP, some respondents may have alternative means of contacting potential 3PL partners such as referral from home countries, since many are multi-nationals for already exiting outsourced relationship by the parent companies and referrals from other organizations attesting to their service delivery and quality. This may be an indication of how controlled, the costs for outsourcing may be for these organizations.

#### **5.5.8: Delphi objective DSO8 - To determine the challenges in the pharmaceutical outbound value chains**

This objective, unlike the earlier ones on the outsourcing of the outbound pharmaceutical value chains was to determine the challenges facing the outbound pharmaceutical value chains.

From the results shown in Table 5.17, the expert panelists rated and ranked the challenges associated with infrastructure (Road & Power) as the most critical challenges of the outbound pharmaceutical value chains in Nigeria. Given the nature of the products in this sector/industry, it is not surprising to see these challenges, especially power supply as the most critical. Throughout the supply chain, steady and adequate power is very important in a highly-regulated

sector with temperature-sensitive products like drugs. Nigeria like some most other sub-Saharan African countries still struggles with steady and adequate power supply and good road infrastructure needed to accelerate the country's development. Notwithstanding the efforts made and the various economic developmental strides and growth that have been recorded by in many Sub-Saharan African countries, persistent infrastructure deficits still pose a number of challenges. (Arewa, 2016). This is particularly worrisome in the supply chains of pharmaceuticals where steady, uninterrupted electricity is required for the storage and potency of thermolabile products like vaccines and antibiotics. The absence of a stable source of power also negatively affects certain aspects of the pharmaceutical supply chains especially the cold chains (Yakum *et al.*, 2015).

This infrastructural deficit has been acknowledged as a plague to the productive sector and businesses generally and one of the most substantial structural barriers in the health systems of sub-Saharan African countries (Fowkes *et al.*, 2016; Ettah, 2017). In comparison with other economies like the middle- and high-income countries, the sub-region has one of the least-developed road networks with approximately 200 metres of roads per km<sup>2</sup> paved compared to 1400 metres in high-income countries (Schürenberg-Frosch, 2014). Delivering pharmaceutical products across these decrepit and sometimes, almost impossible to navigate roads, over hundreds of kilometer is an exogenous one which, far beyond the purview and control of the pharmaceutical companies continues to impact negatively on the efficiency of their outbound value chains. Next to the challenges of road & power infrastructure, the expert panelists ranked/rated another external problem –inadequate policy/regulation and absence of competent 3PL service providers. The pharmaceutical sector is one of the most regulated sectors in any country, Nigeria inclusive, on account of the object (drugs) and subject (human) of the products. The most stringent requirements and standards are imposed on organizations involved with the handling of these products throughout the chain. Despite the foregoing, a lot of lapses exist in the regulatory framework of the sector. From policy formation and/or enforcement of existing policies and laws, gaps exist, which have been capitalized by unscrupulous elements who make merchandize of the system for their selfish, financial gains. In Nigeria and some other sub-Saharan African countries, weak regulatory structure impact negatively on the pharmaceutical supply chains. Several of these national regulatory bodies and agencies in these countries lack adequate resources needed to

control the origin and inflow of medicines being pushed into the outbound supply chains (Preston *et al.*, 2012). This is not only a challenge in itself, it also gives rise to a critical problem of poor quality medicines in the pharmaceutical supply chains (Giralt *et al.*, 2017). It has been reported that as high as 90% of national drug regulatory bodies in SSA are unable to effectively discharge their basic regulatory functions (Giralt *et al.*, 2017). Absence of competent 3PL service providers is also a challenge to effective management of outbound pharmaceutical supply chains in Nigeria. The 3PL Industry in Nigeria is still underdeveloped and dominated by some of the competent 3PL service providers like DHL & UPS who are multinational companies. The industry is very fragmented with many small privately-owned firms serving mostly in other sectors like Consumer Packaged Goods and Telecoms, where regulatory requirements are not as stringent as those obtainable in the Pharmaceutical sector. Other organized players like MDS Logistics (a partnership between UAC of Nigeria & Imperial Logistics of South Africa) are also prominent in the sector and in the last decade have been serving the sector. There is still however a gap of scale and competence in the 3PL sector in Nigeria, accounting in part, to the opinions expressed by the expert panelists.

The least ranked set of challenges by the expert panelists are the somewhat-related issues that are associated with human resources and skill set - lack of skilled personnel and pilferages along the chain. Of the two, pilferages along the chain was ranked the least critical challenge as in the opinion of the expert panelists, indemnity and other forms of product insurance are in place to mitigate this challenge.

#### **5.5.9: Delphi objective DSO9 - To identify the desired outcomes of outsourcing outbound pharmaceutical value chains**

This objective was to identify the outcomes and/or benefits these organizations desire to derive from outsourcing their outbound pharmaceutical value chains. In their responses, the expert panelists rated highest with a very strong consensus, the focus on core competence as the most desired outcome. This is in sync with the results for the rationale behind their outsourcing and studies from other economies and sectors. As already established and acknowledged, these logistics services are considered non-core to the organizations and hence the decision to outsource them to free from the organization, valuable management time to focus on other critical core

activities (Paltriccia, & Tiacci, 2016; Konig and Zhao *et al.*, 2014; Spinler, 2016; Marasco, 2008; Awe *et al.*, 2018; Gazley & Simmonds, 2018). According to Awe et al. (2018), besides core competencies' focus, organizations regard reduction in costs as another critical reason while they outsource. Consequently, it would seem logical that, just like the strong consensus and rating the expert panelists gave for focus on core competency as the most significant role of outsourcing in their organizations, they will also rate and rank reduction in cost as another significant outcome of outsourcing. Conversely, in this study, the expert panelists think otherwise and accordingly, have strong consensus about and rank geographical representation, reduced capital expenditure, improvement in customer service, and speed & agility as other significant benefits and desired outcomes of outsourcing in their organizations.

The outcome of reduced costs is rated at a lower consensus. These results reflect the practical realities in the priorities of most companies operating in Nigeria where speed and agility are critical imperatives for excellent customer service and competitive advantage in the marketplace. With most of these companies based in Lagos, these factors will be very critical in the execution of their channel strategy and quest to get their finished products from their points of origin in Lagos, South West, Nigeria to other locations and regions in the country with some as far as hundreds of kilometers away from Lagos. This is more so in a country with vast population of about 190million and a geography spanning about 1million square kilometers. Outsourcing delivers value in these firms' ability to serve well and fast, the customers, their geographical locations notwithstanding. Value is created through the speed of service delivery at an affordable price point (Banerjee & Williams, 2009). This rating and ranking of this benefit/desired outcome that displaces "reduction in costs" also shows where the operational cost drivers of their organizations lie – in the cost of capital. This cost in Nigeria is on the average, higher than those obtainable in other regions and continents of the world. Survey data (Iarossi, G/The World Bank, 2010:3), confirm this disadvantaged position stating that "firms in Africa pay, on average, an interest rate of 15 percent—close to 5 percentage points more than firms in East Asia and 2 percentage points more than those in South Asia, in nominal terms". However, given the strategic role outsourced logistics plays, for most organizations, the benefits of outbound value chains outsourcing transcend cost savings alone (Min, 2013). However, the expert panelists agreed that there is a moderate cost saving from the outsourcing of outbound pharmaceutical value chains. Also from this study, at a

lower level of benefits and ranking are efficiency, access to specialised skills, market share and indigenous expertise as the other roles the panelists listed outsourcing can play. Relph & Parker (2014:23) affirms that “the rapid growth of outsourcing suggests that both public and private organizations expect benefit from outsourcing. Naturally, different organizations in varying circumstances will expect different benefits”. The benefits and outcomes of outsourcing far outweigh the risks and challenges. Accordingly, logistics outsourcing has witnessed growth, with attendant growth in the 3PL industry in the last two decades (Min, 2013).

#### **5.5.10: Delphi objective DSO10 - To determine the future pivotal context of the pharmaceutical distribution in Nigeria**

Following the responses and opinions of the expert panelists to the challenges of the outbound pharmaceutical supply chains as discussed in DS09, they were asked this open-ended question: “*What do you envisage will be the pivotal context of the pharmaceutical distribution policy in the next 10 years?*”. 10 of the experts responded as reproduced in verbatim below:

1. Control of access & implementation of good distribution practice.
2. The current chaotic drug distribution system needs to be sanitized with long lasting solution.
3. Enforcement & implementation of the National Drug Distribution policy
4. Provision of infrastructure & enforcement of policies towards a structured and better regulated distribution system that will include operations of wholesale outlets in the distribution chain.
5. Government-driven national distribution centres, FDI increase, completion and erosion of margins, improvement of governance.
6. More integrated approach with greater government oversight
7. Mega drug distribution centers and closure of open drug markets
8. There will be specialization in line with the new drug distribution guidelines
9. Full implementation of the National Drug Distribution Guidelines (NDDG) integrated with an IT platform. This will lead to emergence of specialised and definitely resourced distribution companies with capacity to provide demand fulfilment on behalf of its clients (importers & manufacturers)



10. To streamline the chaotic drug distribution and have medicines delivered to consumers with intact integrity

11. Professional and ethical access to quality, safe and affordable medicines to all.

As earlier described under methodology, these responses were analysed with the Qualitative Content Analysis (QCA) technique (Forman & Damschroder, 2015). Accordingly, the following thematic summative constructs were deducted from their responses as the pivotal of future pharmaceutical distribution policy in Nigeria

1. Effective IT-driven, integrated pharmaceutical distribution system
2. Controlled access to affordable and quality medicines
3. Improved public sector corporate governance and regulatory structure
4. Provision of enabling infrastructure and enhanced policy enforcement framework

#### **5.5.11: Other Critical Issues affecting Pharmaceutical Supply Chains & outsourcing in Nigeria**

As earlier listed, in the second open-ended question, the expert panelists were requested to identify other issues affecting pharmaceutical outbound supply chains and outsourcing that may have been omitted from the questions above. They listed the following:

1. Lack of credible industry data for planning & accurate forecasting to help implementing of outsourced services
2. Enhanced regulation of the distribution system to a more regulated structure
3. Few reliable and structured 3PL service providers (may be one). There is need for healthier competition to lift up/expand the industry.
4. Soft infrastructure (human resource) , insurance, unregulated markets, financing
5. Sustainability/Environmental considerations
6. Law enforcement agencies e.g. the National Drug Laws Enforcement Agency (NDLEA) and the Police cause unnecessary harassment/ delays.
7. Regulatory compliance by the outsourcing company
8. Compliance by the 3PL staff to our business ethics, need for training and retraining of staff in the face of high staff attrition, know-how/control of products, getting through the last mile in good condition.

9. Multiple taxation on roads by various states local government, insecurity issues
10. The fragmented nature of the Pharma distribution sector, working capital issues- credit industry, issues handling temperature controlled substances

Utilizing the QCA technique similarly, the following were the summative thematic constructs deducted from their responses as critical issues associated with outbound pharmaceutical supply chains and the outsourcing in Nigeria:

1. Dearth of capable and well-structured 3PL service providers with credible ethical and regulatory compliance systems
2. Burdens of multiple taxation and law enforcement agents/agencies along the supply chains
3. Unstructured and poorly-regulated outbound pharmaceutical distribution system
4. Lack of skilled personnel and reliable industry data for effective planning and management of outsourced relationships.

## **5.6: Conclusion**

Chapter five presented the results and discussions of the Delphi study. Calculations for the impact/influence level was done for the responses to all the questions by the expert panelists as they relate to the question groups addressing different aspects of outsourcing outbound pharmaceutical supply Chains in Nigeria. The age, degree and rationale of outsourcing were considered. Also considered were the satisfaction level, critical success/risk factors, selection criteria and pre-selection activities relating to the outsourcing process.

The responses of the expert panelists to the two open-ended questions were analysed and summarized thematically using the qualitative content analysis technique. Furthermore, the discussions of the findings were made under the various objectives earlier set. The findings from the expert panelists revealed consensus and coherence on the various issues relating to the Nigerian pharmaceutical supply chains and the outsourcing of the outbound segment with distinct patterns of peculiar constructs that will be valuable inputs to development the conceptual framework for the outsourcing of outbound pharmaceutical value chains in Nigeria.

## CHAPTER 6

### RESULTS OF QUANTITATIVE STUDY

#### 6.1: Introduction

In this chapter, the results of the data obtained from the distributed questionnaires are presented. A total of 103 respondents drawn from all the categories of the pharmaceutical sector of Lagos State, Nigeria completed the questionnaires out of 133 administered. With three invalid responses, this represents 77% response rate. The respondents were mainly Pharmacists and other relevant professionals (supply chain, Finance, Sales & Marketing & Operations) working in the various organizations of both private and public sectors of the industry who had knowledge and involvement in the outbound supply chains of the organization. The questionnaire had three main sections – A, containing key information about the respondents' organization, B, containing the main body of the questionnaire which had nine (9) main questions (independent variables) and 76 sub-questions (latent variables) and C, which had the personal information of the respondents.

#### 6.2: Section A – Preliminary information about respondents & organizations

This section contains key information about the respondents and their respective organizations. This information include the gender distribution, academic qualification, professional qualification, years of experience, pharmaceutical sector categories of employers, employers' employee number and annual turnover or value of products handled.

##### 6.2.1: Respondents' gender

The respondents' gender distribution is presented in Table 6.1. It shows 44 males and 56 females responded to the questionnaire. This also represents 44 and 56% of the respondents respectively.

**Table 6. 1: Gender distribution of respondents**

Gender	No	%
Male	44	44
Female	56	56
Total	100	100

### 6.2.2: Educational Qualification of Respondents

From the results shown in Table 6.2, the respondents were all University degree holders with 65 (65%) and 35 (35%) holding Bachelor's and Master's degrees respectively.

**Table 6. 2: Educational qualification of respondents**

Qualification	No	%
Bachelor	65	65
Masters	35	35
Ph.D	0	0
Total	100	100

### 6.2.3: Years of experience of Respondents

Table 6.3 shows the years of relevant professional experience of the respondents. They averaged 12 years.

**Table 6. 3: Years of experience of Respondents**

Years of experience	No	%
0 – 5	19	19
6 – 10	22	22
11 – 15	32	32
16 – 20	17	17
21 – 25	6	6
26 – 30	4	4
above 30	0	0
Total	100	100
	<b>Mean</b>	<b>12.12</b>
	<b>SD</b>	<b>6.3</b>

### 6.2.4: Areas of specialization of respondents

As shown in table 6.4, the respondents were mainly pharmacists rendering pharmaceutical services and supply-chain related services (55%). Others were specialists in supply chain management (11%), Accountants (6%), operations management (7%). Others (engineering, etc.) accounted for 8%.

**Table 6. 4: Areas of specialization of respondents**

Area of Specialization	No	%
Pharmacy	55	55
Supply Chain	11	11
Accounting	6	6
Operations	7	7
Sales & Marketing	13	13
Others	8	8
Total	100	100

### 6.2.5: Categories of Respondents' Organizations

The respondents were drawn from all the categories in the Pharmaceutical sector. As shown in Table 6.5, the categories and the respondent from them are multinational manufacturing - 12 (10.3%), overseas' manufacturers' representatives - 8 (6.8%), indigenous manufacturers - 16 (13.7), importers/distributors - 17 (14.5%), State pharmaceutical services - 30 (25.6%), Local government pharmaceutical services – 23 (19.7%) and large pharmacy chains – 11 (9.4%)

**Table 6. 5: Categories of Respondents' Organizations**

No.	Category	Responses	%
1	Multinational Manufacturing	12	10.3
2	Overseas' Manufacturer's Representatives	8	6.8
3	Indigenous Manufacturer	16	13.7
4	Importer/Distributor	17	14.5
5	State Pharmaceutical Services	30	25.6
6	Local Government Pharmaceutical Services	23	19.7
7	Large Pharmacy Chain	11	9.4

### 6.2.6: Employees' number of respondents' organizations

Table 6.6 shows the employees' number of the respondents' organizations. 53 (53%) had less than 50, 19 (19%) had between 51 – 200 employees, 19 (19%) had between 201 – 500 employees while the largest of the organizations - 9 of them had between 501 – 1000 employees. None of the organizations had more than 1000 employees.

**Table 6. 6: Employee number of respondents' organizations**

Number	Frequency	Percent	Valid Percent	Cumulative Percent
501 – 1000	9	9.0	9.0	9.0
201 – 500	19	19.0	19.0	28.0
51 – 200	19	19.0	19.0	47.0
Less than 50	53	53.0	53.0	100.0

### **6.2.7: Turnover/value of products handled by respondents' organizations**

In Table 6.7, the values of the annual turnover or products handled by the respondents' organizations are presented. As shown in the table, 29 (29%) had less than N100m, 24 (24%) had between N100m – N500m, 29 (29%) had between N1b – N5b while 18 (18%) had more than N5b as annual turnover or value of products handled.

**Table 6. 7: Turnover/value of products handled by respondents' organizations**

Value (Naira)	Frequency	Percent	Valid Percent	Cumulative Percent
More than N5b per annum	18	18.0	18.0	18.0
N1b - N5b per annum	29	29.0	29.0	47.0
N100m - 500m	24	24.0	24.0	71.0
Less than N100m	29	29.0	29.0	100.0

## **6.3: Section B - Results from the responses to the questionnaire**

In this section, the results of the analyses of the responses to the different questions in the questionnaire are presented. The software used for all analyses was the statistical analytical software - SPSS version 25. On account of the nature of the constructs and questions, Questions 1 to 3 were analysed using descriptive and inferential statistical techniques while exploratory factor analytical (EFA) technique was used for questions 4 to 9. In both instances, the final output/results were exported into the tables that are now presented hereunder.

### **6.3.1: Degree of Outsourcing**

This question was intended to determine on the Likert scale of 1 – 5 that was used, the extent to which the earlier-listed outbound supply chain functions were outsourced by the responding organizations, with 1 representing a very low degree and 5, a very high degree. N represents the number of respondents who gave answers/responses to the status of their outsourcing of the

services. Some, whose organizations do not outsource the respective functions left the boxes unticked as to them, it was not applicable to them. This explains why N in all cases was not equal to 100, which was the total number of the respondents.

**Table 6. 8: Degree of Outsourcing**

	<b>Transportation</b>	<b>Warehousing</b>	<b>Distribution</b>	<b>Cold Chain</b>	<b>Reverse Logistics</b>
Mean	3.38	2.74	2.65	2.54	2.63
N	92	66	63	56	42
Std. Dev.	1.27	1.49	1.52	1.51	1.43

Accordingly, and as shown in Table 6.8, of the total number of respondents, 92 (92%) responded that they outsource transportation to an extent denoted by the mean value of 3.38, which represents about 64% outsourcing level. Likewise, 66 (66%) outsource warehousing with just above average degree of 2.74 (about 55%), 63 (63%) outsource distribution with mean value of 2.65; 56 (56%) outsource cold chain at a mean level of 2.54 (about 51%) while the least number of respondents (42) said they outsource reverse logistics at a mean level

### **6.3.2: Age of Outsourcing**

In question 2 of the questionnaire, the respondents were asked to state how long they have outsourced the different outbound supply chain functions with the 5 age brackets provided (1 – 3, 4 – 6, 7 – 9, 10 – 12 and above 12).

**Table 6. 9: Age of Outsourcing - Transportation**

<b>Age (years)</b>	<b>Frequency</b>	<b>Percent</b>	<b>Cumulative Percent</b>
<b>&gt; 12</b>	24	26.1	26.1
<b>10 – 12</b>	10	10.9	37.0
<b>7 – 9</b>	16	17.4	54.3
<b>4 – 6</b>	23	25.0	79.3
<b>1 – 3</b>	19	20.7	100.0
<b>Total</b>	92	100.0	

Table 6.9 presents the age of transportation outsourcing with the practice starting more than 12 years ago with rapid acceptance with 24 (26.1%) of the 92 respondents' organizations commencing outsourcing more 12 years ago. Lower numbers were recorded at the same time for warehousing, distribution, cold chain and reverse logistics as presented in Tables 6.10 for warehousing; Table 6.11 for distribution; Table 6.12 for cold chain and Table 6.13 for reverse logistics respectively

**Table 6. 10: Age of Outsourcing - Warehousing**

Age (years)	Frequency	Percent	Cumulative Percent
> 12	9	13.6	13.6
10 - 12	12	18.2	31.8
7 - 9	18	27.3	59.1
4 - 6	10	15.2	74.2
1 - 3	17	25.8	100.0
<b>Total</b>	66	100.0	

**Table 6. 11: Age of Outsourcing – Distribution**

Age (years)	Frequency	Percent	Cumulative Percent
> 12	5	7.9	0.0
10 - 12	8	12.7	12.7
7 - 9	12	19.0	31.7
4 - 6	17	27.0	58.7
1 - 3	21	33.3	92.1
<b>Total</b>	63	100.0	

**Table 6. 12: Age of Outsourcing – Cold Chain**

Age (years)	Frequency	Percent	Cumulative Percent
> 12	8	14.3	14.3
10 - 12	5	8.9	23.2
7 - 9	12	21.4	44.6
4 - 6	8	14.3	58.9
1 - 3	23	41.1	100.0
<b>Total</b>	56	100.0	

**Table 6. 13: Age of Outsourcing – Reverse Logistics**

Age (years)	Frequency	Percent	Cumulative Percent
> 12	4	9.5	9.5
10 - 12	8	19.0	28.6
7 - 9	10	23.8	52.4
4 - 6	6	14.3	66.7
1 - 3	14	33.3	100.0
<b>Total</b>	42	100.0	



### 6.3.3: Satisfaction from outsourcing

The levels of satisfaction from the outsourcing of the functions with mean values showing above average satisfaction levels as shown in Table 6.14.

**Table 6. 14: Level of satisfaction from outsourced relationships**

	<b>Transportation</b>	<b>Warehousing</b>	<b>Distribution</b>	<b>Cold Chain</b>	<b>Reverse Logistics</b>
<b>Mean</b>	3.38	3.25	3.12	3.32	2.98
<b>N</b>	92	66	63	56	42
<b>Std. Dev.</b>	1.162	1.321	1.181	1.298	1.352

### 6.3.4: The rationale for outsourcing

This section presents the results of the responses on the rationale for outsourcing. The items descriptive statistics (mean item scores, with their ranking) as well as the results for the exploratory factor analysis (EFA) using principal component analysis (PCA) are presented. Prior to the commencement of the analyses, a comprehensive definition of all the latent variables was done and the results are also provided.

Table 6.15 shows the dictionary of definition of the latent variables used in question number 4 of the questionnaire.

**Table 6. 15: Definition of Latent Variables under rationale for outsourcing**

<b>Code</b>	<b>Variable Name</b>	<b>Definition</b>
<b>Q4.1</b>	Cost savings	Amount of costs saved from outsourcing
<b>Q4.2</b>	Industry best practice	Substantive practices obtainable among the leading pharmaceutical organizations
<b>Q4.3</b>	Technological advancement	Improvement in processes & operations through the use of latest technologies
<b>Q4.4</b>	Flexibility	Willingness to accede to request for process changes
<b>Q4.5</b>	Lack of Capacity	Inability to perform a given task
<b>Q4.6</b>	Focus on core competence	Concentration on distinctive know-how and ability by the organization
<b>Q4.7</b>	Corporate Strategy	Overall & overriding organizational policy and goal
<b>Q4.8</b>	Access to Specialised skills	Avenue to acquire abilities to perform technical supply chain functions
<b>Q4.9</b>	Transfer of risks to 3PL	Handover of inherent supply chain risks to Third parties
<b>Q4.10</b>	Lack of in-house expertise	Absence of internal skills to perform supply chain function
<b>Q4.11</b>	Market expansion	Extension of the presence and placement of the company's products in the marketplace
<b>Q4.12</b>	Improvement in Customer service	Enhancement in the level and speed of service to customers

Table 6.16 shows the descriptive statistics for the latent variables and their ranking.

**Table 6. 16: Descriptive Statistics**

<b>Latent Variables</b>	<b>Mean</b>	<b>Cronbach's Alpha</b>	<b>Ranking</b>
Cost savings	3.43	0.859	1
Focus on core competence	3.23	0.821	2
Improvement in Customer service	3.17	0.839	3
Flexibility	2.85	0.827	4
Corporate Strategy	2.79	0.828	5
Market expansion	2.78	0.821	6
Lack of Capacity	2.72	0.865	7
Lack of in-house expertise	2.06	0.844	8

The ranking shows cost savings at the number 1 in the ranking, while focus on core competence, number 2, Improvement in Customer service is ranked number 3, while Flexibility is ranked number 4. Number 5 in the ranking is Corporate Strategy, while Market expansion, Lack of Capacity and Lack of in-house expertise were ranked 6, 7 and 8 respectively.

Exploratory factor analysis (EFA) is helpful in statistical analysis of data for reduction of variables and to show the inter-relationships between the variables (Pallant, 2007). In this study, EFA was conducted using the statistical software, SPSS version 25. Prior to conducting the factor analysis, the suitability and adequacy of the data for the analysis was determined. The correlation matrix showed many coefficient values of more than 0.30, showing a strong correlation between the factors (see Table 6.17). The internal reliability of the scale and composite scores was adequate with the Kaiser-Meyer-Olkin (KMO)'s value of 0.83, above the recommended minimum value of 0.6. Furthermore, as shown in Table 6.18, the Bartlett's test of sphericity was statistically significant at 0.00 (less than 0.05), thus supporting the factorability of the data.

The results for the factor analysis are presented in Tables 6.15 to 6.21 and Figure 6.1. The scree plot presented in Figure 6.1 shows the point of inflection of the Eigen values and the factors extracted and those excluded.

**Table 6. 17: Correlation Matrix**

	Q4.1 Cost savings	Q4.4 Flexibility	Q4.5 Lack of Capacity	Q4.6 Focus on core competence	Q4.7 Corporate Strategy	Q4.10 Lack of in-house expertise	Q4.11 Market expansion	Q4.12 Improvement in Customer service
Q4.1 Cost savings	<b>1.000</b>	0.422	0.045	0.438	0.414	0.138	0.245	0.380
Q4.4 Flexibility	0.422	<b>1.000</b>	0.271	0.529	0.595	0.420	0.605	0.556
Q4.5 Lack of Capacity	0.045	0.271	<b>1.000</b>	0.352	0.312	0.527	0.324	0.047
Q4.6 Focus on core competence	0.438	0.529	0.352	<b>1.000</b>	0.638	0.470	0.662	0.508
Q4.7 Corporate Strategy	0.414	0.595	0.312	0.638	<b>1.000</b>	0.378	0.531	0.492
Q4.10 Lack of in-house expertise	0.138	0.420	0.527	0.470	0.378	<b>1.000</b>	0.541	0.332
Q4.11 Market expansion	0.245	0.605	0.324	0.662	0.531	0.541	<b>1.000</b>	0.655
Q4.12 Improvement in Customer service	0.380	0.556	0.047	0.508	0.492	0.332	0.655	<b>1.000</b>

**Table 6. 18: KMO and Bartlett's Test of Reliability**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.830
Bartlett's Test of Sphericity	Approx. Chi-Square	344.719
	Df	28
	Sig.	0.000

**Table 6. 19: Total Variance Explained**

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings <sup>a</sup>
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
<b>1</b>	4.073	50.914	50.914	3.649	45.613	45.613	3.410
<b>2</b>	1.241	15.512	66.426	0.794	9.929	55.541	1.886
<b>3</b>	0.774	9.673	76.098				
<b>4</b>	0.511	6.387	82.485				
<b>5</b>	0.471	5.885	88.370				
<b>6</b>	0.373	4.663	93.033				
<b>7</b>	0.337	4.217	97.250				
<b>8</b>	0.220	2.750	100.000				

*Extraction Method: Principal Axis Factoring.*

As shown in Table 6.19, the eigenvalue value was set at the conventional 1.00 and factor analysis was conducted with principal axis factoring with oblimin rotation. Of the 12 initial latent variables listed for the rationale for outsourcing, 2 factors were extracted with 6 and 2 variables each, leaving out 4 latent variables with the least impact factor. The 2 factors extracted accounted for 55% of the total variance explained. With Factor 1 accounting for 45.6% and the second factor accounting for 9.9%

Table 6.20 shows the communalities values of the latent variables.

**Table 6. 20: Communalities**

Latent Variables	Initial	Extraction
Q4.1 Cost savings	0.319	0.285
Q4.4 Flexibility	0.523	0.577
Q4.5 Lack of Capacity	0.360	0.633
Q4.6 Focus on core competence	0.601	0.632
Q4.7 Corporate Strategy	0.519	0.549
Q4.10 Lack of in-house expertise	0.444	0.531
Q4.11 Market expansion	0.658	0.646
Q4.12 Improvement in Customer service	0.540	0.590

*Extraction Method: Principal Axis Factoring*



**Figure 6. 1: Scree Plot**

**Table 6. 21: Pattern Matrix**

Latent Variable	Factor	
	1	2
Improvement in Customer service	0.807	
Flexibility	0.715	
Focus on core competence	0.683	
Market expansion	0.681	
Corporate Strategy	0.676	
Cost savings	0.570	
Lack of Capacity		0.815
Lack of in-house expertise		0.587

The Pattern matrix shown in Table 6.21 shows the factors are comprised of the following latent variables. **Factor 1:** *Improvement in Customer service, Flexibility, Focus on core competence, Market expansion, Corporate Strategy and Cost savings.* **Factor 2:** *Lack of Capacity and Lack of in-house expertise.* From the relationships between these variables listed above, Factor 1 was termed **organizational agility & competitiveness** while Factor 2 was called **lack of internal capability**

### **6.3.5: The critical criteria for selection of 3PL service providers**

This section presents the results of the responses on the critical criteria/factors for the selection of third party logistics (3PL) service providers. The items descriptive statistics (mean item scores, with their ranking) as well as the results for the exploratory factor analysis (EFA) using principal component analysis (PCA) are presented. Prior to the commencement of the analyses, a comprehensive definition of all the latent variables was done and the results are also provided. Table 6.22 shows the dictionary of definition of the latent variables used in question number 6 of the questionnaire.

**Table 6. 22: Definition of Latent Variables**

<b>Code</b>	<b>Variable Name</b>	<b>Definition</b>
Q5.1	National/geographical spread	Operational/physical presence of 3PL service provider in other locations/regions of the country
Q5.2	Innovation	Ability to invent and introduce new & better operational techniques
Q5.3	Organizational culture	Value and cultural system, including modus operandi of the organization
Q5.4	Customer orientation	How the organization positions itself and delivers service to the customers
Q5.5	Service reliability	Consistency and dependability of the organization's services to its customers
Q5.6	Financial strength	Financial assets and structural base of the organization
Q5.7	Operational flexibility	3PL's willingness to accede to request for operational process/policy changes by the customer
Q5.8	Pedigree/history of performance	Past history and testimonial of similar services offered by the organization
Q5.9	Stable industrial relations	Consistency in operations in peaceful harmony with employees & stakeholders
Q5.10	Corporate values	The core values and ethics that drive the way the organization operates
Q5.11	Availability of latest ICT tools	Use of newest communication tools and technology in operations by the 3PL
Q5.12	Quality policies and procedures	Local acquisition of supply chain management skills through outsourcing
Q5.13	Management structure & expertise	The skill-set, experience and organogram of the organization's management
Q5.14	Speed of service delivery	The speed at which customers are served by the organization
Q5.15	Flexible payment regimen	Non-rigid, concessional policy in payment for services rendered
Q5.16	Indemnity	Financial & operational guarantee against losses by the outsourced organization

Table 6.23 shows the mean item scores for the latent variables and their ranking.

**Table 6. 23: Descriptive Statistics**

<b>Latent Variables</b>	<b>Mean</b>	<b>Cronbach's Alpha</b>	<b>Ranking</b>
Speed of service delivery	4.12	0.968	1
Service reliability	4.05	0.968	2
National/geographical spread	3.88	0.968	3
Operational flexibility	3.82	0.967	4
Pedigree/history of performance	3.82	0.965	5
Financial strength	3.81	0.967	6
Management structure & expertise	3.78	0.967	7
Stable industrial relations	3.73	0.967	8
Corporate values	3.71	0.966	9
Quality policies and procedures	3.70	0.967	10
Flexible payment regimen	3.70	0.968	11
Availability of latest ICT tools	3.68	0.966	12
Indemnity	3.64	0.968	13
Customer orientation	3.64	0.967	14
Innovation	3.47	0.965	15
Organizational culture	3.38	0.966	16

The ranking shows *speed of service delivery* as the number 1 in the ranking, while *service reliability* is number 2, *national/geographical spread* is ranked number 3, while *Operational flexibility* is ranked number 4. Number 5 in the ranking is *pedigree/history of performance*, while *financial strength*, *management structure/expertise* and *Stable industrial relations* were ranked 6, 7 and 8 respectively. Number 9 is *corporate values*, while number 10 is *Quality policies and procedures*. *Flexible payment regimen*, *Availability of latest ICT tools*, *Indemnity*, *Customer orientation*, *Innovation* and *Organizational culture* complete the ranking at numbers 11, 12, 13, 14, 15 and 16 respectively.

As previously explained, EFA was conducted, and prior to conducting the factor analysis, the suitability and adequacy of the data for the analysis was determined. The correlation matrix showed many coefficient values of more than 0.30, showing a strong correlation between the factors (see Table 6.24). The internal reliability of the scale and composite scores was adequate with the Cronbach's Alpha value of 0.96, above the recommended minimum value of 0.6. The results for the factor analysis are presented in Tables 6.22 to 6.28 and Figure 6.2. The scree plot presented in Figure 6.2 shows the point of inflection of the Eigen values and the factors extracted.

**Table 6. 24: Correlation Matrix**

Latent Variables	National/geographical spread	Innovation	Organizational culture	Customer orientation	Service reliability	Financial strength	Operational flexibility	Pedigree & history of performance	Stable industrial relations	Corporate values	Availability of latest ICT tools	Quality policies and procedures	Mgt structure & expertise	Speed of service delivery	Flexible payment regimen	Indemnity
National/geographical spread	<b>1.000</b>	0.715	0.632	0.542	0.556	0.562	0.519	0.592	0.538	0.534	0.504	0.484	0.426	0.640	0.344	0.413
Innovation	0.715	<b>1.000</b>	0.782	0.668	0.592	0.554	0.644	0.683	0.663	0.618	0.713	0.612	0.525	0.528	0.548	0.571
Organizational culture	0.632	0.782	<b>1.000</b>	0.688	0.578	0.396	0.646	0.602	0.667	0.590	0.650	0.614	0.491	0.408	0.484	0.474
Customer orientation	0.542	0.668	0.688	<b>1.000</b>	0.588	0.502	0.690	0.645	0.546	0.620	0.647	0.529	0.456	0.551	0.327	0.368
Service reliability	0.556	0.592	0.578	0.588	<b>1.000</b>	0.541	0.762	0.619	0.711	0.639	0.457	0.401	0.404	0.653	0.386	0.353
Financial strength	0.562	0.554	0.396	0.502	0.541	<b>1.000</b>	0.674	0.661	0.502	0.686	0.486	0.371	0.476	0.652	0.603	0.500
Operational flexibility	0.519	0.644	0.646	0.690	0.762	0.674	<b>1.000</b>	0.708	0.756	0.677	0.583	0.436	0.416	0.624	0.524	0.481
Pedigree/history of performance	0.592	0.683	0.602	0.645	0.619	0.661	0.708	<b>1.000</b>	0.651	0.759	0.594	0.511	0.547	0.625	0.546	0.493
Stable industrial relations	0.538	0.663	0.667	0.546	0.711	0.502	0.756	0.651	<b>1.000</b>	0.699	0.603	0.466	0.557	0.494	0.593	0.518
Corporate values	0.534	0.618	0.590	0.620	0.639	0.686	0.677	0.759	0.699	<b>1.000</b>	0.594	0.521	0.597	0.569	0.581	0.662
Availability of latest ICT tools	0.504	0.713	0.650	0.647	0.457	0.486	0.583	0.594	0.603	0.594	<b>1.000</b>	0.697	0.709	0.482	0.554	0.468
Quality policies and procedures	0.484	0.612	0.614	0.529	0.401	0.371	0.436	0.511	0.466	0.521	0.697	<b>1.000</b>	0.664	0.401	0.425	0.430
Management structure & expertise	0.426	0.525	0.491	0.456	0.404	0.476	0.416	0.547	0.557	0.597	0.709	0.664	<b>1.000</b>	0.490	0.611	0.537
Speed of service delivery	0.640	0.528	0.408	0.551	0.653	0.652	0.624	0.625	0.494	0.569	0.482	0.401	0.490	<b>1.000</b>	0.466	0.390
Flexible payment regimen	0.344	0.548	0.484	0.327	0.386	0.603	0.524	0.546	0.593	0.581	0.554	0.425	0.611	0.466	<b>1.000</b>	0.679
Indemnity	0.413	0.571	0.474	0.368	0.353	0.500	0.481	0.493	0.518	0.662	0.468	0.430	0.537	0.390	0.679	<b>1.000</b>



**Table 6. 25: Test of Reliability**

Cronbach's Alpha	N of Items
0.957	16

**Table 6. 26: Total Variance Explained**

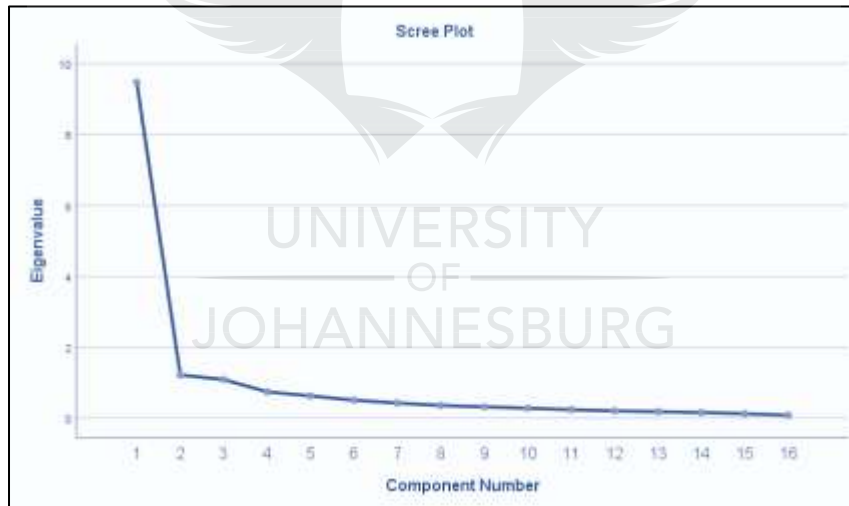
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.471	59.192	59.192	9.471	59.192	59.192	4.927	30.796	30.796
2	1.217	7.607	66.799	1.217	7.607	66.799	3.752	23.453	54.250
3	1.087	6.795	73.594	1.087	6.795	73.594	3.095	19.344	73.594
4	0.740	4.628	78.221						
5	0.625	3.906	82.128						
6	0.504	3.153	85.280						
7	0.425	2.654	87.934						
8	0.355	2.221	90.155						
9	0.316	1.978	92.133						
10	0.279	1.742	93.874						
11	0.237	1.483	95.358						
12	0.203	1.272	96.630						
13	0.180	1.128	97.757						
14	0.156	0.978	98.735						
15	0.122	0.765	99.500						
16	0.080	0.500	100.000						

*Extraction Method: Principal component analysis.*

In Table 6.26, the factor analysis was with principal component analysis with varimax rotation. Three (3) factors with eigenvalue of more than 1 were extracted. The 3 factors extracted accounted for 73.6% of the total variance explained. Factor 1 accounted for 59.2%, Factor 2, 7.6% and the third factor accounted for 6.8% respectively of the total variance explained.

**Table 6. 27: Communalities**

Latent variables	Initial	Extraction
National/geographical spread	1.000	0.613
Innovation	1.000	0.774
Organizational culture	1.000	0.775
Customer orientation	1.000	0.729
Service reliability	1.000	0.757
Financial strength	1.000	0.745
Operational flexibility	1.000	0.792
Pedigree/history of performance	1.000	0.724
Stable industrial relations	1.000	0.669
Corporate values	1.000	0.755
Availability of latest ICT tools	1.000	0.780
Quality policies and procedures	1.000	0.756
Management structure & expertise	1.000	0.734
Speed of service delivery	1.000	0.657
Flexible payment regimen	1.000	0.806
Indemnity	1.000	0.709



**Figure 6. 2: Scree Plot**

**Table 6. 28: Rotated Component Matrix**

Latent Variables	Component		
	1	2	3
Service reliability	0.821		
Operational flexibility	0.793		
Speed of service delivery	0.737		
Financial strength			0.536
Pedigree/history of performance	0.666		
National/geographical spread	0.622		
Customer orientation	0.611		
Stable industrial relations	0.594		
Corporate values			0.545
Quality policies and procedures		0.801	
Availability of latest ICT tools		0.742	
Organizational culture		0.739	
Innovation		0.655	
Flexible payment regimen			0.831
Indemnity			0.767
Management structure & expertise			0.630

*Extraction Method: Principal component analysis.*

The rotated component matrix in Table 6.28 shows the factors are comprised of the following latent variables:

**Factor 1:** *Service reliability, Operational flexibility, Speed of service delivery, Pedigree/history of performance, National/geographical spread, Customer orientation and Stable industrial relations.*

**Factor 2:** *Quality policies and procedures, Availability of latest ICT tools, Organizational culture and Innovation.*

**Factor 3:** *Financial strength, Corporate values, flexible payment regimen, Indemnity and Management structure & expertise*

From the relationships between these variables listed above, Factor 1 was termed **service excellence** while Factor 2 was called **Technical capability**, while Factor 3 was named **strong financial & corporate governance**.

### **6.3.6: The critical risks factors for outsourcing**

In this section, the results of the responses for the critical risk factors for outsourcing are presented. As in previous sections, the items descriptive statistics (mean item scores, with their ranking) as well as the results for the exploratory factor analysis (EFA) using principal component analysis

(PCA) are presented. Prior to the commencement of the analyses, a comprehensive definition of all the latent variables was done and the results are also provided.

Table 6.29 shows the dictionary of definition of the latent variables used in question number 7 of the questionnaire.

**Table 6. 29: Definition of Latent Variables**

<b>Code</b>	<b>Variable Name</b>	<b>Definition</b>
Q6.1	3PL Underperformance	Delivery of less-than-expected service level by the 3PL service provider
Q6.2	Loss of control of outsourced function	Forfeiture of the ability to control the management of supply chain function due to outsourcing
Q6.3	Loss of expertise	Loss of technical know-how and skills in managing supply chains due to outsourcing
Q6.4	Hidden costs	New costs hitherto unseen prior to commencement of outsourced relationship
Q6.5	Corporate governance	The system of rules, practices and processes by which the 3PL is directed and controlled
Q6.6	Vendor employee turnover	The rate at which the 3PL loses its employees, especially the strategic ones
Q6.7	Undertrained vendor's employees	Use of unskilled, undertrained employees by the 3PL to execute the outsourced contract
Q6.8	Obsolete Technology	Use of outdated technology by the employees
Q6.9	Loss of confidentiality	Loss of access or restrictions on certain types of information due to outsourcing
Q6.10	Internal HR issues	Problems associated employees' engagement by the 3PL service provider
Q6.11	Cost reduction not realised	Non-realization of the cost savings agreed to/promised by the 3PL prior to outsourcing
Q6.12	Service levels not achieved	Non-attainment of the service levels agreed to/promised by the 3PL prior to outsourcing
Q6.13	Loss of flexibility	Loss of ease of changes to supply chain processes after outsourcing
Q6.14	No continuous improvement by 3PL	Lack of sustained enhancement in operations & service levels by the 3PL service provider
Q6.15	Value misalignment	Irreconcilable differences in ethics and value systems by the 3PL and outsourcing organizations

Table 6.30 shows the mean item scores for the latent variables and their ranking.

**Table 6. 30: Descriptive Statistics**

<b>Latent Variable</b>	<b>Mean</b>	<b>Cronbach's Alpha</b>	<b>Ranking</b>
Obsolete Technology	3.13	0.950	1
Undertrained vendor's employees	3.13	0.949	2
Service levels not achieved	3.05	0.952	3
Hidden costs	2.94	0.955	4
Cost reduction not realised	2.92	0.951	5
Value misalignment	2.91	0.951	6
No continuous improvement by 3PL	2.85	0.951	7
Loss of control of outsourced function	2.85	0.954	8
Loss of flexibility	2.82	0.952	9
Vendor employee turnover	2.78	0.951	10
Loss of expertise	2.77	0.951	11
Corporate governance	2.75	0.952	12
Internal HR issues	2.65	0.953	13

The ranking shows *Obsolete Technology* as the number 1 in the ranking, while *Undertrained vendor's employees* is number 2, *Service levels not achieved* is ranked number 3, while *Hidden costs* is ranked number 4. Number 5 in the ranking is *Cost reduction not realised*, while *Value misalignment*, *No continuous improvement by 3PL* and *Loss of control of outsourced function* were ranked 6, 7 and 8 respectively. Number 9 is *Loss of flexibility*, while number 10 is Quality policies and procedures. *Loss of expertise*, *corporate governance* and *Internal HR issues* complete the ranking at numbers 11, 12 and 13 respectively

As previously explained, EFA was conducted, and prior to conducting the factor analysis, the suitability and adequacy of the data for the analysis was determined. The correlation matrix showed many coefficient values of more than 0.30, showing a strong correlation between the factors. The internal reliability of the scale and composite scores was adequate with the Cronbach's Alpha value of 0.95, above the recommended minimum value of 0.6, thus supporting the factorability of the data as shown in Table 6.31. The results for the factor analysis are presented in Tables 6.29 to 6.35 and Figure 6.3. The scree plot presented in Figure 6.3 shows the point of inflection of the Eigen values and the factors extracted.

**Table 6. 31: Test of Reliability**

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.953	0.953	15

**Table 6. 32: Total Variance Explained**

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings <sup>a</sup>
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	7.874	60.569	61	7.523	57.868	57.868	7.154
2	1.066	8.198	69	0.745	5.734	63.602	5.776
3	0.807	6.207	75				
4	0.671	5.160	80				
5	0.472	3.632	84				
6	0.391	3.008	87				
7	0.353	2.717	89				
8	0.322	2.477	92				
9	0.296	2.276	94				
10	0.275	2.113	96				
11	0.238	1.832	98				
12	0.146	1.127	99				
13	0.089	0.685	100				

*Extraction Method: Principal Axis factoring.*

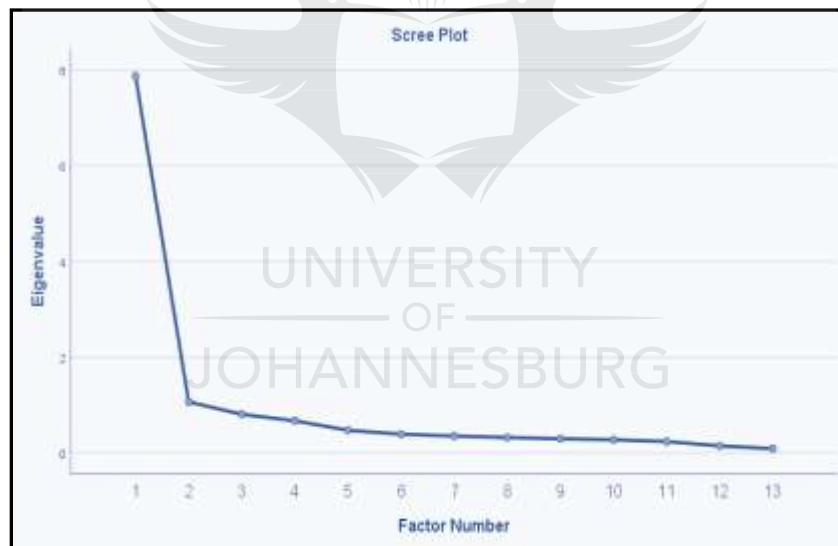
In Table 6.32, the factor analysis was with principal axis factoring with oblimin rotation. Two (2) factors with eigenvalue of more than 1 were extracted. The 2 factors extracted accounted for 63.6% of the total variance explained. Factor 1 accounted for 57.8.2% while Factor 2 accounted for 5.7% of the total variance explained.

**Table 6. 33: Correlation Matrix**

Latent Variables	Loss of control of outsourced function	Loss of expertise	Hidden costs	Corporate governance	Vendor employee turnover	Undertrained vendor's employees	Obsolete Technology	Internal HR issues	Cost reduction not realised	Service levels not achieved	Loss of flexibility	No continuous improv.by 3PL	Value misalignment
Loss of control of outsourced function	1.000	1	0.382	0.588	0.558	0.521	0.566	0.483	0.514	0.485	0.434	0.531	0.454
Loss of expertise	0.702	1	0.421	0.606	0.647	0.605	0.652	0.539	0.558	0.452	0.555	0.609	0.557
Hidden costs	0.382	0	1.000	0.385	0.434	0.510	0.423	0.510	0.649	0.599	0.529	0.363	0.333
Corporate governance	0.588	1	0.385	1.000	0.669	0.583	0.654	0.488	0.518	0.445	0.513	0.546	0.539
Vendor employee turnover	0.558	1	0.434	0.669	1.000	0.793	0.728	0.655	0.590	0.446	0.511	0.632	0.595
Undertrained vendor's employees	0.521	1	0.510	0.583	0.793	1.000	0.809	0.646	0.597	0.590	0.611	0.634	0.664
Obsolete Technology	0.566	1	0.423	0.654	0.728	0.809	1.000	0.719	0.603	0.515	0.553	0.738	0.620
Internal HR issues	0.483	1	0.510	0.488	0.655	0.646	0.719	1.000	0.657	0.586	0.583	0.595	0.524
Cost reduction not realised	0.514	1	0.649	0.518	0.590	0.597	0.603	0.657	1.000	0.660	0.538	0.549	0.450
Service levels not achieved	0.485	0	0.599	0.445	0.446	0.590	0.515	0.586	0.660	1.000	0.759	0.621	0.592
Loss of flexibility	0.434	1	0.529	0.513	0.511	0.611	0.553	0.583	0.538	0.759	1.000	0.655	0.602
No continuous improvement by 3PL	0.531	1	0.363	0.546	0.632	0.634	0.738	0.595	0.549	0.621	0.655	1.000	0.700
Value misalignment	0.454	1	0.333	0.539	0.595	0.664	0.620	0.524	0.450	0.592	0.602	0.700	1.000

**Table 6. 34: Communalities**

<b>Latent Variables</b>	<b>Initial</b>	<b>Extraction</b>
Loss of control of outsourced function	0.578	0.480
Loss of expertise	0.662	0.617
Hidden costs	0.519	0.460
Corporate governance	0.593	0.562
Vendor employee turnover	0.757	0.745
Undertrained vendor's employees	0.807	0.723
Obsolete Technology	0.815	0.783
Internal HR issues	0.653	0.595
Cost reduction not realised	0.657	0.604
Service levels not achieved	0.745	0.883
Loss of flexibility	0.694	0.649
No continuous improvement by 3PL	0.717	0.633
Value misalignment	0.617	0.535



**Figure 6. 3: Scree Plot**



**Table 6. 35: Pattern Matrix**

Latent Variables	Factor	
	1	2
Vendor employee turnover	0.949	
Obsolete Technology	0.916	
Loss of expertise	0.796	
Corporate governance	0.783	
Undertrained vendor’s employees	0.751	
Loss of control of outsourced function	0.666	
No continuous improvement by 3PL Provider	0.634	
Value misalignment	0.585	
Internal HR issues	0.510	
Service levels not achieved		0.914
Loss of flexibility		0.636
Hidden costs		0.630
Cost reduction not realised		0.510

Extraction Method: Principal axis factoring.

The pattern matrix in Table 6.35 shows the factors are comprised of the following latent variables:

**Factor 1:** *Vendor employee turnover, obsolete technology, loss of expertise, corporate governance, undertrained vendor’s employees, Loss of control of outsourced function, no continuous improvement by 3PL service provider, value misalignment and internal HR issues*

**Factor 2:** *Service levels not achieved, loss of flexibility, hidden costs and cost reduction not realised*

From the relationships between these variables listed above, Factor 1 was termed **Institutional inadequacy** while Factor 2 was called **goals under-realizations**.

### **6.3.7: Pre-selection activities by outsourcing organizations**

In this section, the results of the responses for the activities undertaken by the outsourcing organizations before selecting their 3PL service providers are presented. As in previous sections, the items descriptive statistics (mean item scores, with their ranking) as well as the results for the exploratory factor analysis (EFA) using principal component analysis (PCA) are presented. Prior

to the commencement of the analyses, a comprehensive definition of all the latent variables was done and the results are also provided.

Table 6.36 shows the dictionary of definition of the latent variables used in question number 8 of the questionnaire.

**Table 6. 36: Definition of latent variables**

<b>Code</b>	<b>Variable Name</b>	<b>Definition</b>
Q7.1	Analysing present costs of function(s)	Determination of the costs of supply chain functions by the organization prior to outsourcing
Q7.2	Adequate due diligence	Comprehensive appraisal of the 3PL, especially to establish its assets and liabilities and evaluate its potentials, structure and capability to deliver advertised service(s)
Q7.3	Advertising a Request for proposal (RFP)	Putting out an advert to solicit for proposals, by the outsourcing company for interested 3PL organizations to submit their business proposals to provide supply chain services
Q7.4	Engaging present clients of potential 3PL partner	Discussions with current customers of potential 3PL by the outsourcing organizations find out more about their capacity to provide advertised services
Q7.5	Verification of listed references	Confirmatory visits to/contacts with people/organizations listed by potential 3PL as references
Q7.6	Developing service levels agreement (SLA)	Developing an agreement to spell out reciprocal service levels, commitments and obligations between the organization and service provider
Q7.7	Preparing an exit plans/provisions	Making a proactive, contingency plans to exit the outsourced relationship should it fail
Q7.8	Developing a transition plan	Developing a plan for seamless transfer of management of supply chain functions to a newly contracted 3PL service provider
Q7.9	Developing a back-up plan	Developing a fallback position to the management of outsourced supply chains function should the need arise
Q7.10	Contract negotiation	A take-and-give discussion of the various provisions and obligations of the contract with 3PL service provider
Q7.11	Contract preparation	Preparing the legal document to formalize the engagement of the potential 3PL service provider
Q7.12	Visiting 3PLs' locations	Physical visits to operational locations of 3PL service providers to verify claims made in their submission of proposal
Q7.13	Corporate governance checks	Confirmatory investigation on the system of rules, practices and processes by which the 3PL is directed as stated in their response to the RFP
Q7.14	Appointing a relationship manager	The appointment of a manager by the outsourcing organization to act as the point of contact (POC) between it and the potential 3PL service provider
Q7.15	Developing critical proactive Corrective And Preventive Action (CAPA) plans	A proactive process document for corrective and preventive action consisting of improvements to an organization's processes taken to eliminate causes of non-conformities or other undesirable situations that may arise in the outsourced relationship.

Table 6.37 shows the mean item scores for the latent variables and their ranking.

**Table 6. 37: Descriptive Statistics**

<b>Latent Variables</b>	<b>Mean</b>	<b>Cronbach's Alpha</b>	<b>Ranking</b>
Adequate due diligence	3.39	0.956	1
Analysing present costs of function(s)	3.38	0.957	2
Developing service levels agreement (SLA)	2.82	0.955	3
Developing a back-up plan	2.81	0.956	4
Contract preparation	2.77	0.957	5
Verification of listed references	2.77	0.954	6
Developing a transition plan	2.66	0.954	7
Developing critical proactive Corrective And Preventive Action (CAPA) plans	2.55	0.955	8
Visiting 3PLs' locations	2.54	0.955	9
Preparing an exit plans/provisions	2.47	0.954	10
Appointing a relationship manager	2.40	0.956	11
Corporate governance checks	2.38	0.955	12
Advertising a Request for proposal (RFP)	2.24	0.956	13

The ranking shows *Adequate due diligence* as the number 1 in the ranking, while *Analysing present costs of function(s)* is number 2, *Developing service levels agreement (SLA)* is ranked number 3, while *Developing a back-up plan* is ranked number 4. Number 5 in the ranking is *Contract preparation*, while *verification of listed references*, *developing a transition plan* and *developing critical proactive Corrective and Preventive Action (CAPA) plans* were ranked 6, 7 and 8 respectively. Number 9 is *visiting 3PLs' locations*, while number 10 is *preparing an exit plans/provisions*. *Appointing a relationship manager*, *corporate governance checks* and *advertising a Request for proposal (RFP)* complete the ranking at numbers 11, 12 and 13 respectively

The EFA was conducted, and prior to conducting the factor analysis, the suitability and adequacy of the data for the analysis was determined. The correlation matrix showed many coefficient values of more than 0.30, showing a strong correlation between the factors (see Table 6.37). The internal reliability of the scale and composite scores was adequate with the Cronbach's Alpha value of 0.95, above the recommended minimum value of 0.6, thus supporting the factorability of the data as shown in Table 6.39. The results for the factor analysis are presented below in Tables 6.36 to 6.42 and Figure 6.4 The scree plot presented in Figure 6.4 shows the point of inflection of the Eigen values and the factors extracted.



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**Table 6. 38: Correlation Matrix**

<b>Latent Variables</b>	<b>Analysing present costs of functions</b>	<b>Adequate due diligence</b>	<b>Advertising a Request for proposal (RFP)</b>	<b>Verification of listed references</b>	<b>Dev. service levels agreement (SLA)</b>	<b>Preparing an exit plans &amp; provisions</b>	<b>Developing a transition plan</b>	<b>Developing a back-up plan</b>	<b>Contract preparation</b>	<b>Visiting 3PLs' locations</b>	<b>Corporate governance checks</b>	<b>Appointing a relationship manager</b>	<b>Developing critical CAPA plans</b>
Analysing present costs of function(s)	1.000	0.845	0.540	0.700	0.663	0.586	0.606	0.651	0.632	0.546	0.494	0.499	0.555
Adequate due diligence	0.845	1.000	0.578	0.625	0.695	0.658	0.701	0.615	0.582	0.547	0.552	0.516	0.590
Advertising a Request for proposal (RFP)	0.540	0.578	1.000	0.691	0.659	0.811	0.741	0.575	0.482	0.590	0.607	0.567	0.537
Verification of listed references	0.700	0.625	0.691	1.000	0.721	0.770	0.716	0.795	0.618	0.668	0.557	0.608	0.585
Developing service levels agreement (SLA)	0.663	0.695	0.659	0.721	1.000	0.717	0.689	0.566	0.627	0.677	0.646	0.586	0.648
Preparing an exit plans/provisions	0.586	0.658	0.811	0.770	0.717	1.000	0.870	0.718	0.585	0.651	0.692	0.606	0.705
Developing a transition plan	0.606	0.701	0.741	0.716	0.689	0.870	1.000	0.771	0.575	0.594	0.669	0.638	0.672
Developing a back-up plan	0.651	0.615	0.575	0.795	0.566	0.718	0.771	1.000	0.547	0.574	0.536	0.575	0.595
Contract preparation	0.632	0.582	0.482	0.618	0.627	0.585	0.575	0.547	1.000	0.754	0.678	0.582	0.624
Visiting 3PLs' locations	0.546	0.547	0.590	0.668	0.677	0.651	0.594	0.574	0.754	1.000	0.799	0.718	0.726
Corporate governance checks	0.494	0.552	0.607	0.557	0.646	0.692	0.669	0.536	0.678	0.799	1.000	0.730	0.868
Appointing a relationship manager	0.499	0.516	0.567	0.608	0.586	0.606	0.638	0.575	0.582	0.718	0.730	1.000	0.721
Developing (CAPA) plans	0.555	0.590	0.537	0.585	0.648	0.705	0.672	0.595	0.624	0.726	0.868	0.721	1.000

**Table 6. 39: Test of Reliability**

Cronbach's Alpha	N of Items
0.959	13

**Table 6. 40: Total Variance Explained**

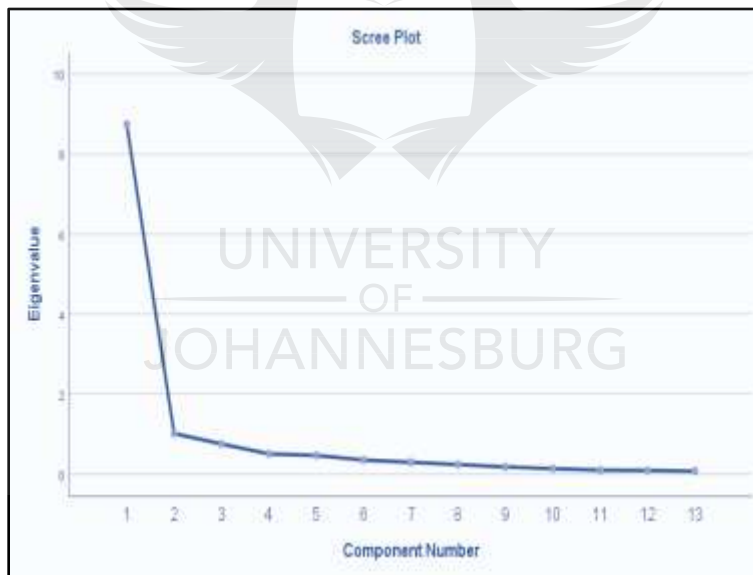
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.738	67.217	67.217	8.738	67.217	67.217	5.280	40.616	40.616
2	1.020	7.847	75.065	1.020	7.847	75.065	4.478	34.449	75.065
3	0.756	5.817	80.881						
4	0.511	3.928	84.809						
5	0.471	3.621	88.430						
6	0.356	2.740	91.169						
7	0.301	2.317	93.486						
8	0.244	1.875	95.362						
9	0.183	1.410	96.772						
10	0.142	1.090	97.862						
11	0.104	0.797	98.659						
12	0.096	0.741	99.400						
13	0.078	0.600	100.000						

*Extraction Method: Principal component analysis.*

In Table 6.40, the factor analysis was with principal axis factoring with oblimin rotation. Two (2) factors with eigenvalue of more than 1 were extracted. The 2 factors extracted accounted for 75.06% of the total variance explained. Factor 1 accounted for 67.2% while Factor 2 accounted for 7.8% of the total variance explained.

**Table 6. 41: Communalities**

Latent Variables	Initial	Extraction
Analysing present costs of function(s)	1.000	0.728
Adequate due diligence	1.000	0.735
Advertising a Request for proposal (RFP)	1.000	0.644
Verification of listed references	1.000	0.782
Developing service levels agreement (SLA)	1.000	0.704
Preparing an exit plans/provisions	1.000	0.794
Developing a transition plan	1.000	0.785
Developing a back-up plan	1.000	0.709
Contract preparation	1.000	0.639
Visiting 3PLs' locations	1.000	0.816
Corporate governance checks	1.000	0.889
Appointing a relationship manager	1.000	0.723
Developing critical proactive Corrective And Preventive Action (CAPA) plans	1.000	0.811



**Figure 6. 4: Scree Plot**

**Table 6. 42: Rotated Component Matrix**

Latent Variables	Component	
	1	2
Analysing present costs of function(s)	0.812	
Adequate due diligence	0.804	
Verification of listed references	0.793	
Developing a back-up plan	0.770	
Developing a transition plan	0.759	
Preparing an exit plans/provisions	0.736	
Advertising a Request for proposal (RFP)	0.688	
Developing service levels agreement (SLA)		0.507
Corporate governance checks		0.888
Visiting 3PLs' locations		0.821
Developing critical proactive Corrective And Preventive Action (CAPA) plans		0.816
Appointing a relationship manager		0.771
Contract preparation		0.664

*Extraction Method: Principal component analysis.*

The pattern matrix shown in Table 6.42 shows the factors are comprised of the following latent variables:

**Factor 1:** *Analysing present costs of function(s), adequate due diligence, verification of listed - references, developing a back-up plan, developing a transition plan, preparing an exit plans/provisions and advertising a Request for proposal (RFP)*

**Factor 2:** *Developing service levels agreement (SLA), corporate governance checks, visiting 3PLs' locations, developing critical proactive Corrective & Preventive Action (CAPA) plans, appointing a relationship manager and contract preparation*

From the relationships between these variables listed above, Factor 1 was termed **internal preparedness** while Factor 2 was called **Proactive & authentication initiatives**



### 6.3.8: Challenges of outbound pharmaceutical value chain in Nigeria & its outsourcing

In this section, the results of the responses for the challenges of the outbound pharmaceutical supply chains are presented. As in previous sections, the items descriptive statistics (mean item scores, with their ranking) as well as the results for the exploratory factor analysis (EFA) using principal component analysis (PCA) are presented. Prior to the commencement of the analyses, a comprehensive definition of all the latent variables was done and the results are also provided.

Table 6.43 shows the dictionary of definition of the latent variables used in question number 9 of the questionnaire.

**Table 6. 43: Definition of latent variables**

Code	Variable Name	Definition
Q8.1	Road Infrastructure	The condition and adequacy of road network in the country
Q8.2	Power Infrastructure	The state, regularity and adequacy of the electricity power supply in the country
Q8.3	Inadequate Policy & Regulation	The insufficiency and ineffectiveness in the various laws and policies governing the pharmaceutical supply chains in the country
Q8.4	Absence of competent 3rd Party Service Providers	Lack of reliable and competent third party organizations to manage the outbound pharmaceutical supply chains if outsourced to them
Q8.5	Lack of skilled personnel	Dearth of trained professionals to manage pharmaceutical supply chains
Q8.6	Pilferages along the chain	In-transit theft of products along the outbound pharmaceutical supply chains

Table 6.44 shows the mean item scores for the latent variables and their ranking

**Table 6. 44: Descriptive Statistics**

Latent Variables	Mean	Cronbach's Alpha	Ranking
Road Infrastructure	4.09	0.739	1
Power Infrastructure	3.65	0.757	2
Inadequate Policy & Regulation	3.63	0.699	3
Absence of competent 3PL Service Providers	2.97	0.665	4
Lack of skilled personnel	3.06	0.673	5
Pilferages along the chain	2.88	0.707	6

The ranking shows *road infrastructure* as the number 1 in the ranking, while *power infrastructure* is number 2, *Inadequate Policy & Regulation* is ranked number 3, while *Absence of competent*

3PL Service Providers is ranked number 4. Number 5 in the ranking is *Lack of skilled personnel*, while *Pilferages along the chain* sits as the last in the ranking at number 6

As previously explained, EFA was conducted, and prior to conducting the factor analysis, the suitability and adequacy of the data for the analysis was determined. The correlation matrix showed many coefficient values of more than 0.30, showing a strong correlation between the factors (see Table 6.45). The internal reliability of the scale and composite scores was adequate with the Cronbach's Alpha value of 0.745, above the recommended minimum value of 0.6, thus supporting the factorability of the data as shown in Table 6.46. The results for the factor analysis are presented in Tables 6.43 to 6.49 and Figure 6.3.8.1. The scree plot presented in Figure 6.3.8.1 shows the point of inflection of the Eigen values and the factors extracted.

**Table 6. 45: Correlation Matrix**

<b>Latent Variables</b>	<b>Road Infrastructure</b>	<b>Power Infrastructure</b>	<b>Inadequate Policy &amp; Regulation</b>	<b>Absence of competent 3rd Party Service Providers</b>	<b>Lack of skilled personnel</b>	<b>Pilferages along the chain</b>
Road Infrastructure	1.000	0.525	0.395	0.266	0.117	0.095
Power Infrastructure	0.525	1.000	0.396	0.137	0.069	0.023
Inadequate Policy & Regulation	0.395	0.396	1.000	0.448	0.340	0.244
Absence of competent 3rd Party Service Providers	0.266	0.137	0.448	1.000	0.643	0.581
Lack of skilled personnel	0.117	0.069	0.340	0.643	1.000	0.700
Pilferages along the chain	0.095	0.023	0.244	0.581	0.700	1.000

**Table 6. 46: Test of Reliability**

<b>Cronbach's Alpha</b>	<b>Cronbach's Alpha Based on Standardized Items</b>	<b>N of Items</b>
0.745	0.747	6

**Table 6. 47: Total Variance Explained**

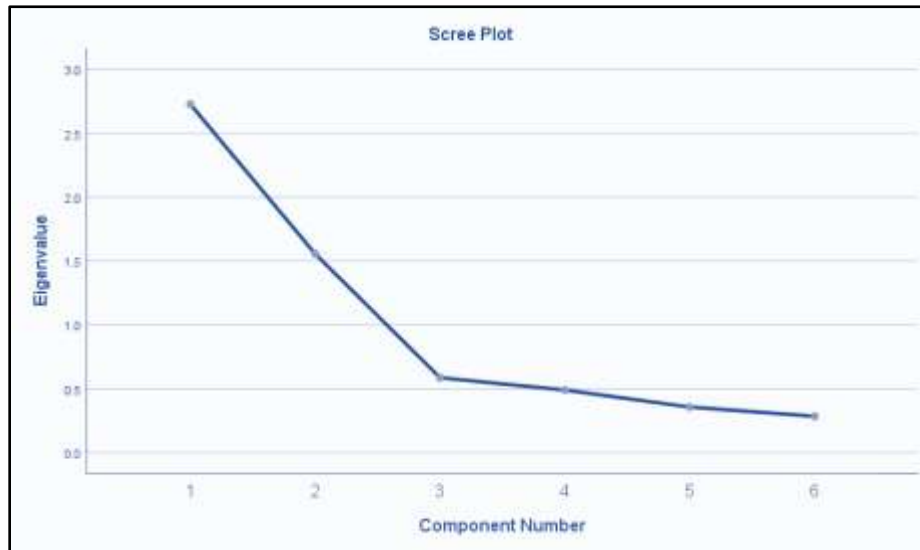
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.726	45.438	45.438	2.726	45.438	45.438	2.388	39.800	39.800
2	1.556	25.937	71.375	1.556	25.937	71.375	1.894	31.575	71.375
3	0.587	9.777	81.152						
4	0.490	8.161	89.313						
5	0.357	5.947	95.260						
6	0.284	4.740	100.000						

Extraction Method: Principal Axis factoring.

In Table 6.47, the factor analysis was with principal axis factoring with oblimin rotation. Two (2) factors with eigenvalue of more than 1 were extracted. The 2 factors extracted accounted for 63.6% of the total variance explained. Factor 1 accounted for 57.8.2% while Factor 2 accounted for 5.7% of the total variance explained.

**Table 6. 48: Communalities**

Latent Variables	Initial	Extraction
Road Infrastructure	1.000	0.687
Power Infrastructure	1.000	0.716
Inadequate Policy & Regulation	1.000	0.583
Absence of competent 3rd Party Service Providers	1.000	0.733
Lack of skilled personnel	1.000	0.803
Pilferages along the chain	1.000	0.760



**Figure 6. 5: Scree Plot**

**Table 6. 49: Rotated component Matrix**

Latent Variables	Component	
	1	2
Lack of skilled personnel	0.894	
Pilferages along the chain	0.872	
Absence of competent 3rd Party Service Providers	0.817	
Power Infrastructure		0.845
Road Infrastructure		0.826
Inadequate Policy & Regulation		0.655

Extraction Method: Principal component analysis.

The rotated component matrix shown in Table 6.49 shows the factors are comprised of the following latent variables:

**Factor 1:** *Lack of skilled personnel, pilferages along the chain and absence of competent 3rd Party Service Providers*

**Factor 2:** *Power Infrastructure, road Infrastructure and inadequate Policy & Regulation*

From the relationships between these variables listed above, Factor 1 was termed **People & competency issues** while Factor 2 was called **infrastructural & regulatory inadequacies**

### 6.3.9: The desired outcomes of outsourcing

This section presents the results of the responses on the desired outcomes of outsourcing. The items descriptive statistics (mean item scores, with their ranking) as well as the results for the exploratory factor analysis (EFA) using principal component analysis (PCA) are presented. Prior to the commencement of the analyses, a comprehensive definition of all the latent variables was done and the results are also provided.

**Table 6. 50 Definition of Latent Variables**

<b>Code</b>	<b>Variable Name</b>	<b>Definition</b>
Q9.1	Cost advantage/benefit	Actual costs saved from outsourcing decision
Q9.2	Reduced manpower	Reduction in personnel after outsourcing decision
Q9.3	Focus on core competency	More time to concentrate on distinctive know-how and ability by the organization after outsourcing
Q9.4	Reduced Capital expenditure	Reduction in spend on capital-intensive assets due to outsourcing
Q9.5	Geographical representation	Presence in other locations and regions of the country through representation by the 3PL partner
Q9.6	Efficiency	Ability and proficiency in managing the outbound value chain in the right way
Q9.7	Access to Specialised skills	Acquisition of supply chain management skills through outsourced partner/relationship
Q9.8	Market expansion	Increase in marketplace presence and placement of the company's products through outsourcing
Q9.9	Improvement in Customer service	Enhancement in the level and speed of service to customers
Q9.10	Speed & Agility	Increased speed of response to marketplace dynamics
Q9.11	Market share	Increase in company's share (in value & volume) of the Market, presence and placement of it's products in the marketplace
Q9.12	Indigenous expertise	Local acquisition of supply chain management skills through outsourcing

Table 6.50 shows the dictionary of definition of the latent variables used in question number 5 of the questionnaire.

**Table 6. 51 - Descriptive Statistics**

<b>Latent Variable</b>	<b>Mean</b>	<b>Cronbach's Alpha</b>	<b>Ranking</b>
Focus on core competency	4.01	0.935	1
Reduced Capital expenditure	3.74	0.934	2
Cost advantage/benefit	3.72	0.938	3
Improvement in Customer service	3.71	0.932	4
Efficiency	3.66	0.936	5
Speed & Agility	3.65	0.934	6
Geographical representation	3.52	0.933	7
Market expansion	3.48	0.933	8
Reduced manpower	3.45	0.938	9
Market share	3.38	0.931	10
Access to Specialised skills	3.27	0.934	11
Indigenous expertise	3.18	0.932	12

Table 6.51 shows the mean item scores for the latent variables and their ranking. The ranking shows *focus on core competency* as the number 1 in the ranking, while *reduced capital expenditure* is number 2, *cost advantage/benefit* is ranked number 3, while *improvement in customer service* is ranked number 4. Number 5 in the ranking is *efficiency*, while *speed & agility geographical representation*, and *market expansion* were ranked 6, 7 and 8 respectively. Number 9 is *reduced manpower*, while number 10 is *market share*. *Access to specialized skills* and *indigenous expertise* complete the ranking at numbers 11 and 12

As previously explained, EFA was conducted, and prior to conducting the factor analysis, the suitability and adequacy of the data for the analysis was determined. The correlation matrix showed many coefficient values of more than 0.30, showing a strong correlation between the factors (see Table 6.52). The internal reliability of the scale and composite scores was adequate with the Kaiser-Meyer-Olkin (KMO)'s value of 0.86, above the recommended minimum value of 0.6. Furthermore, as shown in Table 6.53, the Bartlett's test of sphericity was statistically significant at 0.00 (less than 0.05), thus supporting the factorability of the data.

The results for the factor analysis are presented in Tables 6.50 to 6.56 and Figure 6.6. The scree plot presented in Figure 6.6 shows the point of inflection of the Eigen values and the factors extracted.

**Table 6. 52: Correlation Matrix**

	Cost advantage	Reduced manpower	Focus on core competency	Reduced Capital expenditure	Geograph. representation	Efficiency	Access to Specialised skills	Market expansion	Improvement in Customer service	Speed & Agility	Market share	Indigenous expertise
Cost advantage	1.000	0.427	0.587	0.526	0.480	0.552	0.562	0.233	0.500	0.480	0.487	0.424
Reduced manpower	0.427	1.000	0.590	0.767	0.467	0.350	0.378	0.528	0.321	0.312	0.518	0.544
Focus on core competency	0.587	0.590	1.000	0.661	0.630	0.529	0.523	0.523	0.513	0.575	0.609	0.455
Reduced Capital expenditure	0.526	0.767	0.661	1.000	0.557	0.462	0.418	0.528	0.381	0.453	0.499	0.462
Geograph. representatn	0.480	0.467	0.630	0.557	1.000	0.612	0.546	0.728	0.648	0.579	0.805	0.593
Efficiency	0.552	0.350	0.529	0.462	0.612	1.000	0.558	0.418	0.590	0.716	0.517	0.490
Access to Specialised skills	0.562	0.378	0.523	0.418	0.546	0.558	1.000	0.309	0.476	0.478	0.625	0.655
Market expansion	0.233	0.528	0.523	0.528	0.728	0.418	0.309	1.000	0.612	0.605	0.617	0.503
Improvement in Customer service	0.500	0.321	0.513	0.381	0.648	0.590	0.476	0.612	1.000	0.761	0.652	0.584
Speed & Agility	0.480	0.312	0.575	0.453	0.579	0.716	0.478	0.605	0.761	1.000	0.565	0.521
Market share	0.487	0.518	0.609	0.499	0.805	0.517	0.625	0.617	0.652	0.565	1.000	0.701
Indigenous expertise	0.424	0.544	0.455	0.462	0.593	0.490	0.655	0.503	0.584	0.521	0.701	1.000

**Table 6. 53: KMO and Bartlett's Test of Reliability**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.860
Bartlett's Test of Sphericity	Approx. Chi-Square	505.560
	Df	66
	Sig.	0.000

**Table 6. 54: Total Variance Explained**

Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
6.911	57.590	57.590	6.911	57.590	57.590	4.830	40.247	40.247
1.151	9.590	67.180	1.151	9.590	67.180	3.232	26.933	67.180
0.977	8.144	75.323						
0.776	6.467	81.791						
0.487	4.062	85.853						
0.419	3.492	89.345						
0.347	2.890	92.236						
0.258	2.152	94.388						
0.209	1.741	96.129						
0.192	1.599	97.728						
0.179	1.492	99.219						
0.094	0.781	100.000						

*Extraction Method: Principal component analysis.*

As shown in Table 6.54, the eigenvalue value set at the conventional 1.00 and factor analysis was conducted with principal component factoring with varimax rotation. Of the latent variables listed for the role (benefits) of outsourcing, 2 factors were extracted with 6 and 2 variables each, leaving out 4 latent variables with the least impact factor. The 2 factors extracted accounted for 67.2% of the total variance explained. With Factor 1 accounting for 40.2% and the second factor accounting for 26.9%

**Table 6. 55: Communalities**

Latent Variables	Initial	Extraction
Cost advantage/benefit	1.000	0.465
Reduced manpower	1.000	0.862
Focus on core competency	1.000	0.675
Reduced Capital expenditure	1.000	0.820
Geographical representation	1.000	0.725
Efficiency	1.000	0.642
Access to Specialised skills	1.000	0.528
Market expansion	1.000	0.535
Improvement in Customer service	1.000	0.766
Speed & Agility	1.000	0.746
Market share	1.000	0.714
Indigenous expertise	1.000	0.584



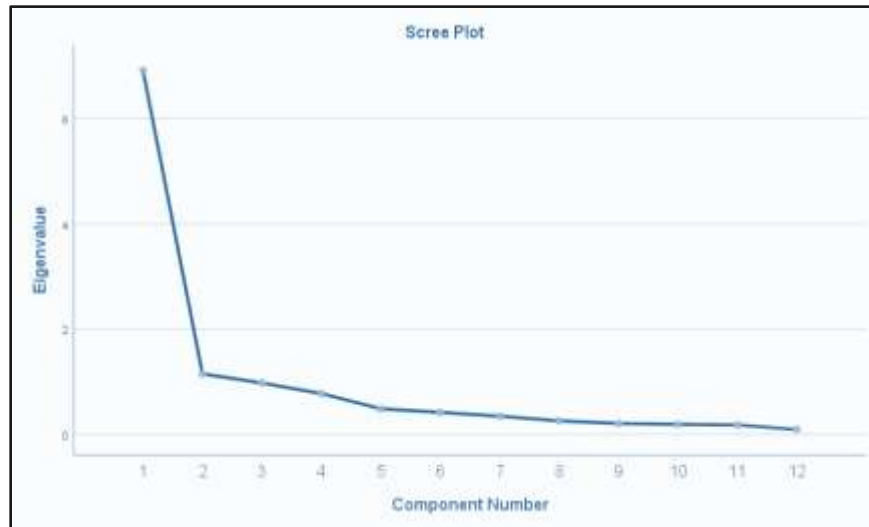


Figure 6. 6: Scree Plot

Table 6. 56: Rotated Component Matrix

Latent Variables	Component	
	1	2
Improvement in Customer service	0.862	
Speed & Agility	0.847	
Efficiency	0.770	
Geographical representation	0.721	
Market share	0.710	
Access to Specialised skills	0.647	
Indigenous expertise	0.634	
Market expansion	0.561	
Cost advantage/benefit		0.437
Reduced manpower		0.915
Reduced Capital expenditure		0.866
Focus on core competency		0.653

Extraction Method: Principal component analysis.

The rotated component matrix shown in **Table 6.56** shows the factors are comprised of the following latent variables. **Factor 1:** *Improvement in Customer service, Speed & Agility, Efficiency, Geographical representation, market share, Access to Specialised skills, Indigenous expertise and Market expansion.*

**Factor 2:** *Cost advantage/benefit, reduced manpower, reduced capital expenditure and focus on core competency.* From the relationships between these variables listed above, Factor 1 was termed **marketplace dominance** while Factor 2 was called **operational efficiency**.

#### 6.4: Summary of Factors

The tables below show the summary of all the 13 factors extracted and their component latent variables

**Table 6. 57: Factors for rationale for outsourcing**

QUESTION	FACTOR	LATENT VARIABLE	1	2
4 (Rationale for outsourcing)	1 - Organizational agility & competitiveness	Improvement in Customer service	0.807	
		Flexibility	0.715	
		Focus on core competence	0.683	
		Market expansion	0.681	
		Corporate Strategy	0.676	
	Cost savings	0.570		
	2 - Lack of internal capability	Lack of Capacity		0.815
		Lack of in-house expertise		0.587

**Table 6. 58: Critical criteria/factors for 3PL selection**

QUESTION	FACTOR	LATENT VARIABLE	1	2	3
5 (Critical criteria/factors for 3PL selection)	1 - Service excellence	Service reliability	0.821		
		Operational flexibility	0.793		
		Speed of service delivery	0.737		
		Pedigree/history of performance	0.666		
		National/geographical spread	0.622		
		Customer orientation	0.611		
		Stable industrial relations	0.594		
	2 - Technical capability	Quality policies and procedures		0.801	
		Availability of latest ICT tools		0.742	
		Organizational culture		0.739	
		Innovation		0.655	
	3 - Financial & corporate governance	Flexible payment regimen			0.831
		Indemnity			0.767
		Management structure & expertise			0.63
		Financial strength			0.536
		Corporate values			0.545

**Table 6. 59: Factors for Critical risk factors of outsourcing**

QUESTION	FACTOR	LATENT VARIABLE	1	2
6 (Critical risk factors of outsourcing)	1 - Institutional Inadequacy	Vendor employee turnover	0.949	
		Obsolete Technology	0.916	
		Loss of expertise	0.796	
		Corporate governance	0.783	
		Undertrained vendor's employees	0.751	
		Loss of control of outsourced function	0.666	
		No continuous improvement by 3PL Provider	0.634	
		Value misalignment	0.585	
		Internal HR issues	0.51	
	2 - Goals under-realization	Service levels not achieved		0.914
		Loss of flexibility		0.636
		Hidden costs		0.63
		Cost reduction not realized		0.51

**Table 6. 60: Factors for Pre-selection activities**

QUESTION	FACTOR	LATENT VARIABLE	1	2
7 (Pre-selection activities)	1 - Internal preparedness	Analysing present costs of function(s)	0.812	
		Adequate due diligence	0.804	
		Verification of listed references	0.793	
		Developing a back-up plan	0.77	
		Developing a transition plan	0.759	
		Preparing an exit plans/provisions	0.736	
	2 - Proactive & authentication initiatives	Advertising a Request for proposal (RFP)	0.688	
		Developing service levels agreement (SLA)		0.507
		Corporate governance checks		0.888
		Visiting 3PLs' locations		0.821
		Developing critical proactive Corrective And Preventive Action (CAPA) plans		0.816
		Appointing a relationship manager		0.771
	Contract preparation		0.664	

**Table 6. 61: Factors for Challenges to outbound supply chains/outsourcing**

QUESTION	FACTOR	LATENT VARIABLE	1	2
8 (Challenges to outbound supply chains/outsourcing)	1 - People & competency issues	Lack of skilled personnel	0.894	
		Pilferages along the chain	0.872	
		Absence of competent 3rd Party Service Providers	0.817	
	2 - Infrastructural & regulatory inadequacies	Power Infrastructure		0.845
		Road Infrastructure		0.826
		Inadequate Policy & Regulation		0.655

**Table 6. 62: Factors for desire outcomes of outbound supply chains/outsourcing**

QUESTION	FACTOR	LATENT VARIABLE	1	2	
9 (Desired outcomes of outsourcing)	1 - Marketplace dominance	Improvement in Customer service	0.862		
		Speed & Agility	0.847		
		Efficiency	0.77		
		Geographical representation	0.721		
		Market share	0.71		
		Access to Specialised skills	0.647		
		Indigenous expertise	0.634		
		Market expansion	0.561		
	2 - Operational efficiency	Cost advantage/benefit			0.437
		Reduced manpower			0.915
		Reduced Capital expenditure			0.866
		Focus on core competency			0.653

## 6.5: Conclusion

In this chapter, the results of the quantitative survey have been presented. They include key background information about the respondents and their organizations, the analyses of the responses to the different questions (latent variables) under the nine (9) major groups of independent variables and focus of investigation. As appropriate, the analytical methods employed range from descriptive, inferential and exploratory factor analysis (ETA) statistical techniques using SPSS version 25 software. The interpretation of the results has been done using extracted tables from the software where applicable and explanatory notes on them. The discussions on the results are presented in chapter seven.

## CHAPTER 7

### DISCUSSIONS OF THE QUANTITATIVE STUDY

#### 7.1: Introduction

Chapter six presented the results of the quantitative study with analyses of the responses to contents of the questionnaire. Also, exploratory factor analyses for questions 4 – 9 were conducted and out of the 76 latent variables, thirteen (13) factors were extracted as the critical ones with influences on the different questions/dependent variables of outsourcing outbound value chains by pharmaceutical organizations in Nigeria; namely: the rationale (reasons) for outsourcing, the critical risk factors, 3PL service providers' selection criteria, the pre-selection activities, the challenges to the outbound pharmaceutical value chain/its outsourcing and the desired outcomes of outsourcing. This chapter discusses the survey results in two sections – section A will focus on questions Q1 – Q3 with descriptive analysis, while section B will focus on the results of the EFA conducted on questions Q 4 – Q9.

#### 7.2: Section A – Discussions on the questionnaire survey results

This section discusses the responses to questions 1 to 3 of the questionnaire. The results have been presented in descriptive statistics, considering the nature of the responses and hence the discussions on them will focus on this format. Accordingly, in the Likert scale of 1 – 5 used, 1 represents very low level, impact or degree; 2 represents low; 3 represents moderate, 4 represents high while 5 represents very high level, impact or degree respectively.

##### 7.2.1: Degree of outsourcing

As shown in Table 6.8 in the previous chapter, of the total number of respondents, 92% responded that they outsource transportation to an extent denoted by the mean value of 3.38 (SD 1.27). Of the 5 outbound value chain functions investigated, this represented the function with the highest

degree of outsourcing at above moderate to high level with a mean value of 3.38 (SD 1.27). Likewise, although in decreasing order 66% of the respondents outsource warehousing with just about moderate degree of 2.74 (SD 1.49); 63% outsource distribution with mean value of 2.65 (SD 1.52); 56% outsource cold chain at between low to moderate level with a mean value of 2.54 (SD 1.51), while the least number of respondents 42 (42%) said they outsource reverse logistics at between low to moderate level with a mean value of 2.54 (SD 1.43). The high standard deviation of these mean values shows diversity and heterogeneity in the degree/level of outsourcing from low to high by these respondents' organizations. These agree with findings from previous studies on outsourced logistics. Domestic transportation (haulage & distribution) and warehousing are some of the most outsourced supply chain functions. Globally, the degree of outsourcing of domestic transport has been found to be as high as 80%, with warehousing (66%) and reverse logistics (34%) also featuring to a lesser degree ((Langley & Capgemini, 2016; Bulgurcu & Nakiboglu, 2018). These figures represent a significant growth in the degree of outsourcing of these functions reported in early studies which put the levels of outsourcing at transportation (53.3%), reverse logistics (26.9%) and warehousing (23.4%) (Xiaofeng & Jianhua, 2006).

Recent study in South Africa confirm the steady rise in the outsourcing of outbound value chain functions in the last decade. In a survey by Karrapan et al. (2017), the leading outsourced functions are: transportation (99%), customs clearance (83.5%), freight forwarding (83.5%), freight billing (70.9%) and warehousing (37.9%). Efficiency in inventory management and accuracy in supply and warehousing practices have been long recognized by the healthcare professionals, influencing the adoption of outsourcing by the pharmaceutical organizations (Azzi *et al.*, 2013). The relatively low degree of cold chain outsourcing is largely attributable to the historical practice in developing countries like Nigeria where a lot of vaccine and cold chain management is done internally by both the public and private organizations on account of the specialized skills required for their handling and the dearth of competent third party service providers.

Despite the foregoing, outsourcing of the storage and distribution services have been on the increase and successful in the last few decades (Transaid, 2009; WHO/PATH, 2012; Zhao *et al.*, 2014). The outbound pharmaceutical value chain is part of the larger healthcare system for which outsourcing has now become a strategic tool for increasing overall effectiveness and efficiency of the system (Chiara & Lorenzo, 2016)

### **7.2.2: Age of outsourcing**

Tables 6.9 - 6.13 present the results of the ages of outsourced relationships with providers of the value chain services (Transportation, Distribution, Warehousing, Reverse Logistics and Cold chain) by the pharmaceutical organizations studied. The age brackets used in this study were designed not necessarily to determine the actual individual ages of these outsourced relationships, but to study the growth in the outsourcing practices in the last decade.

As shown in these tables, 24 (26.1%) of the respondents had commenced the outsourcing of transportation more than 12 years ago, the figures for other functions are warehousing, 9 (13.6%); distribution 5 (7.9%), cold chain, 8 (14.3%) and reverse logistics, 4 (9.5%). These figures show that apart from transportation services, more than 80% of the outsourced relationships for the other serviced were contracted in the last 12 years, showing a period of tremendous growth and adoption of the practice during this period.

General/informal outsourcing has been practiced in Nigeria for some decades now (Kolawole & Agha, 2015). However, strategic outsourcing as a practice in the Nigerian pharmaceutical sector is relatively new with the early relationships mainly tactical and on peripheral services such as catering, cleaning, security, etc. The earliest scholarly study on outsourcing in Nigeria in 1998 had a poor response with only 29% of the 70 companies investigated responding (Okolie, 1999). Of the few companies investigated, only 2 were pharmaceutical, and the only outbound value chain functions outsourced were transport (17.7%) and warehousing (5.9%). The growth trend observed in this study in the last decade corroborates findings reported in studies in other sectors in Nigeria and sub-Saharan Africa (Acti & Abigail, 2014; Ikegwuru & Ihunwo, 2018; Kolawole & Agha, 2015; Muogboh & Ojadi, 2018).

### **7.2.3: Satisfaction from outsourced relationships**

The level of satisfaction derived from the outsourced services was measured here for all the five (5) outbound value chain functions under investigation in this study. As presented in Table 6.14; among the respectively respondents for the different functions – Transportation, 92; Warehousing, 66; Distribution, 63; Cold chain, 56 and Reverse logistics, 42; the mean levels of satisfaction were:



Transportation, 3.38 (SD, 1.16); Warehousing, 3.25 (SD, 1.32); Distribution, 3.12 (SD, 1.18); Cold chain, 3.32 (SD, 1.30) and Reverse logistics, 2.98 (SD, 1.35). Translated into percentages, these come to 67.6%, 65%, 62.4%, 66.4% and 59.6% satisfaction levels respectively. These are moderate, above-average level satisfaction across all the functions, albeit less than high - very high levels of satisfaction. In the earliest scholarly article on outsourcing in Nigeria, the level of satisfaction by the companies investigated was 50% (Okolie, 1999).

Some scholars have used customer satisfaction level by users of outsourced services as one of the indirect indicators (or soft measures as they are also called) of the success of outsourcing and performance by third party service providers (Grover *et al.*, 1996; Cho *et al.*, 2008; Lahiri, 2016). According to Hansemark and Albinson (2004), the satisfaction that a customer derives from a service is a wholesome one which involves both the attitude of the customer towards the service provider and the emotional fulfillment attached to the service. Generally, satisfaction is achieved when a customer's expectation about a service is either met or exceeded (Fornell *et al.*, 1996; Ali & Kaur, 2018).

Since the 1990s, which witnessed a rapid growth of the practice and research into outsourcing, the satisfaction and experiences of the users of 3PL services have been mixed, with reports of dissatisfaction (Currie & Willcocks, 1997; Kakabadse & Kakabadse, 2000) and satisfaction reported in various sectors in both developed (Lieb & Miller, 2002) and emerging economies including Ghana, South Africa and Nigeria (Sohail & Sohal, 2003; Sohail *et al.*, 2004; Cilliers & Nagel, 1994; Rahman, 2011).

As reported in this study, satisfaction in outsourcing relationships has been investigated from the angle of the service users (Gopalakrishnan *et al.*, 2017). Customer satisfaction from outsourcing relationship is a product of the service quality or contractual factors/obligations (Juga *et al.*, 2010) and what has been called "relational factors" such as communication, trust, among others (Ojha, 2002; Rai *et al.*, 2012). The other factors that affect the satisfaction level experienced by users are the experience of the organization in outsourcing arrangements (Waug & Luke, 2011; Hanna, 2009); the 3PL human resources deployed and their skills in service delivery (Sanchis-Pedregosa *et al.*, 2018) and the capability for service recovery (in cases of failures) and processes of the 3PL services provider (Gazley & Simmonds, 2018). In pharmaceutical outbound value chain outsourcing, in addition to the factors enumerated above as drivers of customer satisfaction, total

visibility of the inventory (pharmaceutical products) all throughout the chain until they get to the final consumer (the patient) from real-time data contributes to satisfaction by 3PL service users (Bhavana, 2018).

### **7.3: Section B – Discussions on the questionnaire survey results (Q4 – Q9)**

The section discusses the results of the responses to questionnaires questions 4 to 9 which contain the latent variables associated with different aspects of the outsourcing process. As previously presented in chapter 6, for each question, both the descriptive and exploratory factor analysis was done, with the final outputs being the ranking (for the descriptives) and extracted factors (for the EFA) of the latent variables. Therefore, the discussions of these results will focus on the ranking status and the identified/extracted factors.

#### **7.3.1: The rationale for outsourcing**

This section presents the results of the responses on the rationale for outsourcing. The items descriptive statistics (mean item scores, with their ranking), as well as the results for the exploratory factor analysis (EFA) using principal component analysis (PCA) are presented. Prior to the commencement of the analyses, a comprehensive definition of all the latent variables was done and the results are also provided. Table 6.16 shows the mean item scores for the latent variables and their ranking. The ranking shows cost savings at the number 1 in the ranking, while focus on core competence, number 2, Improvement in customer service is ranked number 3, while flexibility is ranked number 4. Number 5 in the ranking is corporate Strategy, while market expansion, lack of capacity and lack of in-house expertise were ranked 6, 7 and 8 respectively. During the factor analysis, four latent variables (Q4.2: Industry best practice; Q4.3: Technological advancement; Q4.8: Access to Specialised skills & Q4.9: Transfer of risks to 3PL) with low coefficients and/or showing cross loading on the factors were excluded. From the ranking of the latent variables, top four variables are *cost savings*, *focus on core competence*, *improvement in Customer service* and *flexibility*. These variables will be discussed under the 1<sup>st</sup> Factor extracted in the next section.

### **7.3.1.1: Factor 1 – Organizational agility and competitiveness**

This extracted factor contains 6 latent variables - *improvement in Customer service, flexibility, focus on core competence, market expansion, corporate strategy and cost savings* and is discussed as the first factor influencing the decision of the pharmaceutical organizations to outsource their outbound value chains.

As the operating environment becomes more competitive and challenging, many organizations have been evolving, redefining their operating strategies and devising ways of gaining competitive advantage in the marketplace to reach out to their customers faster than others. The outbound value chain is one key area where focus has been placed by many organizations to become agile and accordingly, acquire competitiveness. Organizational agility refers to the ability of an organization to swiftly respond to the changes in the environment through changes in their products and services. This ability has been very critical for organizations not just to gain competitiveness, but also to attain sustainability in it (Singh *et al.*, 2013). This concept has been traced to the erstwhile CEO of General Electric, Jack Welch, who emphasized “speed, agility, and simplicity” as important (Tichy & Charan, 1989:3; Baškarada & Koronios, 2018). Likewise, agility in supply chain refers to the ability of organizations to master the turbulence in the market (van Hoek *et al.*, 2001; Yusuf *et al.*, 2014).

Agility in the value chain which in turn confers agility to the organization and its speedy responsiveness to its customers, is viewed as a virile source of competitiveness nowadays, even though its development is slower than expected (Jain, *et al.*, 2008). Value chain agility is a vital operational capability in view of the critical factors of cost and speed in products delivery (Ngai *et al.*, 2011; Overby *et al.*, 2006). This capability derives from efficiency and the ability of the organization to integrate and coordinate with external partners in the value chain like 3PL service providers. (Brusset, 2016). Previous studies on organizational agility have concentrated on the nature and features of the organization, without any focus on the unique abilities and attributes on the practices that confer agility and competitiveness on such organizations. (Appelbaum *et al.*, 2017a; 2017b). Even though there is no global consensus in academic literature on these attributes that confer organizational agility and competitiveness (Brusset, 2016), an effective supply/value chain has been identified as key (Porter, 1985, Christopher, 2000). The outsourcing of the

outbound segment of the value chain as confirmed by this study has been identified as one of the ways to acquire organizational agility and competitiveness.

### **7.3.1.2: Factor 2 – Lack of capacity**

The second factor influencing the outsourcing of outbound value chain by pharmaceutical organizations in Nigeria is the lack of capacity to undertake the ownership and management of the value chain. Outbound pharmaceutical value chains are unlike other value chains with regards to the requirements to the management and nature of the products being managed. Due to the sensitive, thermolabile and high-regulated products along these chains, a lot of investment on capacities is required to effectively manage the value chains. These capacities are not only limited to the physical assets like vehicles (both ambient and cold-chain) and storage facilities like warehouses, but also include human capacities in the effective management of the processes. To achieve competitive edge and effective product delivery, pharmaceutical organizations outsource their outbound value chain management to: acquire additional capacity (Somuyiwa, 2015; Christopher), to reduce capital expenditure on acquisition of assets (Somuyiwa, 2015); gain access to the 3PL service providers' automation, leverage on their process maturity and reduce operational risks (Sandhu *et al.*, 2018) and acquire innovative capacities from their association with the 3PL service providers (Sanchis-Pedregosa *et al.*, 2018). Deepen *et al.* (2008) posit that organizations who outsource service are actually acquiring value-adding capacities like skills and knowledge.

Grossler *et al.* (2013) report that while the focus of organizations who outsource internationally is on cost saving, those who outsource locally, like the ones investigated in this study do so to achieve flexibility in their capacities. In doing so, these organizations often outsource such outbound value chain functions like transportation and warehousing where they lack capacity (Denisa *et al.*, 2015). In Nigeria, like many developing countries, the gap in outbound value chain management capacities transcends beyond the facilities and infrastructure, but also include the human capacity to manage effectively, the entire process (Jahree *et al.*, 2012; Kolawole & Agha, 2015)

### **7.3.2: The critical criteria for 3PL selection**

This section discusses the results for the criteria the organizations use in selecting their 3PL service providers. The ranking of the 16 latent variables has been done from the descriptive statistical analysis as explained in the previous chapter. Table 6.23 shows the mean item scores for the latent

variables and their ranking. The ranking shows *speed of service delivery* as the number 1 in the ranking, while *service reliability* is number 2, *national/geographical spread* is ranked number 3, while *Operational flexibility* is ranked number 4. Number 5 in the ranking is *pedigree/history of performance*, while *financial strength*, *management structure/expertise* and *Stable industrial relations* were ranked 6, 7 and 8 respectively. Number 9 is *corporate values*, while number 10 is *Quality policies and procedures*.

*Flexible payment regimen*, *Availability of latest ICT tools*, *Indemnity*, *Customer orientation*, *Innovation and Organizational culture* complete the ranking at numbers 11, 12, 13, 14, 15 and 16 respectively.

Furthermore, the rotated component matrix in Table 6.28 shows 3 factors were extracted, using all the 16 latent variables. The names of the factors and their latent variables are as follows:

**Factor 1: Service Quality** (*Service reliability*, *Operational flexibility*, *Speed of service delivery*, *Pedigree/history of performance*, *National/geographical spread*, *Customer orientation* and *Stable industrial relations*).

**Factor 2: Technical capability** (*Quality policies and procedures*, *Availability of latest ICT tools*, *Organizational culture* and *Innovation*).

**Factor 3: Financial Health & corporate governance** (*Financial strength*, *corporate values*, *flexible payment regimen*, *Indemnity* and *Management structure & expertise*)

#### **7.3.2.1: Factor 1: Service quality**

The main objective behind any organization's decision to outsource its customer-facing outbound value chain is to render service on behalf of the organizations to its customers. The service quality by a provider is therefore important in its selection and retention for the provision of the service(s). It is therefore not surprising that service attributes and capabilities are topmost criteria both in the descriptive statistics and in the number of latent variables loading on Factor 1 extracted.

The top position occupied by service quality in this survey aligns with the ranking from various studies (Bayazit & Karpak, 2013; Menon *et al.*, 1998; Qureshi *et al.*, 2007; Karrapan *et al.*, 2017; Fachao *et al.*, 2012; Efendigil *et al.*; 2008; Alkhatib *et al.*, 2015).

Service quality is a vital ingredient of organization's strategy to differentiate itself and its services from competition and determine its competitive advantage (Ghobadian *et al.*, 1994). Sustainability in the delivery of quality service by any 3PL service providers is also vital for its long-term success and profitability (Owen *et al.*, 2001; Stamenkov & Dika, 2015; Ghobadian *et al.*, 1994)

Many service users and even researchers ascribe their understanding of quality to different components of the service offering but will generally consider a service of good or high quality if it meets and /or exceeds the customer's expectations (Ojasalo, 2018). From this study, the key indicators of service quality as ranked by the respondents are speed and service reliability, the geographical spread of their operations; their customer service orientation and the history/pedigree of service delivery. These attributes are topmost in the list of criteria the respondents/their organizations use to determine service quality and hence select their service providers.

The revolutionary study by Parasuraman *et al.* (1985; 1988) extracted the 5 key components of service quality which are now popularly called by the acronym "RATER" as: reliability, assurance, tangibles, empathy, and responsiveness. These 5 key components are now acceptably used as the five dimensions in the evaluation of service quality and are altogether called SERVQUAL dimensions (Carr, 2007; Gandhi *et al.*, 2018). Further studies of the components and dimensions of service quality in 3PL services put three dimensions to include dimensions of operational, personal and technical (Ojasalo, 2018).

### **7.3.2.2: Factor 2: Technical capability**

This second factor of the selection of 3PL service providers contains as latent variables, *quality policies and procedures, availability of latest ICT tools, organizational culture and Innovation.*

The management of the outbound value chains of the pharmaceutical sector poses a lot of unique challenges unlike other sectors. The sensitive nature of life-saving drugs/medicaments and other pharmaceutical products for human use and the strict regulations of the handling of these products places a high demand on the pharmaceutical organizations and accordingly their service providers involved at different stages of the supply chains especially outbound value chains. Technical capability of the 3PL service providers is crucial in their selection for the provision of outbound value chain services as the focus of these organizations has over the years moved from routinized service provision to value creation by these service providers. 3PL service providers must seek to develop solutions that address specific customer's requirements and market-sensing and technical

capability (Kindstrom *et al.*, 2013; Raddats & Burton, 2014). The potential benefit of gaining value from these external partners is central in today's competitive operating environment (Lintukangas *et al.*, 2016).

Capability is “the ability to implement and integrate resources to achieve corporate goals, as well as results acquired from long-term accumulation of interaction among various resources” (Tseng & Lee, 2014:159). The technical capability of 3PL service providers as prioritized by the respondents of this study contains vital capabilities such as quality policies and procedures, availability of latest ICT tools, organizational culture and Innovation all of which are prerequisites for effective and efficient management of the unique outbound pharmaceutical value chains. Over time, various dimensions and components of technical capability have been studied and identified. **Information Technology (IT) capability** (Maheshwari *et al.*, 2012); **innovation capability**, critical for the introduction of new processes faster than competitors (Guan & Ma, 2003; Zawislak *et al.*, 2018); **operational capability**, which involves the ability of the firm to coordinate multiple aspects of the service delivery in a cost-efficient, flexible and commercially-viable way (Zawislak *et al.*, 2018). **Managerial capability** denotes the expertise skills and procedures for the coordination of the firm's other activities in a way as to reduce internal organizational friction and complexities (Zawislak *et al.*, 2018). Other technical capabilities identified include **transactional capability**, for efficient transaction costs management, (Tello-Gamarra & Zawislak, 2013; Zawislak *et al.*, 2018)

Consignment tracking capability (Kumar & Singh, 2012) which is very critical especially in the outbound value chain management to ensure adequate inventory monitoring and visibility. In a recent study, another capability, **robust supply network/distribution network capability** was found to be the most significant capability and factor in the selection of 3PL logistics service providers in Indian pharmaceutical sector (Gardas *et al.*, 2019).

### **7.3.2.3: Factor 3: Financial & corporate governance**

This last factor for the selection of 3PL service providers contains two sub-factors that have been grouped together on account of their common linkage and use in the selection process in being able to evaluate the overall structure and health of the 3PL company, thereby assessing its sustainability, business model and continuity status. The selection is a multi-dimensional process

that transcends the pricing consideration (Ho *et al.*, 2012). Earlier selection processes were subjective and resulting in sub-optimal outcomes and decisions (Xu, 2000; Wang *et al.*, 2015).

While Aguezzoul (2014) in her review reported similarities in the selection criteria of both goods and logistics service providers, with difference in their order of importance; Bulgurcu and Nakiboglu (2018) report that financial measures like financial stability and viability are some of the most commonly used criteria. Apart from the spectrum of service offering, the financial structure and key indicators of the service providers are critical to their selection by the outsourcing organizations (Gotzamani *et al.*, 2010; Hofmann & Lampe, 2013). Different measures have been used to assess the financial health of companies including ratings by credit rating organizations, even though credit rating may in itself not be totally objective and a true reflection of the health of a company, Griffin and Tang (2012), Ames *et al.* (2014) opine that a lot of information can still be accessed from such ratings. In few circumstances, there have been cases of the outsourcing organization with stronger financial might and higher credit rating assisting their 3PL providers with financial support to increase their service delivery capacities (Randall & Farris II, 2009). Other measures and indicators used to assess the financial health of a 3PL firm include companies' market capitalization and stock exchange quotation for listed and publicly quoted firms and the revenue streams (Hofmann & Lampe, 2013). Some researchers like Bhandari (1988) have used the debt-to-equity ratio which is a key assessment data for financial risks. Hofmann & Lampe (2013) reported another financial measure - liquidity which is a useful indicator of the capacity of the 3PL firm to meet up with the various operational and contractual obligations especially in the pharmaceutical value chain management which involves the use of specialised, capital-intensive assets and facilities.

On account of the widely-reported collapses of some major companies in the private sector, the issue of corporate governance in private companies has received close scrutiny globally (L'Huillier, 2014).

The focus of corporate governance has been on the management structure and performance of companies and has been a critical component of the financial reporting and performance of these companies (Stuebs & 2015). Srivastava *et al.* (2018:19) refer to corporate governance "as a set of predefined rules which guide the actions of managers resulting in the best interest of investors". In Nigeria, the national corporate governance code was revised in 2018 and now contains such



elements as: role of the board, board structure and composition, corporate governance evaluation, risk management, relationship with shareholders, protection of shareholders' rights, business conduct/ethics and sustainability (FRCN, 2018). On account of the paucity of well-established 3PL providers from the organised private sector, a lot of family-controlled private 3PL firms abound in Nigeria with the attendant risks of ineffective boards even with independent directors who are unable to prevent poor corporate governance practices like financial misstatements and manipulations (Jaggi *et al.*, 2010; Michael & Goo, 2015). Given the foregoing, it's imperative that outsourcing organizations must determine the most suitable criteria for selecting of their service providers to warrant that these firms have all it takes to meet their immediate and future value chain management needs (Kumar *et al.*, 2011) and prevent the outsourcing risks (Handley, 2012; Zhang *et al.*, 2013)

### **7.3.3: The critical risks factors for outsourcing**

Table 6.30 shows the mean item scores for the latent variables on the critical risk factors and their ranking. The ranking shows *Obsolete Technology* as the number 1 in the ranking, while *Undertrained vendor's employees* is number 2, *Service levels not achieved* is ranked number 3, while *Hidden costs* is ranked number 4. Number 5 in the ranking is *Cost reduction not realised*, while *Value misalignment*, *No continuous improvement by 3PL* and *Loss of control of outsourced function* were ranked 6, 7 and 8 respectively. Number 9 is *Loss of flexibility*, while number 10 is *Quality policies and procedures*. *Loss of expertise*, *corporate governance* and *Internal HR issues* complete the ranking at numbers 11, 12 and 13 respectively.

Upon factor analysis, two factors were extracted as follows:

**Factor 1:** *Vendor employee turnover, obsolete technology, loss of expertise, corporate governance, undertrained vendor's employees, Loss of control of outsourced function, no continuous improvement by 3PL service provider, value misalignment and internal HR issues*

**Factor 2:** *Service levels not achieved, loss of flexibility, hidden costs and cost reduction not realised*

From the relationships between these variables listed above, Factor 1 was termed **Organizational inadequacies** while Factor 2 was called **goals under-realizations**.

### **7.3.3.1: Factor 1 – Organizational inadequacies**

As listed above, this factor contains the following latent variables: Vendor employee turnover, obsolete technology, loss of expertise, corporate governance, undertrained vendor's employees, Loss of control of outsourced function, no continuous improvement by 3PL service provider, value misalignment and internal HR issues. Despite the several advantages and benefits of outsourcing, like many other management practices and initiatives, there are some risks. Gandhi et al. (2012) refers risk as the result of the probability of an untoward incident happening and its consequences or impact. According to Christopher (2001:202), "It can be argued that in today's volatile business environment the biggest risks to business continuity lie in the wider supply chain" Various critical risk elements have been categorised into two major factors in this research. In this first factor, organizational inadequacies, the elements are risks associated with the inadequacies of the two organizations involved – the outsourcer and service provider.

The inadequacies of outsourcing organizations emanate from the impact of the process on the organization. This impact is characterized by their inability to exhibit some attributes and or loss of some capacities and capabilities. Various researchers have reported the form of these losses to include loss of control of the innovative capacity (Aubert *et al.*, 1998; Gandhi *et al.*, 2012) loss of operational capabilities (Aron *et al.*, 2005; Handley *et al.*, 2012; Zhang *et al.*, 2015; Iqbal & Dad, 2013); technical expertise or business process knowhow (Willcocks *et al.*, 2004; Iqbal & Dad, 2013); lack of control over the 3PL service provider (Quinn and Hilmer, 1994; Kakabadse & Kakabadse, 2000), loss of cross functional expertise (Kakabadse & Kakabadse, 2000); loss of privacy /intellectual property (Herath and Kishore, 2009; Iqbal & Dad, 2013). In this study, the potential risks associated with the outsourcing organization are loss of expertise and internal human resources issues. The latter may manifest as decreased productivity and motivation of the employees resulting from job insecurity and satisfaction.

On the side of the service providers, inadequacies identified result from their inability to match service delivery/expectations with actual expectations. Some of the latent variables identified in this study leading to these inadequacies include obsolete technology, high employee turnover and lack of continuous improvement, amongst others. These inadequacies and gap in performance have also been reported in various forms since the advent of researches into outsourcing practices and include: service disruption (Aubert *et al.*, 1998; Gandhi *et al.*, 2012), declining quality of

service (Beasley *et al.*, 2004; Aron *et al.*, 2005; Iqba & Dad, 2013), hidden costs (Aubert *et al.*, 1998; Gandhi *et al.*, 2012). Outsourcing risks have been grouped and categorised by other researchers. While some of these categories relate to the nature, origin and impact factor; some are associated with the relationships, processes, whilst others cut across the two participating organizations. These categories that have emerged both generally and specific to the pharmaceutical industry include operational, strategic, regulatory, technical and corporate responsibility (Harland *et al.*, 2003; Enyinda *et al.*, 2009; El Mokrini *et al.*, 2016).

The type and impact of these risks depend on the outsourced relationships and number of stakeholders (Gandhi *et al.*, 2012). It has been shown that one way of mitigating against these risks and prevent them from impacting negatively on the business is to have a back-up service provider or use more than one provider (Pratap, 2014; Colicchia *et al.*, 2010; Bhattacharya *et al.*, 2013). Other approaches in the mitigation and management of these risks which have been widely reported are risk retention, avoidance, reduction and transfer (Deloach, 2000; Wagner & Bode, 2008; El Mokrini *et al.*, 2016)

The issues of risks and the management in outsourcing have become prominent in the last few decades. These sources of uncertainties faced by the outsourcing pharmaceutical organizations have been critically investigated and considered when the strategic decision of outsourcing OPVC is being taken (Costa *et al.*, 2006; Gandhi *et al.*, 2012).

#### **7.3.3.2: Factor 2 - Goals under-realization**

The second factor comprising the risk elements of outsourcing OPVC relates to the under-realization of the strategic goals of the outsourcing decision. In this study, the component latent variables of this risk factor are Service levels not achieved, loss of flexibility, hidden costs and cost reduction not realised. All these risk elements are identified as possessing the potentials for non-attainment of the desired strategic goals the outsourcing organizations set out to achieve with the outsourcing initiative. For every organization in or contemplating an outsourcing contract, these goals are very critical form the kernel of the contract and accordingly, are embedded in it. Gottschalk and Solli-Saether (2006: 201) capture the importance of the outsourcing goal in their definition of the outsourcing contract by referring to it as a “legally bound, institutional framework in which each party’s rights, duties, and responsibilities are codified and the goals, policies, and strategies are specified” The goals of outsourcing by most organizations are connected with the

rationales to outsource as has been extensively discussed in previous sections. Generally, most organizations, including the pharmaceutical ones studied in this research have as major components of their goals, focus on core competence, financial goals such cost reduction, service, amongst others. Studies have shown that apart from some few organizations whose goals are beside financial measures, most of them focus on cost reduction as their main goal of outsourcing (Denisa *et al.*, 2015; Mukherji & Ramachandran, 2007; Bustinza *et al.*, 2010; Brewer *et al.*, 2013). Few others consider financial goals as complementary to other non-financial strategic goals like efficiency and service targets (Wang *et al.*, 2015). No matter the content and intent of the goals, all organizations, irrespective of their size and sector have outsourcing goals (O'riodan & Sweeney, 2007). Suraju & Hamed (2013:26) opine that “outsourcing must be done carefully, systematically, and with explicit goals and expectations”. Consequently, a critical risk of the outsourcing decision and relationship is when these goals are not realised in the form and magnitude set out in the outsourcing strategy and contract. Common manifestations of these risks if and when they materialize are service levels not achieved by the 3PL service provider and outright failure in service delivery and task performance (Alkhatib *et al.*, 2015; Bulgurcu *et al.*, 2018).

It is reported that outsourcing failures resulting from under or non-realization of goals are due to lack of alignment of the goals of the two organizations – the outsourcer and the 3PL service provider with reported cases of post-engagement complaints like payment of low prices by service providers and goals and objectives mismatch by outsourcers (Bhattacharya *et al.*, 2013). Achieving short-term instead of long-term strategic goals has been reported as a risk of goals under-realization (Hupfeld, 1997; Kakabadse & Kakabadse, 2000). Tsay (2014) refers to goals mismatch and conflict in outsourcing relationship as a “moral hazard”. A periodic review of the strategic fit between the outsourcer's goals and that of the 3PL service provider has been recommended as a mitigation against goals' mismatch in outsourcing relationship especially in the pharmaceutical sector (USAID/Deliver, 2014). While Vitasek and Manrodt (2012) report that organizations must become “vested,” or mutually dedicated to the attaining a successful long-term relationship founded on either party's dedication to their mutually-beneficial goals, Suraju and Hamed (2013) report that even though most organizations attain some demonstrable success in their outsourcing relationship, the outcomes of such relationships still fall short of the strategic goals underpinning

the relationship. Outsourcing like many management and supply chain decisions are not free from risks. Despite these risks associated with outsourcing of outbound pharmaceutical value chain (OPVC); a lot of value can still be derived from the process and practice. Fundamental to this value extraction and maximisation is identifying these risks and their dimensions (El Mokrini *et al.*, 2016), understanding the interconnections between them and implementation mitigating strategies at the commencement of the outsourcing process (Gandhi *et al.*, 2012; Gbadegesin *et al.*, 2015).

### **7.3.4: Pre-selection activities by outsourcing organizations**

**Table 6.37** shows the mean item scores for the latent variables and their ranking. The ranking shows *Adequate due diligence* as the number 1 in the ranking, while *Analysing present costs of function(s)* is number 2, *Developing service levels agreement (SLA)* is ranked number 3, while *Developing a back-up plan* is ranked number 4. Number 5 in the ranking is *Contract preparation*, while *verification of listed references*, *developing a transition plan* and *developing critical proactive Corrective and Preventive Action (CAPA) plans* were ranked 6, 7 and 8 respectively. Number 9 is *visiting 3PLs' locations*, while number 10 is *preparing an exit plans/provisions*. *Appointing a relationship manager*, *corporate governance checks* and *advertising a Request for proposal (RFP)* complete the ranking at numbers 11, 12 and 13 respectively. From the EFA conducted, the two factors extracted are comprised of the following latent variables:

**Factor 1:** *Analysing present costs of function(s)*, *adequate due diligence*, *verification of listed references*, *developing a back-up plan*, *developing a transition plan*, *preparing an exit plans/provisions* and *advertising a Request for proposal (RFP)*

**Factor 2:** *Developing service levels agreement (SLA)*, *corporate governance checks*, *visiting 3PLs' locations*, *developing critical proactive Corrective & Preventive Action (CAPA) plans*, *appointing a relationship manager* and *contract preparation*

From the relationships between these variables listed above, Factor 1 was termed **internal preparedness** while Factor 2 was called **Proactive & authentication initiatives**

#### **7.3.4.1: Factor 1 - Internal preparedness**

Preparedness refers to a state of being ready. In this first factor, the critical internal activities and processes that assist the outsourcing organization's readiness for the strategic transition to the

outsourced relationship are discussed. The component variables as listed earlier address various aspect of the outsourcing project. Fundamental to this factor and phase is the situational assessment of the organization, involving the comprehensive analysis of its current target outbound value chain functions to determine level of performance and the associated costs for internal management. Greaver (1999) considers this important step as exploring strategic implications of the outsourcing decision. It will be helpful and serve as a veritable tool in the tenure of the relationship for evaluation of the deliverables of the contract. The process also involves the benchmarking of the functions and comparative analysis of various dimensions of the functions with external alternatives (Franceschini *et al.*, 2003; Sandhu *et al.*, 2018). The next activity in the internal preparedness factor is “the request for proposal”, RFP. In this study, this step/activity was ranked low. This is probably because of the form in which the activity was captured in the questionnaire – “advert for RFP”.

In Nigeria, except for some multinational and Foreign Donor organizations, not many organizations spend to advert for RFP. Instead, the outsourcing organizations use various means like professional groups, technical networks & associations, references, 3PL service providers’ websites and direct contacts to send out their RFPs. Howbeit, this is an activity that all the organizations conduct prior to the selection of their preferred service providers. Other activities listed in this factor address additional areas of internal situational assessment and checks (adequate due diligence & verification of listed references) effective and seamless migration to the new business architecture (developing a transition plan) and advanced measures to guarantee against future gaps in the relationship and to provide a business continuity plan in the event of a failure (developing a back-up plan and preparing an exit plans/provisions).

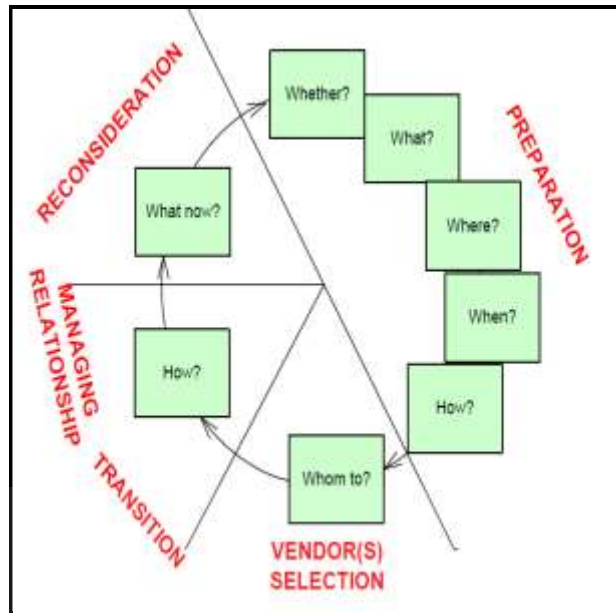


Figure 7. 1: Framework for the outsourcing process (Perunovic *et al.*, 2006)

Perunovic et al. (2006) provide a framework for outsourcing process where they refer to the pre-selection stage as “preparation”. As shown in Figure 7.1, the preparation stage sums the activities in five strategic questions they named whether? What? Where? When? and How?, with each question addressing the critical activity at this stage of the outsourcing process.

Perunovic and Perderson (2007) list the key activities at the preparation to include screening of potential vendors, the outsourced process configuration, drafting of service level agreement (SLA) and determining preferred length of the outsourcing contract. Strategic transitions like the outsourcing transition is a critical one which needs to be properly managed hence an activity like “developing a transition plan” is embedded in the pre-selection stage to ensure a seamless non-disruptive migration to the new business model of the organization.

#### 7.3.4.2: Factor 2 - Proactive & authentication initiatives

This second factor containing other pre-selection activities by the outsourcing organizations are various proactive steps taken to: ensure potential sources of failures are identified and a template for their remediation developed (developing critical proactive Corrective & Preventive Action (CAPA) plans); have a cordial and mutually-beneficial relationship (appointing a relationship manager). Furthermore, this factor helps in the verification of claims by the 3PL service provider in responding to the RFP (visiting 3PLs’ locations); confirm the firm’s *modus operandi*,

management, ownership structure and business continuity (corporate governance checks) and finally, to prepare the outsourcing contract with adequate provisions and clauses to accommodate various aspects of the future relationship and spell out obligations of both parties (developing service level agreement (SLA) and contract preparation). The preparation phase and the pre-selection activities help to design the future of the outsourcing relationship (Perunovic & Perderson, 2007) and to ensure that one of the strategic goals of outsourcing decision to be competitive is achieved (Sandhu *et al.*, 2018)

In a country like Nigeria with huge population and vast geography, visiting the 3PL locations is critical to confirming the capacity of the 3PL service provider to offer an advantage in the areas of lead-time reduction and reduced transportation costs that are distance-related (Sandhu *et al.*, 2018). As the complexity of the outbound pharmaceutical value chains grows, it is vital for these outsourcing organizations to authenticate the resources at the disposal of their potential service providers not only to achieve execution of routine services but also to design optimal and innovative solutions to the benefit of their customers (Flint *et al.*, 2005; Wallenburg *et al.*, 2010). These solutions go beyond the traditional tactical performance of efficiency and costs reduction to include capabilities to responding to the ever-changing dynamism in the operating environment (Zhang *et al.*, 2013).

The outsourcing contract is very critical in guiding the principles of the relationship and hence should reflect such components as the type, pricing, reward/penalty clauses and vital performance indicators and measures (Gunasekaran *et al.*, 2015). These terms and provisions are included in the contract to avoid future contractual disputes and relationship failures. Even though many criteria and pre-selection activities are and have been considered by the outsourcing organizations, over time and especially in the last decade, more attention has been focused on issues of performance pedigree, financial structure and control systems of the 3PL firms, thus providing a more robust framework for their assessment prior to engagement by the outsourcing organizations (Alkhatib *et al.*, 2015)



### **7.3.5: Challenges of outbound pharmaceutical value chain in Nigeria & its outsourcing (Q8)**

In this section, the results for the challenges of outbound pharmaceutical value chain and its outsourcing are discussed. Table 6.44 shows the mean item scores for the latent variables and their ranking. The ranking shows *road infrastructure* as the number 1 in the ranking, while *power infrastructure* is number 2, *Inadequate Policy & Regulation* is ranked number 3, while *Absence of competent 3PL Service Providers* is ranked number 4. Number 5 in the ranking is *Lack of skilled personnel*, while *Pilferages along the chain* sits as the last in the ranking at number 6. Two factors were extracted - **Factor 1** named **People & competency issues** comprising of *Lack of skilled personnel*, *pilferages along the chain* and *absence of competent 3rd Party Service Providers* & **Factor 2** named **infrastructural & regulatory inadequacies** and comprising *Power Infrastructure*, *road Infrastructure* and *inadequate Policy & Regulation*

#### **7.3.5.1: Factor 1 - People & competency issues**

The first factor of challenges to OPVC and its outsourcing in Nigeria is related to people issues. This factor, “people & competency issues” contains three latent variables - *Lack of skilled personnel*, *pilferages along the chain* and *absence of competent 3rd Party Service Providers*. Underlining every organization’s quest to undertake the strategic outsourcing of its OPVC is the desire to leverage on the specialized skills and knowledge of the 3PL service provider. (Zhang *et al.*, 2013). This skill-set and competencies are different from those deployed in traditional, tactical outsourcing (Ordoobadi, 2009). Studies have shown that these skills help in the competitiveness of the outsourcing organization (Ketchen & Hult, 2007; Brewer *et al.*, 2013) as the 3PL service provider’s expertise, managerial capabilities and competency are embedded in the knowledge and skill-set of its people (employees) deployed to manage the outsourced functions (Bhattacharya *et al.*, 2013). Lack of skills both in the outsourcing organization and the potential service provide is a critical challenge to the overall outsourcing process.

The skill gaps identified among the human resources of the outsourcing organization manifest as inability to evaluate and or manage the outsourced functions (El Mokrini *et al.*, 2016). Relationship management skills are also required during the tenure of the relationship. Pilferages along the value chain speaks of both process monitoring gap and sometimes, the integrity of the personnel involved in the handling of these products. Even though both the outsourcing organizations and their service providers have mitigating plans like stock and goods in transit

insurance policies to indemnify them against financial losses resulting from these unwholesome practices, the negative impact of non-availability of the medicine to treat the target customer (sick patient) is a worrisome outcome of treatment failures in the healthcare delivery system.

Absence of competent 3PL service providers as a challenge to outbound pharmaceutical supply chains in Nigeria relate to the country's infrastructural and industrial development. The 3PL Industry in Nigeria is still underdeveloped and dominated by some of the competent 3PL service providers like DHL & UPS who are multinational companies. The industry is very fragmented with many small privately-owned firms playing mostly in other sectors like Consumer Packaged Goods and Telecoms, where regulatory requirements are not as stringent as those obtainable in the Pharmaceutical industry. Other organized players like MDS Logistics (a partnership between UAC of Nigeria & Imperial Logistics of South Africa) are also prominent in the sector and in the last decade have been serving the sector. There is still however a gap of scale and competence in the 3PL sector in Nigeria.

#### **7.3.5.2: Factor 2 - Infrastructural & regulatory inadequacies**

This factor contains exogenous barriers and challenges facing the outbound pharmaceutical value chains and their outsourcing not just in Nigeria but across the sub-Saharan and other developing countries with poor infrastructure and regulatory structures. The latent variables in this factor - *Power Infrastructure, road Infrastructure and inadequate Policy & Regulation* have over the years impacted negatively on both the costs and efficiency of the value chains.

Pharmaceutical products are not just thermolabile, requiring special handling techniques, the facilities deployed in their management have high asset intensity, reflecting the ratio of the fixed asset to current assets involved (Hofmann & Lampe, 2013). Power supply is a very critical requirement for the handling of these products. Throughout the supply chain, steady and adequate power is very important in this highly-regulated sector. Nigeria like some most other sub-Saharan African countries still struggles with steady and adequate power supply. At national power output of 5,000 megawatts for its 180million citizens compared to South Africa, another African economy with an output of about 53,000 megawatts for its 57 million citizens, Nigeria is obviously “underpowered” with corresponding negative consequences to the industries generally and power-intensive sectors like the pharmaceutical in particular. This is particularly worrisome in the supply chains of pharmaceuticals where steady, uninterrupted electricity is required for the storage and

potency of thermolabile products like vaccines and antibiotics. The absence of a stable source of power also negatively affects certain aspects of the pharmaceutical supply chains especially the cold chains (Yakum *et al.*, 2015).

Nigeria has a very poor road infrastructure (Schürenberg-Frosch, 2014). Good road infrastructure is needed to accelerate enhance the management of the outbound pharmaceutical value chains and overall development of the country. Notwithstanding the efforts made and the various economic developmental strides and growth that have been recorded by the country, persistent infrastructure deficits still pose a number of challenges (Arewa, 2016). This infrastructural deficit has been acknowledged as a challenge to the management of OPVC and one of the most substantial structural barriers in the health systems of the country (Fowkes *et al.*, 2016; Ettah, 2017).

Delivering pharmaceutical products across these decrepit and sometimes, almost impossible to navigate roads, over hundreds of kilometer is an exogenous one which, far beyond the purview and control of the pharmaceutical companies continues to impact negatively on the efficiency of their outbound value chains. Included in this factor is another external challenge – that of inadequate policy/regulation and absence of competent 3PL service providers. The pharmaceutical sector is one of the most regulated sectors in any country, Nigeria inclusive, on account of the object (drugs) and subject (human) of the products. The most stringent requirements and standards are imposed on organizations involved in the handling of these products. Despite the foregoing, a lot of lapses exist in the regulatory framework of the sector. From policy formation and/or enforcement of existing policies and laws, gaps exist, which have been capitalized by unscrupulous elements who make merchandize of the system for their selfish, financial gains. In Nigeria and some other sub-Saharan African countries, Weak regulatory structure impact negatively on the pharmaceutical supply chains. Several of these national regulatory bodies and agencies in these countries lack adequate resources needed to control the origin and inflow of medicines being pushed into the outbound supply chains (Preston *et al.*, 2012). This is not only a challenge in itself, it also gives rise to a critical problem of poor quality medicines in the pharmaceutical supply chains (Giralt *et al.*, 2017). It has been reported that as high as 90% of national drug regulatory bodies in SSA are unable to effectively discharge their basic regulatory functions (Giralt *et al.*, 2017).

### 7.3.6: The desired outcomes of outsourcing

Table 6.51 shows the mean item scores for the latent variables and their ranking. The ranking shows *focus on core competency* as the number 1 in the ranking, while *reduced capital expenditure* is number 2, *cost advantage/benefit* is ranked number 3, while *improvement in customer service* is ranked number 4. Number 5 in the ranking is *efficiency*, while *speed & agility geographical representation*, and *market expansion* were ranked 6, 7 and 8 respectively. Number 9 is *reduced manpower*, while number 10 is *market share*. *Access to specialized skills* and *indigenous expertise* complete the ranking at numbers 11 and 12. The rotated component matrix shown in Table 6.56 shows two factors extracted as given below with the component latent variables:

**Factor 1:** *Improvement in Customer service, Speed & Agility, Efficiency, Geographical representation, market share, Access to Specialised skills, Indigenous expertise and Market expansion.*

**Factor 2:** *Cost advantage/benefit, reduced manpower, reduced capital expenditure and focus on core competency.* From the relationships between these variables listed above, Factor 1 was termed **marketplace dominance** while Factor 2 was called **operational efficiency**.

#### 7.3.6.1: Factor 1 - marketplace dominance

At the core of every organization's strategic decision to outsource its customer-facing process and functions like outbound value chains is a goal to achieve a desired outcome. In this study, the one of the factors for these desired outcomes has been named "marketplace dominance". The factor contains various latent variables that are requisite for a superior performance and interface in the marketplace vis-à-vis other similar players. The component latent variables - improvement in customer service, speed & agility, efficiency, geographical representation, market share, access to specialised skills, indigenous expertise and market expansion are all attributes closely linked to gaining a competitive advantage and dominance in the marketplace. Until recently, most pharmaceutical organizations, especially in the private sector channeled their efforts and resources at discovery and development of new "blockbuster" drugs, sales and marketing activities which expectedly, should bring superior performance and competitiveness to them. (Gollu, 2017). However, real and sustained competitive advantage and dominance requires products' access and availability to the patients which outbound value chain provides (Srai *et al.*, 2015; Gollu, 2017).

One of the ways to achieve marketplace dominance in the pharmaceutical industry is via sustained outbound value chain strategy as part of a larger supply strategy for sustainability in the overall organizational development (Cervera & Flores, 2012; Gonzalez-Loureiro *et al.*, 2015). This process is irreplicable by competitors and it is now the source of competitive advantage (Banerjee & Williams, 2009) in the ever-changing and intensely-competitive business environment. According to Slone (2004), competition between organizations has now moved from the traditional inter-organizational mode to between supply chains of the organizations. The strategic initiatives that organizations deploy to achieve competitive advantage including the outsourcing of their outbound value chains has been a key focus of studies in the strategic management field (Grimm *et al.*, 2015). Gaining marketplace dominance through the outsourcing of outbound value chains or other functions involves amongst others, risk sharing, relational strategies and the alignment of the various supply chain players (Gonzalez-Loureiro *et al.*, 2015).

Limited studies and extant literature exist in the field of marketplace dominance by pharmaceutical organizations. Few have focused on the structure and component determinants of agility of the pharmaceutical supply chains like speed, flexibility, competence (Gollu, 2017; Yu *et al.*, 2010; Mehralian *et al.*, 2015). Awe *et al.* (2018) report that there is no unanimity in studies on organizational performance and outsourcing as the results are still mixed. Both outsourcing organizations and 3PL service have realized that beyond providing efficiency in operations and the value chains, sources of marketplace dominance and sustained competitive advantage have transformed to unique value-adding managerial and technical capabilities (Banerjee & Williams, 2009).

### **7.3.6.2: Factor 2 - operational efficiency**

This second factor (operational efficiency) for the desired outcomes of outsourcing outbound value chains by pharmaceutical organizations contains latent variables which have proved to be vital in the quest by various organizations – both public and private sectors in entrenching efficiency in their operations. Operational efficiency is defined as “the difference between business inputs and the resulting outputs of goods and/or services” (Crumpton, 2013:21). In the present competitive business environment, operational excellence is a vital tool for any successful organization (Abbasi & Kaviani, 2016). According to Kanghwa (2010:138), “operational efficiency is what occurs when the right combination of people, process and technology come together to enhance the

productivity and value of any business operation, while driving down the cost of routine operations to a desired level”. Measuring the performance of the organization and the processes that impact on operational efficiency assists Managers in their definition of their overall business strategy. Many studies have been carried out which confirms outsourcing as one key strategy that organizations use to improve operational efficiency.

Outbound value chain functions like most other supply chain functions involve enormous financial and human resources, hence a decision to outsource these functions will correspondingly have a very significant implication on costs (Min, 2013). This value-adding decision frees resources that can be channeled to other core areas (Sanders & Locke, 2005). Outsourcing outbound value chain activities to 3PL providers with the requisite expertise has evolved over the years, providing organizations a viable means of focusing on their core competencies (Wang *et al.*, 2015). Supply chain is regarded as essential to improvements in organizational efficiency (Mathur *et al.*, 2018). To achieve the objective of outsourcing and operational efficiency in the face of keener competition and challenging business environment at a minimal cost, the efficient management of inventory, costs, human and other organizational resources is a pre-requisite (Mohanty *et al.*, 2018). In this study, the measures of operational efficiency are cost advantage/benefit, reduced manpower, reduced capital expenditure and focus on core competency.

#### **7.4: Overview of results from Delphi study & Quantitative survey**

In this study and as earlier explained in Chapter 4, a sequential mixed methodology was adopted, with the Delphi (qualitative) study preceding the quantitative survey. The results from both studies have been presented and discussed in Chapters 5 to 7. An overview of the results from both studies shows a congruity in the trend. In the scope and age of the outbound value chain functions outsourced, both studies show that Transportations was both the most frequently outsourced and the oldest among the five functions investigated. Satisfaction levels were above average with 60 – 80% levels obtained and following a similar trend. Rankings for the different variables listed in questionnaires questions showed also a similar trend. The five most critical variables as ranked from both studies for these variables are presented Tables 7.1 to 7.6

**Table 7. 1: Rationale for outsourcing**

<b>Function</b>	<b>Ranking</b>	
	<b>Delphi</b>	<b>Quantitative</b>
Focus on core competence	1	2
Cost savings	2	1
Improvement in Customer service	3	3
Flexibility	4	4
Lack of Capacity	5	7

**Table 7. 2: Critical criteria/factors for 3PL selection**

<b>Function</b>	<b>Ranking</b>	
	<b>Delphi</b>	<b>Quantitative</b>
Speed of service delivery	1	1
Service reliability	2	2
Operational flexibility	3	4
Pedigree/history of performance	4	5
Financial strength	5	6

**Table 7. 3: Critical risk factors for outsourcing**

<b>Function</b>	<b>Ranking</b>	
	<b>Delphi</b>	<b>Quantitative</b>
3PL Underperformance	1	1
Service levels not achieved	2	3
Corporate governance	3	12
Value misalignment	4	6
Loss of confidentiality	5	7

**Table 7. 4: Pre-selection activities**

<b>Function</b>	<b>Ranking</b>	
	<b>Delphi</b>	<b>Quantitative</b>
Analysing present costs of function(s)	1	2
Adequate due diligence	2	1
Visiting 3PLs' locations	3	9
Developing SLA	4	4
Contract preparation	5	5

**Table 7. 5: Challenges of outbound pharmaceutical value chain in Nigeria**

Function	Ranking	
	Delphi	Quantitative
Road Infrastructure	1	1
Power Infrastructure	2	2
Absence of competent 3PL providers	3	4
Inadequate Policy & Regulation	4	3
Lack of skilled personnel	5	5

**Table 7. 6: Desired Outcomes of outsourcing**

Function	Ranking	
	Delphi	Quantitative
Focus on core competency	1	1
Reduced Capital expenditure	2	2
Geographical representation	3	6
Speed & Agility	4	7
Improvement in Customer service	5	4

As shown in the six results presented in Tables 7.1 to 7.6, the quantitative study had a high degree of congruence with and validated the Delphi study.

### **7.5: Developing the framework for outsourcing outbound pharmaceutical value chain in Nigeria**

In the development of the frameworks for outsourcing process, capability & relationships in the pharmaceutical industry, many of the existing frameworks focus on one aspect of the industry – either the public or the private sector, even though application can be generalized and the principles applied. Another gap observed is the dearth of frameworks developed out of empirical studies in developing countries. This framework is proposed to fill these gaps by utilizing inputs from both sectors of the pharmaceutical industry in Nigeria in its development. It is developed for outsourcing outbound pharmaceutical value chains.



The model is presented below:

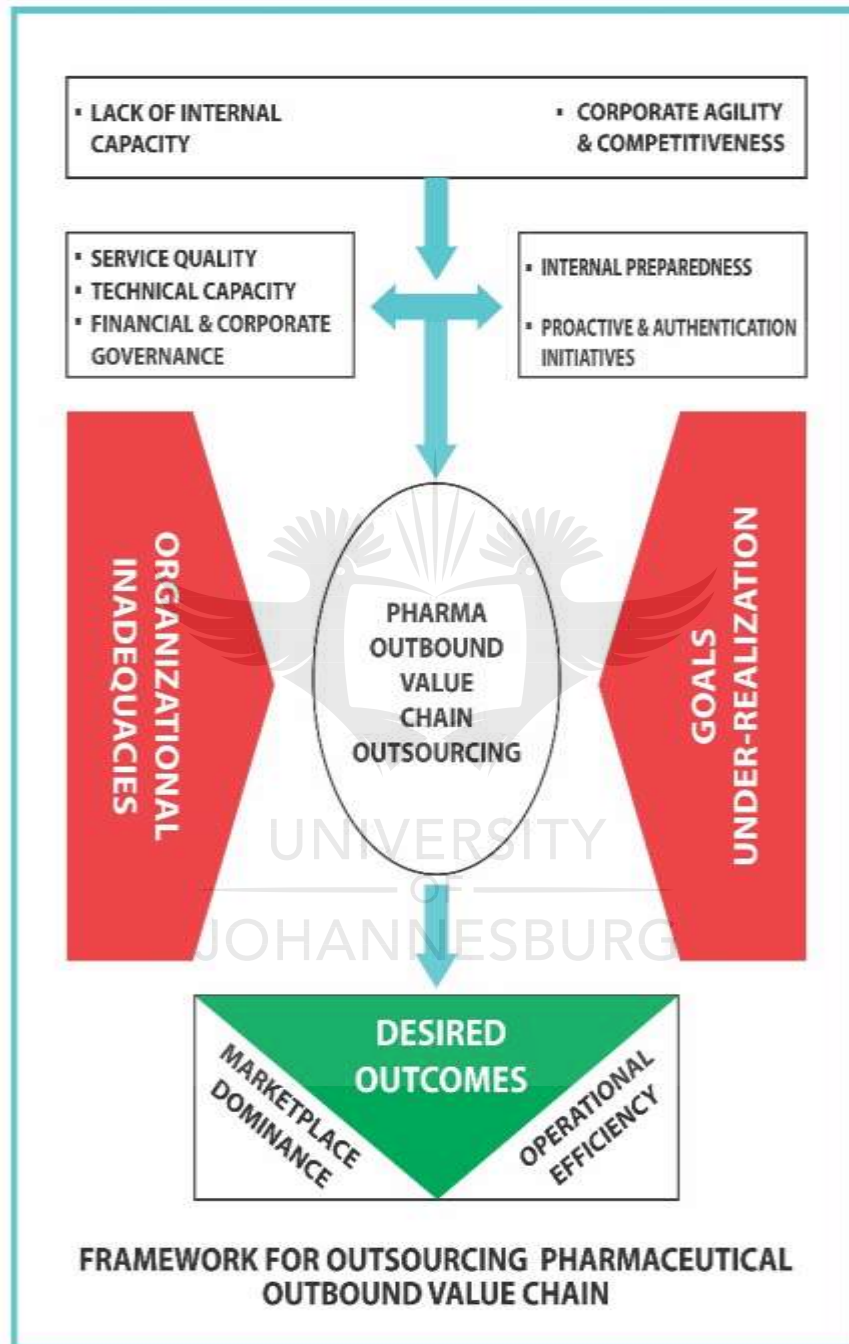


Figure 7. 2: Framework for outsourcing pharmaceutical outbound value chain in Nigeria (Author)

### 7.5.1: Components of the framework

The components of this framework are the various factors extracted from the quantitative survey results as have been extensively discussed in the earlier sections. This model is founded on the Porter's value chain theory/model with a focus on one of the primary activities of the model – outbound logistics.

As shown in Figure 7.2, the framework details the outsourcing process from the decision to outsource to the desired outcomes. The components are:

- 1. Lack of internal capacity & organizational agility and competitiveness:** These two components are the factors which explains the rationales influencing the outsourcing decision
- 2. Service quality, technical capacity and financial/corporate governance:** These three components are the factors which form the vital criteria used by the outsourcing organization to select the value chain service provider.
- 3. Internal preparedness and proactive and authentication initiatives:** These two are the factors which detail the pre-selection activities the organization engages in prior to the final selection of the service provider. They contain activities that confirm the readiness of both the outsourcing organization and validate the readiness and capability of the potential service provider. As shown in the framework, these activities are in dynamic equilibrium with the factors for selection criteria on account of the interconnectivity between the two sets of factors and processes
- 4. Organizational inadequacies and goals under-realization:** These are the critical risk factors that envelope the entire outsourcing process which the both involved parties involved in the outsourcing process, especially the outsourcer should proactively plan a mitigating strategies for.
- 5. Marketplace dominance and operational efficiency:** These two factors are the desired ultimate outcomes and deliverables of the outsourcing decision.

## **7.6: Conclusion**

In this chapter, the quantitative survey findings were discussed, leading to the extraction of 13 factors addressing various aspects of the outsourcing process. The comparative overview of the results of both quantitative survey and the Delphi study was done. It showed a lot of communalities between the two study methods used and hence one can conclude that the quantitative survey validated the Delphi study results. Finally, the factors extracted from the exploratory factor analysis (EFA) of the survey results were used to develop the framework for outsourcing pharmaceutical outbound value chains.



## Chapter 8

### CONCLUSION

#### 8.1: Introduction

The focus of this study was the Nigerian pharmaceutical supply chains management with emphasis on the outsourcing of the outbound value chains. In conducting the study, a review of literature on pharmaceutical supply chain management in Nigeria, overview of outsourcing and pharmaceutical supply chains was undertaken. In this chapter, the summary of the results of the study, vis-à-vis the research objectives is presented. Also included in this chapter, are the contributions, value of the study and recommendations for methodology, policy implications and practice. Finally, the recommendations for further studies and a final conclusion of the study are included in this chapter.

##### 8.1.1: Research objective RO1

This first objective was to study the extent (degree) of outsourcing of outbound value chain activities in the Nigerian pharmaceutical industry. The findings show that all five outbound value chain functions investigated – transportation, warehousing, distribution, cold chain and reverse logistics are outsourced to varying degree. The transport services (long-distance transportation & distribution) were outsourced to the highest degree while cold chain was least outsourced. Furthermore, it was observed that there has been a steady increase in the level of the outsourcing of these functions in the last decade. The trend observed in the study was generally in tandem with earlier studies in other economies and sectors.

##### 8.1.2: Research objective RO2

The second objective of this study was to investigate the rationale (reasons) for outsourcing outbound pharmaceutical value chains in Nigeria. In the study, latent variables identified from literature and some additional ones were investigated in both the Delphi and the quantitative studies. From the common ranking of these variables, the most significant rationales given by the responding organizations are: focus on core competence, cost savings, improvement in customer service, flexibility and lack of capacity. Furthermore, the factors as extracted from all the variables investigated are: **organizational agility & competitiveness** and **lack of internal capacity**. Most literature reports focus on core competence and costs reductions as the main reasons while organizations outsource their outbound value chains.

### **8.1.3: Research objective RO3**

This objective was to study the critical criteria for a successful selection and outsourcing relationship with a 3rd Party Service Provider in the Nigerian pharma industry. Of the 16 criteria investigated, the most critical ones identified by the study are: speed of service delivery, service reliability, operational flexibility, pedigree/history of performance and financial strength. Of interesting note is the topmost ranking accorded speed of service delivery. This is probably due to the vast geography of the country, the state of the road infrastructure since all but one (warehousing) of the outbound value chain functions studied are mobile services requiring one form of physical movement or the other. Three factors – service quality, technical capacity and financial & corporate governance were identified as the most critical criteria ones for the selection process. Furthermore, in this study and unlike what is reported by most other researches on the selection of 3PL services, a number of pre-selection activities engaged in by the outsourcing organizations were investigated. The most critical of these activities are: analyzing present costs of function(s), adequate due diligence, visiting 3PLs' locations, developing SLA and contract preparation. The factors identified are **internal preparedness & proactive and authentication initiatives**.

### **8.1.4: Research objective RO4**

Many previous studies have reported that at the core of every organization's decision to outsource its outbound value chain is to amongst others, to gain competitive advantage and focus on its core competencies. This objective was to identify the desired outcomes of outsourcing outbound pharmaceutical value chains in Nigeria and to confirm if the results of other studies were obtainable in the Nigerian setting. From this study, the desired outcomes of the outsourcing process by these organizations are: focus on core competency, reduced capital expenditure, geographical representation, speed & agility and improvement in customer service. This result confirms earlier studies and additionally, it was observed that the organizations focus greatly on the issues of reduced capital expenditure and geographical representation on account on the comparative higher cost capital, vast geography and challenging transport infrastructure in Nigeria which makes the issues more critical. From these variables, operational efficiency and marketplace dominance were the factors extracted and identified as the desired outcomes of the outsourcing decision by these organizations.

### **8.1.5: Research objective RO5**

The last objective of this study was to develop a framework for outsourcing and improvement of outbound value chain activities in the Nigerian pharmaceutical industry. Figure 7.2 shows the framework developed using the output factors extracted from the various latent variables associated with different aspect of the outsourcing process. The framework in itself and the summary of the recommendations of this study will be beneficial to the pharmaceutical industry in Nigeria in the area of outsourcing in particular and improvements in outbound value chains management in general.

## **8.2: Research Value and Contributions**

The contribution and value of this study theoretically, methodologically and practically are discussed in the section. The development of a conceptual framework for the outsourcing of outbound pharmaceutical value chain is a notable contribution of this study to the body of knowledge and the pharmaceutical industry.

### **8.2.1: Framework for outsourcing pharmaceutical outbound value chain in Nigeria**

The most outstanding contribution of this study is developing a framework for outsourcing pharmaceutical outbound value chains in Nigeria. As shown in Figure 7.2, this framework incorporates in it, different factors which are critical and associated with the outsourcing of pharmaceutical outbound value chains. It contains the factors (Lack of internal capacity & organizational agility and competitiveness) which explain the variable for assessing the rationale and decision to outsourcing. After this stage, the framework leads to the selection stage where three factors (service quality, technical capacity and financial/corporate governance) containing the criteria for selection, guide the selection process. These two factors are in sync and dynamism with two other factors (Service quality, technical capacity and financial/corporate governance) which govern the process of conducting a series of pre-selection activities which the outsourcing organization should engage in to confirm the status of the potential partner before the final sign-off. Before and during the contract, the framework illustrates two critical risk factors (Organizational inadequacies and goals under-realization). These are the murky waters/critical risk factors that envelope the entire outsourcing process which the both involved parties involved in the outsourcing process, especially the outsourcer should proactively plan a mitigating strategies

for. If well implemented, the framework leads to the desired outcomes of the entire outsourcing process. These positive outcomes are founded on two significant factors - Marketplace dominance and operational efficiency. The current study utilised a mixed method approach and extension of the value chain theory/model as developed by Porter (1985) as the underpinning model to investigate the outsourcing process and to develop the framework.

### **8.2.2: Theoretical contribution and value**

The results of the exploratory factor analysis confirm that the outsourcing of pharmaceutical outbound value chain is a 13-factor framework. From extensive literature, there is no evidence of any similar study conducted in the pharmaceutical industry of Nigeria. Although many latent variables are involved in the entire outsourcing process, this study is significant in providing the theoretical information about the most critical factors involved in each of the stages involved in the outsourcing processes. The place of latent variables like financial measures, pre-selection validation activities, geography and infrastructure which are prominent factors in the Nigeria setting will provide additional theoretical information about outsourcing processes in similar developing countries.

### **8.2.3: Methodological contribution and value**

Many studies on outsourcing generally and on logistics and SC management in the Nigerian pharmaceutical industry in particular have been either theoretical, single-method or single-sector approach. There is no evidence of any study that has used empirical, mixed-method and both sector approach in its methodology as has been used in this study. This novel approach therefore will be a useful basis for other similar studies in and beyond the pharmaceutical industry in Nigeria and other countries with similar socio-economic features as Nigeria. The approach used in this study will be a useful contribution to logistics and SC management researches in Nigeria.

### **8.2.4: Practical contribution and value**

Outsourcing in the pharmaceutical industry in Nigeria is still a relatively new and growing practice. Given the nature of products handled in the outbound value chain and the myriad of infrastructural and systemic challenges confronting the sector, any outsourcing decision needs to be critically examined and carefully taken. The developed framework will be useful in providing management of organizations, a handy tool in taking the outsourcing decision.

### **8.3: Recommendations**

The recommendations from this study as they relate to the methodology, policy implications and SC management and outsourcing practices are given in the next sections.

#### **8.3.1: Methodological**

It is recommended that the mixed method design used in this study be used in studies in supply chain management in Nigeria as opposed to the mostly-used current practice of a single methodology. The use of Delphi method in the highly technical and regulated industry like the Pharmaceutical is also encouraged and recommended. Conducting a similar study for other regions in Nigeria and other SSA is further recommended.

#### **8.3.2: Policy implications**

As has been reported in previous studies and confirmed by the contribution of the Delphi panelists used in this study, the pharmaceutical supply system in Nigeria is both chaotic and unorganized with a lot of regulatory and policy gaps giving rise to unprofessional practices. The current drug distribution system needs to be sanitized with long lasting solutions involving amongst others, the enforcement of the National Drug Distribution policy and provision of enabling infrastructure & environment for professionalism in the supply system of the pharmaceutical industry. The public pharmaceutical sector needs to adopt the use of carefully-implemented outsourcing strategies to improve the outbound value chain management of products from centrally stored locations.

#### **8.3.3: Practice**

In practice, the outcomes from a strategic outsourcing decision may not always be desirable and positive. It is recommended that any organization considering the outsourcing of its outbound value chain or any of its non-core functions and activities, conducts a comprehensive internal situational analysis. The determination of the organization's core and non-core activities, and benchmarking them in terms of costs, scope and efficiency is critical for this analysis. Also recommended is a thorough and objective process for service providers' selection using relevant criteria and pre-selection activities. A well-managed transition involving a focal or relationship manager will be a vital requirement for a seamless transition to an outsourced relationship. The development of a mitigation strategies for the identified outsourcing risks, back-up and CAPA (corrective and preventive action) plans is recommended for a successful outsourcing relationship.



## **8.4: Limitations**

This study was conducted in Lagos, one of the 36 states in Nigeria. Even though it is the industrial hub of the country and was sufficient for the study, it would have been better if the scope of the study was expanded to include other States like the South Western States in the same geo-political region as Lagos. The absence of an embedded design to simultaneously compare both sectors of the pharmaceutical industry with its consequent useful insights is another limitation. Finally, another limitation is the size of the sample used. Notwithstanding that the quantitative sample size of 100 was cross-sectional and adequate, a larger sample would have been more desirable, as with most empirical studies involving sampling from a population. Despite these limitations, this study has produced some outcomes that will be significant in the academia, strategic outsourcing policy development/management and the pharmaceutical industry at large.

## **8.5: Further research suggestions**

The following are the areas identified and recommended for further research:

- A study to investigate the various aspects of the outsourcing relationships like scope of services, challenges of service delivery and 3PL contracts is recommended. Many researches that have been carried out in the field of outsourcing have been conducted from the viewpoint of the outsourcing organizations. Only few researches have been conducted from the perspective of the service provider. Case studies to investigate experiences of some selected organizations who have had outsourced relationships in the last decade in the pharmaceutical industry need to be carried.
- A replica of this study needs to be conducted in other sectors and industries of the country, besides the pharmaceutical industry.
- A similar study on the inbound value chain will be useful in gaining more insight into the outsourcing practices by these organizations. The outbound value chain was the focus of this study.

## **8.6: Conclusion**

In this study, the pharmaceutical supply chains management in Nigeria with emphasis on the outsourcing of the outbound value chains was investigated. In conducting the study, an extensive review of literature on pharmaceutical SC management in Nigeria, overview of outsourcing in

general and pharmaceutical SC in particular was undertaken. A sequential exploratory mixed method approach with Delphi study preceding a quantitative survey was adopted. The findings of quantitative survey were in congruence with the Delphi study, with exploratory factor analysis used in extracting factors which served as the inputs for the development of the conceptual framework for the outsourcing of outbound pharmaceutical value chains. Valuable contributions to knowledge, research methodology and policies have been made from the results of this study. The framework developed for the outsourcing of the outbound value chains will be a valuable tool for policy and decision makers in the pharmaceutical industry in Nigeria and other resource-poor countries.



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## APPENDICES

### Appendix A: Delphi Study (Qualitative) Questionnaire

#### INVITATION TO PARTICIPATE IN A STUDY



April 23, 2018

Dear Sir/Ma,

Solomon Aigbavboa is registered for a Ph.D. in the Department of Quality & Operations Management at the University of Johannesburg under the supervision of Prof Charles Mbohwa

The area of his research is on **PHARMACEUTICAL SUPPLY CHAINS IN NIGERIA: FRAMEWORK FOR OUTSOURCING OUTBOUND VALUE CHAINS**. He requires the participation of experts in the field in the technique (Delphi) he will be adopting. Your consent to participate will be highly appreciated.

Yours sincerely,

**Prof. Charles Mbohwa**

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## BACKGROUND INFORMATION

### The Delphi Method

You have been asked to participate in the Delphi process for a doctoral study on PHARMACEUTICAL SUPPLY CHAINS IN NIGERIA: A FRAMEWORK FOR OUTSOURCING OUTBOUND VALUE CHAINS. The goal of this project is to study the outbound value chains of the Nigerian pharmaceutical sector with a view to identifying the extent, role of, and framework for outsourcing these distribution activities and to consider future improvement practices.

### DELPHI SURVEY – ROUND 1

#### SECTION A – PRELIMINARY INFORMATION

Kindly answer by marking “X”

1. Which of the following is your organization’s main status?

Category	Mark “X”
Multinational Manufacturing	
Overseas’ Manufacturer’s Representative	
Indigenous Manufacturer	
Importer/Distributor	
State Pharmaceutical Services	
Local Govt Pharmaceutical Services	
Large Pharmacy Chain	

2. Which of the following does your Organization manufacture, import, distribute or store?

Category	Mark “X”
Over the Counter Products	
Ethical/Prescription Drugs	
Vaccines	

3. Indicate No. of employees & level of annual turnover or value of drugs handled (N’m/b)

No. of employees & level of annual turnover(N’m/b)	Less than 50	51-200	201-500	501-1000	1001-5000	More than 5000
Less than N100m						

N100-500m							
N501m-N1b							
N1– N5b per annum							
More than N5b per annum							

**SECTION B – DELPHI SURVEY – ROUND 1**

**Q1. DEGREE OF OUTSOURCING:** To identify the level of outbound supply chain outsourcing in the last decade

Functions	CODE	What is the <b>level</b> of the listed outbound supply chain functions have you outsourced in the last <b>10 years</b> ? (1=low level, 10=high level)									
		1	2	3	4	5	6	7	8	9	10
Transportation	Q1.1										
Warehousing	Q1.2										
Distribution	Q1.3										
Cold Chain	Q1.4										
Reverse Logistics	Q1.5										



**Q2. SATISFACTION LEVEL:** To identify level of satisfaction from the outbound supply chain functions currently being outsourced

Functions	CODE	What is the <b>level</b> of satisfaction you currently achieve from outsourcing the listed outbound supply chain functions?									
		1	2	3	4	5	6	7	8	9	10
Transportation	Q2.1										
Warehousing	Q2.2										
Distribution	Q2.3										

Cold Chain	Q2.4											
Reverse Logistics	Q2.5											

**Q3. AGE OF OUTSOURCING RELATIONSHIP:** This is to determine the age of the outsourcing relationships

Functions	CODE	How long have you outsourced the following outbound supply chain functions? (indicate in the age brackets provided below)											
		Age of relationship (years)											
		1	2	3	4	5	6	7	8	9	10	Others	
Transportation	Q3.1												
Warehousing	Q3.2												
Distribution	Q3.3												
Cold Chain	Q3.4												
Reverse Logistics	Q3.5												

**Q4. RATIONALE OF OUTSOURCING:** To identify the main factors influencing the decision to outsource your outbound supply chains

Factors	CODE	What is the <b>influence</b> of the following factors in the decision to outsource your outbound supply chains? (1=low influence, 10=high influence)											
		1	2	3	4	5	6	7	8	9	10		
Cost savings	Q4.1												
Industry best practice	Q4.2												
Technological advancement	Q4.3												
Flexibility	Q4.4												
Lack of Capacity	Q4.5												
Focus on core competence	Q4.6												
Corporate Strategy	Q4.7												
Access to Specialised skills	Q4.8												
Transfer of risks to 3PL	Q4.9												
Lack of in-house expertise	Q4.10												

Market expansion	Q4.11													
Improvement in Customer service	Q4.12													

**Q5. CRITICAL 3PL SELECTION FACTORS:** This refers to the factors that are critical to a successful selection and relationship with a 3<sup>rd</sup> Party Service Provider

Factors	CODE	What is the <b>Impact</b> of each of the listed factors in determining the selection and successful relationship with 3PL provider?												
		1	2	3	4	5	6	7	8	9	10			
National/geographical spread	Q5.1													
Innovation	Q5.2													
Organizational culture	Q5.3													
Customer orientation	Q5.4													
Service reliability	Q5.5													
Financial strength	Q5.6													
Operational flexibility	Q5.7													
Pedigree/history of performance	Q5.8													
Stable industrial relations	Q5.9													
Corporate values	Q5.10													
Availability of latest ICT tools	Q5.11													
Quality policies and procedures	Q5.12													
Management structure & expertise	Q5.13													
Speed of service delivery	Q5.14													
Flexible payment regimen	Q5.15													
Indemnity	Q5.16													

**Q5. CRITICAL RISK FACTORS:** This refers to the underlying risk factors in the outsourcing relationship

Factors	CODE	What is the <b>Level</b> of potential risk that each of the listed factors presents in your outsourcing relationship? (1=very low, 10=very high)												
		1	2	3	4	5	6	7	8	9	10			

3PL Underperformance	Q6.1																		
Loss of control of outsourced function	Q6.2																		
Loss of expertise	Q6.3																		
Hidden costs	Q6.4																		
Corporate governance	Q6.5																		
Vendor employee turnover	Q6.6																		
Undertrained vendor's employees	Q6.7																		
Obsolete Technology	Q6.8																		
Loss of confidentiality	Q6.9																		
Internal HR issues	Q6.10																		
Cost reduction not realised	Q6.11																		
Service levels not achieved	Q6.12																		
Loss of flexibility	Q6.13																		
No continuous improvement by 3PL	Q6.14																		
Value misalignment	Q6.15																		

**Q7. PRE-SELECTION ACTIVITIES:** This refers to the vital pre-engagement activities by the outsourcing organization

Factors	CODE	To what <b>Extent</b> do you engage in the following pre-selection activities? (1=very low, 10=very high)																		
		1	2	3	4	5	6	7	8	9	10									
Analysing present costs of function(s)	Q7.1																			
Adequate due diligence	Q7.2																			
Advertising a Request for proposal (RFP)	Q7.3																			
Engaging present clients of potential 3PL partner	Q7.4																			
Verification of listed references	Q7.5																			
Developing service levels agreement (SLA)	Q7.6																			

Preparing an exit plans/provisions	Q7.7													
Developing a transition plan	Q7.8													
Developing a back-up plan	Q7.9													
Contract negotiation	Q7.10													
Contract preparation	Q7.11													
Visiting 3PLs' locations	Q7.12													
Corporate governance checks	Q7.13													
Appointing a relationship manager	Q7.14													
Developing critical proactive Corrective And Preventive Action (CAPA) plans	Q7.15													

**Q8. CHALLENGES OF THE OUTBOUND VALUE CHAIN:** This refers to the present challenges in the pharmaceutical outbound value chains and their outsourcing

Factors	CODE	How do you rate the <b>impact</b> of each of the listed factors on your outbound supply chains? (1= low, 10=very high)												
		1	2	3	4	5	6	7	8	9	10			
Road Infrastructure	Q8.1													
Power Infrastructure	Q8.2													
Inadequate Policy & Regulation	Q8.3													
Absence of competent 3 <sup>rd</sup> Party Service Providers	Q8.4													
Lack of skilled personnel	Q8.5													
Pilferages along the chain	Q8.6													

**Q9. DESIRED OUTCOMES OF OUTSOURCING:** To identify the desired outcomes of outsourcing your outbound value chains

Role	CODE	To what extent have the following benefits accrued to your organization following the decision to outsource your outbound supply chains? (1=low, 10=high)												
		1	2	3	4	5	6	7	8	9	10			
Cost advantage/benefit	Q9.1													
Reduced manpower	Q9.2													

Focus on core competency	Q9.3													
Reduced Capital expenditure	Q9.4													
Geographical representation	Q9.5													
Efficiency	Q9.6													
Access to Specialised skills	Q9.7													
Market expansion	Q9.8													
Improvement in Customer service	Q9.9													
Speed & Agility	Q9.10													
Market share	Q9.11													
Indigenous expertise	Q9.12													

**Q10.** What do you envisage will be the future pivotal context of the pharmaceutical distribution in Nigeria?

**Q11.** What are the critical issues facing pharmaceutical outbound supply chains and their outsourcing that have been omitted from the questions above.

#### PERSONAL INFORMATION

<b>Title</b>	
<b>Qualification</b>	
<b>Specialisation</b>	
<b>Years of experience</b> (pharma management etc.)	
<b>Current employer</b>	
<b>Position</b>	

Thank you for completing this survey.

Should you have any questions relating to this study, please contact me or my supervisor, **Professor Charles Mbohwa**.

Thank you.

**Solomon Aigbavboa. B.Pharm., M.Sc., MBA.**

Ph.D. Student, Dept. of Quality & Operations Management  
University of Johannesburg, South Africa

## Appendix B: Quantitative Questionnaire

### INVITATION TO PARTICIPATE IN A QUANTITATIVE SURVEY



Dear Sir/Ma,

August 20, 2018

#### LETTER OF INVITATION FOR RESEARCH SURVEY

I am registered Ph.D. student in the Department of Quality & Operations Management at the University of Johannesburg under the supervision of Prof Charles Mbohwa.

The area of my research is: **PHARMACEUTICAL SUPPLY CHAINS IN NIGERIA: A FRAMEWORK FOR OUTSOURCING OUTBOUND VALUE CHAINS.**

I humbly request your assistance in completing the following questionnaire which will take approximately **15 minutes**.

Should you have any questions relating to this study, please contact me or my supervisor, **Professor Charles Mbohwa**.

Thanking you in advance

**Solomon Aigbavboa. B.Pharm., M.Sc., MBA.**

Ph.D. Student, Dept. of Quality & Operations Management  
University of Johannesburg, South Africa



**QUESTIONNAIRE ON: PHARMACEUTICAL SUPPLY CHAINS IN NIGERIA: FRAMEWORK FOR OUTSOURCING OUTBOUND VALUE CHAINS.**

**SECTION A – PRELIMINARY INFORMATION**

*Please answer by marking “X”*

1. Which of the following is your organization’s main status?

Category	Mark “X”
Multinational Manufacturing	
Overseas’ Manufacturer’s Representative	
Indigenous Manufacturer	
Importer/Distributor	
State Pharmaceutical Services	
Local Govt Pharmaceutical Services	
Large Pharmacy Chain	

2. Which of the following does your Organization manufacture, import, distribute or store?

Category	Mark “X”
Over the Counter Products	
Ethical/Prescription Drugs	
Vaccines	

4. Indicate No. of employees & level of annual turnover or value of drugs handled (N’m/b)

No. of employees & level of annual turnover(N’m/b)	Less than 50	51-200	201-500	501-1000	1001-5000	More than 5000
Less than N100m						
N100-500m						
N501m-N1b						
N1– N5b per annum						
More than N5b per annum						

## SECTION B - QUESTIONNAIRE

**Q1. DEGREE OF OUTSOURCING:** What is the level of the listed outbound supply chain functions have you outsourced in the last **10 years**? (1=low level, 5=high level)

Functions	CODE	Degree of outsourcing				
		1	2	3	4	5
Transportation	Q1.1					
Warehousing	Q1.2					
Distribution	Q1.3					
Cold Chain	Q1.4					
Reverse Logistics	Q1.5					

**Q2. AGE OF OUTSOURCING RELATIONSHIP:** How long have you outsourced the following outbound supply chain functions? (indicate in the age brackets provided below)

Functions	CODE	Age of relationship (years)				
		1 - 3	4 - 6	7 - 9	10 - 12	>12
Transportation	Q2.1					
Warehousing	Q2.2					
Distribution	Q2.3					
Cold Chain	Q2.4					
Reverse Logistics	Q2.5					

**Q3. SATISFACTION LEVEL:** What is the level of satisfaction you currently achieve from outsourcing the listed outbound supply chain functions? (1=low satisfaction, 5=high satisfaction)

Functions	CODE	Level of satisfaction				
		1	2	3	4	5
Transportation	Q3.1					
Warehousing	Q3.2					
Distribution	Q3.3					
Cold Chain	Q3.4					
Reverse Logistics	Q3.5					

**Q4. RATIONALE OF OUTSOURCING:** What is the **influence** of the following factors in the decision to outsource your outbound supply chains? (1=low influence, 5=high influence)

Factors	CODE	Level of influence				
		1	2	3	4	5
Cost savings	Q4.1					
Industry best practice	Q4.2					
Technological advancement	Q4.3					
Flexibility	Q4.4					
Lack of Capacity	Q4.5					
Focus on core competence	Q4.6					
Corporate Strategy	Q4.7					
Access to Specialised skills	Q4.8					
Transfer of risks to 3 <sup>rd</sup> Party	Q4.9					
Lack of in-house expertise	Q4.10					
Market expansion	Q4.11					
Improvement in Customer service	Q4.12					

**Q5. CRITICAL 3PL SELECTION FACTORS:** What is the **Impact** of each of the listed factors in determining a successful selection & outsourcing relationship with a 3PL Provider? (1=not critical, 5=very critical)

Factors	CODE	Level of impact				
		1	2	3	4	5
National/geographical spread	Q5.1					
Innovation	Q5.2					
Organizational culture	Q5.3					
Customer orientation	Q5.4					
Service reliability	Q5.5					
Financial strength	Q5.6					
Operational flexibility	Q5.7					
Pedigree/history of performance	Q5.8					
Stable industrial relations	Q5.9					
Corporate values	Q5.10					

Availability of latest ICT tools	Q5.11					
Quality policies and procedures	Q5.12					
Management structure & expertise	Q5.13					
Speed of service delivery	Q5.14					
Flexible payment regimen	Q5.15					
Indemnity	Q5.16					

**Q6. CRITICAL RISK FACTORS:** What is the **Level** of potential risk that each of the listed factors presents in your outsourcing relationship? (1=very low, 5=very high)

Factors	CODE	Risk level				
		1	2	3	4	5
3PL (3 <sup>rd</sup> Party) Underperformance	Q6.1					
Loss of control of outsourced function	Q6.2					
Loss of expertise	Q6.3					
Hidden costs	Q6.4					
Corporate governance	Q6.5					
Vendor employee turnover	Q6.6					
Undertrained vendor's employees	Q6.7					
Obsolete Technology	Q6.8					
Loss of confidentiality	Q6.9					
Internal HR issues	Q6.10					
Cost reduction not realised	Q6.11					
Service levels not achieved	Q6.12					
Loss of flexibility	Q6.13					
No continuous improvement by 3PL (3 <sup>rd</sup> Party Logistics) Provider	Q6.14					
Value misalignment	Q6.15					

**Q7. PRE-SELECTION ACTIVITIES:** To what **Extent** do you engage in the following pre-selection activities?  
(1=very low, 5=very high)

Factors	CODE	Extent				
		1	2	3	4	5
Analysing present costs of function(s)	Q7.1					
Adequate due diligence	Q7.2					
Advertising a Request for proposal (RFP)	Q7.3					
Engaging present clients of potential 3PL partner	Q7.4					
Verification of listed references	Q7.5					
Developing service levels agreement (SLA)	Q7.6					
Preparing an exit plans/provisions	Q7.7					
Developing a transition plan	Q7.8					
Developing a back-up plan	Q7.9					
Contract negotiation	Q7.10					
Contract preparation	Q7.11					
Visiting 3PLs' locations	Q7.12					
Corporate governance checks	Q7.13					
Appointing a relationship manager	Q7.14					
Developing critical proactive Corrective And Preventive Action (CAPA) plans	Q7.15					

**Q8. CHALLENGES OF THE OUTBOUND VALUE CHAIN:** How do you rate the impact of each of the listed challenges on your outbound supply chains? (1= low, 5=very high)

Factors	CODE	Impact level				
		1	2	3	4	5
Road Infrastructure	Q8.1					
Power Infrastructure	Q8.2					
Inadequate Policy & Regulation	Q8.3					

Absence of competent 3 <sup>rd</sup> Party Service Providers	Q8.4					
Lack of skilled personnel	Q8.5					
Pilferages along the chain	Q8.6					

**Q9. DESIRED OUTCOMES OF OUTSOURCING:** To identify the desired outcomes of outsourcing your outbound value chains (1=low, 5=high)

Role	CODE	Extent of benefits				
		1	2	3	4	5
Cost advantage/benefit	Q9.1					
Reduced manpower	Q9.2					
Focus on core competency	Q9.3					
Reduced Capital expenditure	Q9.4					
Geographical representation	Q9.5					
Efficiency	Q9.6					
Access to Specialised skills	Q9.7					
Market expansion	Q9.8					
Improvement in Customer service	Q9.9					
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<b>Position</b>	

Thank you for completing this survey.

Should you have any questions relating to this study, please contact me or my supervisor, **Professor Charles Mbohwa**.

**Prof. Charles Mbohwa**

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