ADDIS ABABA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

SCHOOL OF COMMERCE

DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT

Assessment of Pharmaceutical Supply Chain Performance: The Case of Tikur Anbessa Specialized Hospital

By

Adafir Tadesse Woubshet ……ID GSE/6759/14

Advisor: Matiwos Ensermu (PhD)

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Addis Ababa, Ethiopia

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DEPARTMENT OF LOGISTICS & SUPPLY CHAIN MANAGEMENT

A thesis submitted to Addis Ababa University, School of Commerce, in partial fulfillment of the requirement of the degree of master in logistics and supply chain management

BY

Adafir Tadesse…….. GSE/6759/14

Advisor: Matiwos Ensermu (PhD)

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Addis Ababa, Ethiopia

Declaration

This thesis, "Assessment of Pharmaceutical Supply Chain Performance in the Case of Tikur Anbessa Specialized Hospital," was done under Matiwos Ensermu's (PhD) supervision. It is my original work to fulfill the requirement for a master's degree in logistics and supply chain management. So, this thesis is not submitted to other universities or institutions.

Investigator's Name ----------

Date ---------- signature ----------

Statement of Certification

This is to certify that Adafir Tadesse's thesis on the topic of "Assessment of Pharmaceutical Supply Chain Performance in the Case of Tikur Anbessa Specialized Hospital" is his original work and is eligible for submission for a Master of Arts Degree in Logistics and Supply Chain Management.

Advisor

Matiwos Ensermu (PhD)

Signature …….Date……..

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DEPARTMENT OF LOGISTICS & SUPPLY CHAIN MANAGEMENT

This is to certify that the thesis entitled, "Assessment of Pharmaceuticals Supply Chain Performance: A Case of Tikur Anbessa Specialized Hospital" submitted in partial fulfillment of the requirements for the degree of Master of Logistics and Supply Chain Management, the Graduate Program of the Department of Logistics and Supply Chain Management, and has been carried out by Adafir Tadesse under the advisor of Matiwos Ensermu (PhD). Therefore, we recommend that the student has fulfilled the requirements and hence at this moment can submit the thesis to the Department of Logistics and Supply Chain Management.

Verified by the board of examiners

Matiwos Ensermu (PhD)

Advisor

Signature: ---------- Date: ----------

Examiners

Tariku Jebena (PhD)

Internal examiner

Signature ---------- Date ----------

Abera (PhD)

External examiner

Signature ---------- Date----------

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List of Acronyms

AAU-Addis Ababa University

APTS-- Auditable Pharmaceutical Transaction and Service

CHS-College of Health Science

EFMHACA- Ethiopian Food, Medicines, Healthcare Administration and Control Authority

EPDA---Ethiopian Pharmaceutical and Drug Authority

EPSA--Ethiopian Pharmaceutical Supply Agency

FMOH--Federal Minister of Health

IFRR—Internal Facility Report and Resupply Form

IPLS-- Integrated Pharmaceutical Logistics System

LMIS--Logistics Management and Information System

MDG---Millennium Development Goal

PFSA--Pharmaceutical Fund and Supply Agency

PSC---Pharmaceutical Supply Chain

RRF---Report Requisition form

SC---Supply Chain

SCM---Supply Chain Management

SCP---Supply Chain Performance

SCPM--Supply Chain Performance Management

SPSS---Statistical Package for Social Science

Std. /SD-standard deviation

TASH-Tikur Anbesa Specialized Hospital

USAID--United States Agency for International Development

WHO---World Health Organization

Abstract

PSC is a critical component of healthcare institutions that diagnose, treat, and prevent disease. Health institutions that lack a pharmaceutical supply chain and effective supply management fail to promote societal well-being and health. This study aims to examine Tikur Anbessa Specialized Hospital's pharmaceutical supply chain performance in terms of responsiveness, reliability, flexibility, cost, and management efficiency.

From April 20 to May 20, 2024, 55 pharmacy personnel at Tikur Anbessa Specialized Hospital participated in the study, which used a cross-sectional descriptive design. The study employed a mixed research strategy. Because of the hospital's small target population, it was chosen to adopt a census method to gather insight into pharmaceutical supply chain performance. To maintain the confidentiality of the respondents' data, the subjects were assured that their responses would be used only for the research study and would be treated strictly confidentially by an institutional cooperative letter from the School of Commerce to the Tikur Anbessa specialized hospital. The data were gathered using self-administered questionnaires distributed to pharmacy personnel and interviews with key informants. The observation was along with data collection. The data was analyzed using SPSS version 21.

Based on findings on documentation practice, the hospital had properly documented, reported and requested pharmaceutical supply chain rather than trained the employees before giving service about the documentation format. However, the study showed an overblowing gap in that the hospital didn’t evaluate its customers' (patients) satisfaction and saw complain. On the other side, the hospital couldn’t properly manage the pharmaceutical asset and optimize assets. Results also revealed that the hospital supply chain performance average mean values were 2.96 with respect to responsiveness, 2.43 in cost, 2.55 in reliability, and 3.60 in asset management, and the hospital didn’t allow private procurement to compensate for the shortage of pharmaceutical products. From the findings, we can conclude that the performance of the pharmaceutical supply chain was good in terms of reliability and cost, moderate in terms of responsiveness, low in terms of asset management, and not agile in the procurement of pharmaceutical products. It recommended that the hospital will work the weakness side its performance and gaps.

Keywords: pharmaceutical supply chain, health SC, supply chain performance

CHAPTER ONE: INTRODUCTION

1.1 Background of the study

The supply chain is the network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hands of the ultimate end user (Chandra and John, 2016). A supply chain consists of all parties involved in fulfilling a customer request. The supply chain includes the manufacturer, suppliers, transporters, warehouses, retailers, and clients. Within each organization, such as a manufacturer, the supply chain includes all functions involved in receiving and filling a customer's need. The supply chain functions include, but are not limited to, new product development, marketing, operations, distribution, finance, and customer service (Chopra & Meindl, 2016).

One of the main issues with supply chain management (SCM) is performance measurement. Supply chain performance cannot be controlled without standard measurement. Supply chain performance measurement (SCPM) has become a main component of the establishment of a tangible plan and a catalyst for increased corporate productivity. Therefore, to build up strategic objectives, assess organizational performance, and effectively manage the organization's future goals and activities, it is imperative to establish the appropriate performance metrics and measurement system (Kyung, 2014).

Nowadays, supply chain performance measurement (SCPM) is an integral part of supply chain management, which makes many critical contributions to supply chains, especially for companies and supply chains to identify potential problems and improvement fields, evaluate the efficiency and effectiveness of processes, and enhance the wellbeing and success of supply chains (Özkanlısoy & Bulutlar, 2023).

Every facet of healthcare supply chain management (SCM) as it is implemented in various hospitals today is covered using a practical and comprehensive approach. This includes a review of numerous research articles, historical market surveys, and hospital trends. Healthcare is the continuing maintenance of human’s physical and mental health by preventing, diagnosing, and treating diseases. Logistics in the healthcare industry include pharmaceutical, medical, and surgical supplies, as well as gadgets and other goods required by healthcare professionals such as doctors, nurses, and administrative staff make up the logistics in the

healthcare industry. Timeliness, accuracy, and favorable outcomes are critical components in the healthcare industry (Heinbuch, 1995).

According to Smith (2011), the pharmaceutical supply chain (PSC) refers to the operations involved in pharmaceutical production and product delivery to patients via a supply chain management system. The activities involve acquiring raw materials, manufacturing, transportation, inventory, and delivery to the ultimate user (patients). The supply chain includes four major components: manufacturers, purchasers, providers, and patients.

There are various methods for dissecting supply chains and assessing their performance. As Dowling (2011) stated, two methods were employed to set up frameworks for analyzing the features of supply chains for the pharmaceutical sector: the first involved examining the functions of the chain, and the second involved examining the ideal traits of supply chains that operate properly. The supply chains of rich countries and low- and middle-income countries differ greatly from one another. It is important to remember that supply chains in rich and low-income nations are entirely different in terms of structure and funding.

The United States supply chain can be characterized by a high degree of automation and technological use, excellent availability performance, lean inventory levels (stock levels measured in days), high levels of efficiency, daily or even more frequent deliveries, a growing emphasis on security and quality assurance, and a high level of private sector (commercial) participation. Regarding stock levels and other details, there is a high level of visibility. The medical supply chain in the United States is well-resourced, typically has enough inventory to satisfy demand, and is largely run by the commercial sector either directly or through outsourcing, and supply chain management is seen as a crucial corporate function. Despite this, developing nations in Asia and Africa experience the opposite situation. The supply chain for pharmaceuticals in developing nations is typified by low capacity and bad storage conditions, lengthy delivery intervals (monthly or quarterly), restricted transportation, low automation, low flexibility, low quality, low data visibility, and inadequate coordination. (Dowling, 2011).

The Ethiopian Food and Drug Authority (EFDA) is a government regulatory body that oversees the pharmaceutical industry in Ethiopia. Its duties include approving new product launches, inspecting pharmaceutical companies that manufacture, import, and distribute pharmaceuticals, and awarding certificates of competency to these companies (FDRE, 2007).

Pharmaceutical supply chain management and pharmacy service operations are important components and cross-cutting activities in the healthcare system. Managing the pharmaceutical supply chain, pharmacy services, and medical equipment is crucial to achieving basic customer satisfaction in terms of delivering the right product at the right time (FMOH, 2019).

However, there were a lot of obstacles to overcome in the pharmaceutical supply management sector, including limited access to necessary medications and resource waste. Similarly, there have been several shortcomings in the nation's pharmacy service, including inadequate infrastructure, inadequate human resource planning, deployment, and capacity building, low patient satisfaction and poor counseling, a lack of service standards, and a lack of a framework for monitoring and evaluating performance (FMOH, 2019).

The hospital is an essential component of a social and medical institution whose mission is to provide the public with comprehensive healthcare, both curative and preventive, and whose out-patient services reach out to families in their homes. The hospital also serves as a teaching institution for health workers and conducts biosocial research. It is a residential facility that provides short-term and long-term medical care, including observational, diagnostic, therapeutic, and rehabilitative treatments, to people who are sick or injured, as well as pregnant women. It may or may not give out-patient services to ambulatory patients.

1.2 Historical Background of TASH

"Tikur Anbessa Specialized Hospital (TASH), also known as Black Lion Specialized Hospital, is a university teaching hospital in Addis Ababa, Ethiopia, affiliated with Addis Ababa University. TASH is the largest public referral hospital in the country. The hospital was transferred to school by the Federal Ministry of Health, and it has since become a university teaching hospital. Tikur Anbessa Specialized Hospital is now the main teaching hospital for both clinical and preclinical training in most disciplines. It is also an institution where specialized clinical services that are not available in other public or private institutions are rendered to the whole nation. The various departments, faculties, and residents under specialty training in the School of Medicine provide patient care in the hospital. In addition, almost all regional and federal hospitals in Addis Ababa are affiliated with the School of Medicine as clinical services and training sites.

Tikur Anbessa Specialized Hospital was established in 1964 by Emperor Haile Selassie I as "Prince Mekonnen Memorial Hospital" and got its current name in 1976. The hospital was built with funds from the entire Ethiopian people and has been providing services for all communities.

The CHS is comprised of four schools and one teaching hospital. The four schools are the School of Medicine (SoM), the School of Pharmacy (SoP), the School of Public Health (SPH), and the School of Allied Health Sciences (SAHS). The SAHS offers professional training in nursing, midwifery, and medical laboratory technology. Tikur Anbessa Specialized Hospital (TASH) is the teaching hospital of the college. TASH is the largest specialized hospital in Ethiopia and serves as a training center for undergraduate and postgraduate medical students, dentists, nurses, midwives, pharmacists, medical laboratory technologists, radiology technologists, and others who shoulder the health problems of the community and the country at large.

The School of Medicine at Tikur Anbessa Specialized Hospital is under Addis Ababa University and is one of the earliest medical schools in the country. The school has been providing quality medical education to students from Ethiopia and other African countries for more than five decades.

Tikur Anbessa Hospital is the only public hospital in Ethiopia that is certified to perform heart surgery. The hospital was the first in Africa to be certified to use angioplasty, a less-invasive form of heart surgery.

The hospital's main services include general medicine, surgery, obstetrics and gynecology, and pediatrics. TASH also provides specialized services such as oncology, hematology, urology, neurology, ENT (ear, nose, and thorax), ophthalmology, orthopedics, dermatology, deontology, obstetrics, gynecology, cardiology and cardiothoracic, internal medicine, radiology, pathology, and anesthesiology.

Generally, Tikur Anbessa Specialized Hospital is a comprehensive hospital offering healthcare services, inpatient and outpatient care, inpatient pharmacy, radiology services, and laboratory services"(AAU profile).

1.3 Statement of the Problem

The primary goal of any healthcare system is to supply medicine as a strategic product. In today's health-conscious society, pharmaceutical supply chain management has become more complex because it involves human lives and requires the participation of various stakeholders, such as pharmaceutical manufacturers, wholesalers, distributors, customers, information service providers, and regulatory agencies (Kapoor, 2018).

According to OMS (2004), one-third of the global population lacks access to basic pharmaceuticals, diagnosis services, and the healthcare system. This figure jumps to 50% in Africa and Asia's poorest countries. Although the primary causes of low availability and thus accessibility of pharmaceutical items are

complex, major contributing factors include unaffordable pharmaceutical prices, unreasonable drug use, a shortage of financing, and a fluctuating supply and distribution system to make essential pharmaceutical items available to patients. Similarly, medications are one of the most important instruments for improving and maintaining health, yet for far too many people around the world, they remain overpriced, unavailable, dangerous, and misused.

Study by Muia (2013) at Maragua District Hospital in Kenya discovered that the procurement department had insufficient personnel and that the procedure for purchasing goods was not consistently followed. Financing was a major issue. Legal restraints were challenging and hindered the procurement process, resulting in irregularities in receiving pharmaceutical supplies. The hospital needed a basic tool for optimizing procurement performance. The hospital faced numerous challenges, including a shortage of workers in the procurement department and financial constraints. The survey also discovered irregularities in the distribution of therapeutic supplies in Kenya's government hospitals.

According to Adane (2017), a study of Addis Pharmaceutical Factory found that the company neglected to respond to consumer inquiries, lacked a good communication system, and did not conduct customer surveys to determine their satisfaction.

According to a study conducted by Haymanot (2019) on measuring the pharmaceutical supply chain, less numbers of the store's employees were actively involved in pharmaceutical procurement and storage. The study found that pharmaceutical supply chain operations performed poorly in the workplace. The study additionally showed that, while the hospital supply chain is reliable, it is less responsive in identifying and measuring client satisfaction, has a more prolonged lead time, lacks procurement flexibility, and only obtains pharmaceutical supplies from one supplier (EPSA).

Georgebush (2019) did a study in Hawassa University's compressive specialized hospital, and the outcomes revealed a 20.8% reliability in pharmaceutical supply. The order fulfillment cycle lasted 22.8 days. The inventory turnover rate was 2.05. The inventory days of supplies were 178, and the hospital's performance was inadequate. The causes of hospital supply management's poor performance were the inability of distributors to furnish drugs in the requisite amount and kind, extended sourcing cycle times, payment approval delays, and transportation delays.

This paper proposes to identify the problems with TASH's pharmaceutical supply chain management by assessing its performance and benchmarking it with other hospitals' pharmaceutical performance to provide solutions for improving and developing hospital supply chain management.

1.4 Research Questions

- What kind of practices apply to the pharmaceutical supply chain at TASH?
- What is the pharmaceutical supply chain reliability in TASH?
- What is the pharmaceutical supply chain responsiveness in TASH?
- Wow the pharmaceutical supply chain is flexible in TASH?
- What kind of cost of the pharmaceutical supply chain in TASH?
- How does TASH handle its pharmaceutical assets?

1.5 Objectives of the Study

1.5.1 General Objective

The main objective of the study is to assess the pharmaceutical supply chain performance in the case of Tikur Anbessa Specialized Hospital using five key indicators.

1.5.2 Specific Objective

- To examine pharmaceutical supply chain practice at TASH
- To evaluate the supply chain reliability of TASH
- To assess the supply chain responsiveness of TASH
- To assess the pharmaceutical supply chain flexibility of TASH
- To assess the costs of pharmaceutical supply chain at TASH
- To examine the asset management efficiency of TASH

1.6 Significance of the Study

This study seeks to increase knowledge about supply chain performance, specifically TASH. The theoretical and practical contributions of this research are summarized as follows: After completing this study, actors from various supply chains (individuals, organizations, and businesses) were able to identify significant elements that are likely to influence performance in the pharmaceutical supply chain (PSC).

Furthermore, the study may have an impact on attaining its goal in healthcare services. Following the findings, the study's suggestions will provide a mechanism for supply chain actors and hospital administration to better understand their roles in enhancing supply chain performance.

1.7 Scope of the Study

This study evaluated the performance of TASH's pharmaceutical supply chain. Because of the large range of hospital logistics, the study was restricted to the pharmaceutical supply chain. The geographical room of the study was limited to TASH in Addis Ababa, Ethiopia, where pharmaceutical supply chain performance was examined. Even if there were other parties in the TASH supply chain, only hospital pharmacy workers would be included. The study did not include hospital suppliers, patients, and other professionals working in healthcare.

1.8 Definition of Terms

Supply chain (SC): The supply chain refers to all the interconnected resources and activities required to generate and deliver items and services to clients.

Supply Chain Management (SCM): SCM is the process of integrating and leveraging suppliers, manufacturers, warehouses, and retailers to ensure that things are manufactured and delivered in the correct amounts and at the correct time, all while reducing costs and meeting customer expectations. (Bahari et al., 2017).

Pharmaceuticals: Pharmaceuticals, often known as medicine, medication, or medicament, are chemical substances used to diagnose, cure, treat, or prevent disease (FDRE, 2007).

Pharmaceutical Supply Chain (PSC): The pharmaceutical supply chain (PSC) is the means by which prescribed medicines and medical equipment are distributed to health facilities and patients (Parmata et al., 2016).

Supply Chain Performance (SCP) is the systematic process of evaluating the effectiveness and efficiency of supply chain operations (Anand & Grover, 2015).

1.9 Organization of the Study

The paper is divided into five chapters. The first chapter is an introduction that covers the background, organization background, problem statement, research question, study objective, term definitions, study significance, and study scope. The second chapter is a literature review that includes a theoretical, empirical, and conceptual framework. The third chapter covers research methodology, which includes the study approach, research design, sample design, data sources, data collection technique, data collection tools, data analysis, validity and reliability, and research ethics. The fourth chapter includes data analysis, findings, and discussion. The final chapter contains conclusions, future study, and recommendations.

CHAPTER TWO: REVIEW OF RELATED LITERATURE

2.1 Theoretical Review

2.1.1 Supply Chain Management

Supply chain management (SCM) is the process of managing connections and overflows of material, information, and resources across and within a network of upstream and downstream companies to produce value, increase effectiveness, and satisfy consumers. SCM is also the operation of a network of connections within a establishment and between interdependent associations and business units conforming of material suppliers, purchasing, manufacturing facilities, logistics, marketing, and related systems that grease the forward and rear inflow of materials, services, finances, and information from the original producer to the final client, with the benefits of adding value, maximizing profitability through efficiencies, and client satisfaction (Chandra and John, 2016).

Lummus & Vokurka (1999) defined supply chain management as the network of entities (suppliers, carriers, manufacturing sites, distribution centers, retailers, and customers) through which material flows by adding certain value for each partner. Tan (2001) linked supply chain management to two environments within an organization and externally along the supply chain.

According to Aburadi (2016), Supply chain management is the network that connects partners across the entire value chain, from raw material extraction to the end of their useful life, through three key functions: (1) material supply to a manufacturer; (2) the manufacturing process; and (3) the distribution of finished goods through a network of distributors and retailers to a final destination.

Because of expanding technological advancement and globalization, the core supply chain structure has evolved into a more sophisticated supply chain network, with a higher level of dependency and collaboration among more organizations. Supply chain networks can be utilized to emphasize relationships between businesses while simultaneously demonstrating the flow of information and resources between organizations. Supply chain networks are organized into five key areas: inbound logistics (suppliers), internal logistics (manufacturing), outbound logistics (distributors), demand sectors, and shipment assets (Martel & Klibi, 2016).

Supply Chain Management includes the planning and management of all activities related to sourcing and procurement, conversion, demand generation and fulfillment, and logistics management. It also includes

coordination and collaboration with channel partners, who might be suppliers, intermediaries, third-party service providers, or customers. In this feature, supply chain management combines supply and demand management within and between enterprises (Mentzer et al., 2008).

2.1.2 Healthcare Supply Chain

Senna et. al (2021), define healthcare supply chain as an organization that is involved in the delivery process and is motivated by the overall goal of providing healthcare and saving lives. The healthcare supply chain is a complex network of institutions and procedures that involves various mediators.

A supply chain in healthcare is the sequence of physical and technical resources required to provide a satisfactory service to patients with complete satisfaction while remaining cost-effective. Stakeholders in the healthcare supply chain are classified into four categories based on their functions: manufacturers, purchasers, distributors, and providers. Healthcare supply logistics involves a variety of operations, including demand/supply management, manufacturing control, operation, inventory management, warehouse management, distribution, and transportation management (Heidari-Fathian et. al., 2017).

Hospital Supply Chain Management (HSCM) is a method for efficiently connecting suppliers or vendors, transportation, and hospital services (including outpatient, emergency, inpatient, laboratory, radiology, stores and purchases, food, laundry, and pharmaceuticals) to accomplish Total Quality Management (TQM) in healthcare services by maximizing resource utilization. Supply chain management in health facilities encompasses both the internal chain (patient care unit, hospital inventory, patient) and the external chain (vendors, producers, and distributors). Healthcare Supply chain management methods consist of three sorts of flows: physical product flow, information flow, and budgetary flow (Shou, 2013).

In health supply chains, integration takes many forms, including process integration and coordination, information flows, planning processes, intra- and inter-organizational process integration, market approach integration, and market development. The hospital supply chain is divided into two main categories: pharmaceutical and medical supplies, and non-medical products utilized in patient care.
(Shou, 2013).

In other words, Mahmud et al. (2016) classify the hospital supply chain into four groups. These include product and service development, procurement and contracting, material management, and working capital management. To create a remarkable supply chain, hospitals must construct an integrated governance

system, implement dynamic processes, and automate their IT systems. The combined operation of internal and external hospital supply networks has the potential to lower supply chain expenses by nearly half. It is estimated that employees in any hospital spend 10% of their time executing logistics activities rather than caring for patients.

Healthcare supply chain logistics is a set of operations that involve the workforce across many teams, as well as the transfer of medicines, surgical equipment, and other products required by healthcare professionals to perform their duties. The supply chain in healthcare aims to identify departmental vulnerabilities and take steps to mitigate them. It tries to identify weak regions in order to attain certain health outcomes and raise global health investments. An efficient supply chain in healthcare has several advantages, including enhanced operations, efficient resource usage, satisfied personnel, successful treatment, improved healthcare, and satisfied patients (Smith, 2011). Effective health delivery, including information, financing, personnel, and supplies, is critical to obtaining great health results. The availability of medications and supplies in healthcare institutions is critical and can be influenced by supply chain performance. However, to enhance supply chain performance, you must first understand how things now work (Aronovich et al., 2010).

2.1.3 Pharmaceutical Supply Chain

The pharmaceutical supply chain is the process by which prescription medications are delivered to patients. Drugs are produced in manufacturing facilities, transferred to wholesalers, stored at retail locations, dispensed by druggists, and finally delivered to end users/patients (Parmata et al., 2016).

Pharmaceuticals are any drug or combination of substances used in the diagnosis, treatment, mitigation, or prevention of a disease, including medical devices and supplies. Furthermore, "medical supplies" means any article that may be used on the inner or outer part of the human body for diagnosis or treatment of disease, including suturing materials, syringes, needles, bandages, gauze, cotton and similar products, chemicals, and x-ray films; and "medical instrument" means any instrument that may be used on the inner or other part of the human body for diagnosis or treatment of a disease, including various diagnostic, laboratory, surgical, and dental instruments (FDRE, 2007).

The generic pharmaceutical sector, particularly supply chains, is made up of the following components: manufacturing raw materials, manufacturing pharmaceuticals, distribution centers, retail pharmacies and hospitals, and patients (Shah, 2004). Because of economic changes, pharmaceutical industry member

businesses have attempted to restructure their supply networks. The pharmaceutical industry is a multifaceted business with competing goals and several challenges. The pharmaceutical sector is a complex system due to its highly regulated environment and the life-changing nature of its products (Fine et al., 2005).

According to Woldehitsan (2018), Pharmaceutical supply chain management is the basis of healthcare delivery. This is because patient treatment is highly dependent on the availability of pharmaceuticals and other medical supplies at the appropriate time and quantity. A scarcity of pharmaceutical drugs at the point of use in healthcare facilities frequently leads to unnecessary deaths and unnecessary complications. Pharmaceutical supply chain management, medical equipment, and pharmacy service operations are all important parts of the healthcare system. They are essential to establishing fundamental customer satisfaction by delivering an appropriate drug in the right amount and condition at the right time to the right client.

Pharmaceutical supply chain management focuses on five main actions from the drug management cycle: selection, quantification, procurement, distribution, and utilization. At the center of this stage is a collection of management support systems that comprise organization, financing and sustainability, information management, human resources, and quality assurance. The qualified hospital pharmacists are in charge of selecting medications as well as making decisions concerning goods, amounts, product standards, and supply sources. Although the pharmacist has the freedom to choose a brand or source of supplies based on economic and qualitative (Iqbal et al., 2016).

2.1.4 Supply Chain Performance

Supply chain performance refers to the systematic process of evaluating the effectiveness and efficiency of supply chain operations (Anand & Grover, 2015). It also refers to the extended supply chain activities in meeting end-customer requirements, including product availability, on-time delivery, and all necessary inventory and capacity in the supply chain to deliver that performance in a responsive manner (Nurmandi & Kim, 2015).

Supply Chain Performance relates to meeting end-customer needs through product availability, on-time delivery, and enough inventory and capacity. Supply Chain performance includes basic materials, components, subassemblies, and finished goods, along with their distribution to clients via various channels. It covers traditional organizational responsibilities including procurement, production, distribution,

marketing, sales, and research and development. SC has three key dimensions: service, asset, and speed. Service refers to the ability to predict, capture, and meet consumer demand through individualized products and on-time delivery; assets are everything of commercial worth, mostly inventory and cash; and speed refers to time-related indicators like responsiveness and execution velocity (Hausman, 2004).

Many key indicators can be used to measure the supply chain performance. According to Ambe (2014) supply chain reliability, responsiveness, cost, delivery lead time, asset management, flexibility, quality, innovation and product variety are some indicators of SC performance. The SCOR model measurement assesses organizational processes and performance. Process measurements include plan, source, make, deliver, return, and enable operations, while performance indicators include firm reliability, responsiveness, agility, cost, and asset management level (Lee et al., 2012). SCOR has five measure categories: dependability metrics, flexibility metrics, responsiveness metrics, cost metrics, and asset metrics. The first three categories are directly related to customers and are therefore considered customer-facing. The remaining metrics are internal and are used to measure the SC's internal operations (APICS, 2017);(Jagan Mohan Reddy et al., 2019).

2.2 Empirical Literature Review

Ethiopia's yearly pharmaceutical business is expected to be worth between $400 and $500 million and increase at a rate of 25% per year. The public sector, through the Pharmaceuticals Fund and Supplies Agency (PFSA), procures nearly 70% of all medicines consumed in Ethiopia, but the Ethiopian Food, Medicines, Healthcare Administration and Control Authority (EFMHACA) estimates that out-of-pocket health expenditure is 46%. The PFSA procurement scaled from US$27 million in 2007 to US$310 million in 2014 (FMoH, 2015).

Woldehitsan (2018), a study of the pharmaceutical supply chain at 41 health institutions in Addis Ababa discovered that each healthcare facility had a specific medicine list, a low warehouse accident rate, and most health facilities used supply planning. However, 58.54% of the healthcare facilities polled reported medicine shortages. Pharmaceutical prices were 64% cheaper than the international average. The study also discovered that the waste rate range and average inventory turnover rate were 1.04–10.21% and 0.82, respectively. Furthermore, data suggested that health institutions' pharmaceutical supply chain performance (PSCP) was average concerning quality, responsiveness, cost, and productivity.

A countrywide assessment revealed that blank bin cards, IFRR, and RRF are generally available in hospitals (more than 90%) and health facilities (about 80%). However, as the supply system moved down, the availability of documentation and reporting forms decreased. Bin cards for collecting inventory data were 40% available at the health post level. Similarly, health posts' monthly reporting and replenishment forms (HPMRR) were available in 55% of health posts and 49% of health facilities (Shewarega et. al, 2015).

2.2.1 Supply Chain Practice in Ethiopia

The healthcare system in Ethiopia has always consisted of a mixture of public, private, and non-governmental healthcare sectors. However, currently, the public healthcare system is organized into a three-tier health care delivery system, which was introduced. Level one is a district health system comprised of a primary hospital (for 60 000–100 000 people), health centers (for 15 000–25 000 population), and their satellite health posts (for 3000–5000 population), connected to each other by a referral system. The primary hospital, health centers, and health posts form a primary health care unit. Secondary health Care is a general hospital for 1–1.5 million people, and Tertiary Health Care is a specialized hospital for 3.5–5 million people (FMoH, 2015).

Pharmaceuticals are a crucial, high-value element in the healthcare system that often makes a difference in health outcomes for individuals and populations. As the availability of medicines is integrated into modern healthcare, access to these medicines is the fundamental right of a person (WHO, 1978). However, the World Health Organization (WHO) reported that approximately one-third of the world's population lives without essential medicines. Among the medicines available, more than 50% are prescribed, dispensed, or sold inappropriately, and 50% of the patients take incorrectly (WHO, 2002). The reasons undermining the availability of medicine include poor supply and distribution system, insufficient health facilities and staff, low investment in health, and the high cost of medicines.

EFMHACA, FMOH, and WHO worked together to assess the pharmaceutical sector using level I and II indicators. The pharmaceutical value chain is a collection of progressive pharmaceutical processes that have become technologically complicated. At one end of the chain is the sole importer of finished pharmaceutical products, and at the other are research-based pharmaceutical companies. Many steps of pharmaceutical manufacturing occur in between, including the creation of active pharmaceutical ingredients (API). Each step may lead to the next, resulting in increased value, complexity, investment, and regulatory obligations. International quality standards must be met at all levels (FMoH, 2015).

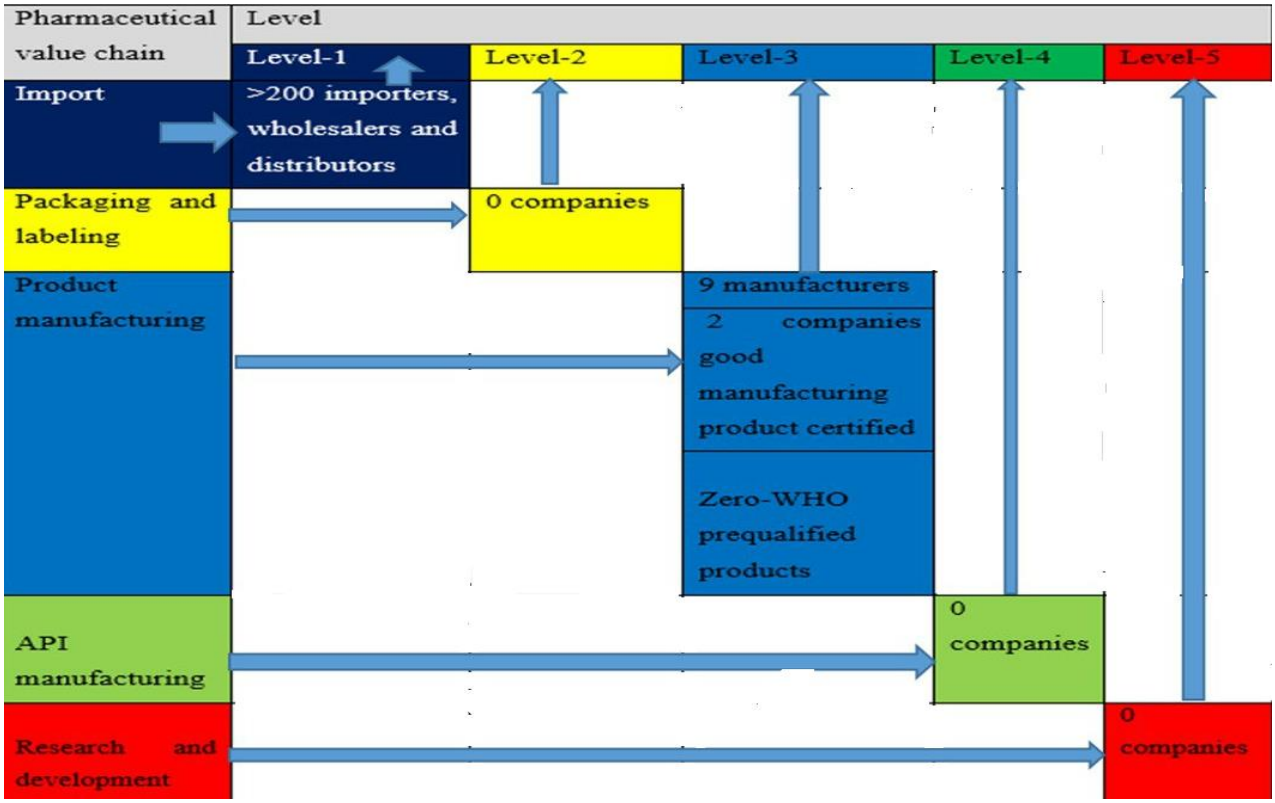


Figure 1: Ethiopian Pharmaceutical Value Chain (FMoH, 2015)

Overall, the picture above shows that none of the 200 importers and wholesalers have moved to Level 2. EFMHACA has licensed nine manufacturing companies. Two pharmaceutical companies have already acquired accreditation for acceptable manufacturing practices. Most companies have made significant investments and advancements in this area. No pharmaceutical products created in Ethiopia have obtained WHO prequalification status, while one company is working toward it. No company has yet achieved Level 4, which represents domestic API production. A Chinese-Ethiopian joint venture firm makes hard gelatin capsules and is Africa's sole manufacturer, delivering to numerous African and Middle Eastern countries. No company is at Level 5, which represents active R&D. APIs are rarely developed in Africa, and almost all APIs are imported from China or India. APIs account for between 40 and 60% of the final retail price of a pharmaceutical product. API manufacture is a technically challenging and expensive endeavor that requires chemistry expertise and raw material availability. API manufacturing in Africa is typically regarded impracticable.

In Ethiopia, the pharmaceutical industry is controlled in four areas: medications, premises, pharmacy staff, and practices. Currently, the EFMHACA under the Federal Ministry of Health is responsible for regulatory tasks like product evaluation and registration, import and export control, pharmaceutical establishment licensing and inspection, post-marketing surveillance, and pharmacovigilance. It is also responsible for maintaining food quality and safety standards. The Regional Regulatory Counterparts, which are either part of regional health bureaus or operate independently, are responsible for regulating the licensing and inspection of medication retail outlets and pharmaceutical wholesale premises in their respective regions. EFMHACA receives regular funding from the government and is additionally funded by its partners (Teferi G. et al., 2016).

Sustainable economic growth, innovations in healthcare delivery, and the national implementation of social health insurance coverage in July 2015 all served to boost demand. Cadila, Julphar, GlaxoSmithKline, Sandoz, and Hikma Pharmaceuticals have all indicated plans to invest in Ethiopia as a consequence of recent developments. Ethiopia has around 200 importers of pharmaceuticals and healthcare products. The local economy includes 22 pharmaceutical and medical suppliers and manufacturers, with nine actively producing pharmaceutical items. Most businesses operate below capacity, serving only around 20% of the local market. In 2014, local pharmaceutical companies supplied items worth $44.2 million (FMoH, 2015).

Local manufacturers have limited product portfolios and are expected to furnish only 90 of the approximately 380 items on the national critical medication list. Approximately 35-40% of their total output is sold to the private sector for a 10% premium. Ethiopia's yearly private pharmaceutical business is estimated to be worth about $100 million. In 2014, Ethiopia's pharmaceutical industry exported commodities worth approximately US$2 million, falling significantly short of the GTP-I objective of US$20 million. A large portion of the exports were from China and Ethiopia and comprised empty gelatine capsules. Enterprise ownership varies, ranging from two massive corporations to smaller entities that are joint ventures between Ethiopian entrepreneurs and foreign investors from China, India, Jordan, Saudi Arabia, Sudan, and (FMoH, 2015).
According to the minister of health's study, Ethiopia's yearly pharmaceutical business is anticipated between $400 and $500 million and increasing at a remarkable rate of 25% each year. The public sector, through the Pharmaceuticals Fund and Supplies Agency (PFSA), procures nearly 70% of all medicines consumed in Ethiopia, but the Ethiopian Food, Medicines, Healthcare Administration, and Control Authority

(EFMHACA) estimates that out-of-pocket health expenditure is still significant (46%). PFSA procurement grew from US$27 million in 2007 to US$310 million by 2014 (FMoH, 2015).

Despite significant investments in the health sector and advancements in healthcare services, Ethiopia faces numerous challenges. Most health issues in Ethiopia might have been easily avoided or addressed by assuring the ongoing availability and good use of a few key medicines chosen based on illness prevalence and evidence of efficacy, safety, and relative cost-effectiveness. However, there are numerous reasons why these vital drugs are not readily available at all public health facilities on an ongoing basis (WHO, 2005).

According to Teferi G. et al. (2016), the weak governance of Ethiopia's pharmaceutical sector is thought to have contributed considerably to the majority of the issues associated with pharmaceutical management at various levels of the healthcare system. Medicines were not selected and prioritized using recognized tools and techniques, resulting in frequent stock outs and the expiration of life-saving medications. Furthermore, the delivery of pharmaceutical services was not systematized to ensure optimal workflow and effective drug usage counseling during the dispensing process, compromising overall treatment outcomes and patient satisfaction. The documentation of services was inadequate and not consistent. As a result, no relevant reports were prepared or shared with the appropriate body to aid decision-making processes.

Providing comprehensive healthcare requires access to safe, effective, and affordable pharmaceuticals in sufficient quantities. Ethiopia's pharmaceutical supply chain has regularly faced obstacles such as non-availability, unaffordability, inadequate warehouse and stock management, and irrational utilization.

(PFSA, 2017).

The Pharmaceuticals Fund and Supply Agency (PFSA) has put in place the Integrated Pharmaceutical Logistics System (IPLS) for vital health commodities in the public sector. The Integrated Pharmaceutical Logistics System (IPLS) utilized efficient procurement, enhanced warehousing and inventory management, and efficient pharmaceutical distribution to health facilities. A recent nationwide study of IPLS to measure system effectiveness at public health facilities (hospitals, clinics, and health posts) discovered that the system had significantly boosted the supply of necessary pharmaceuticals at health facilities. With the introduction of IPLS, several recording and reporting formats were created for usage at different stages of the healthcare supply chain. The availability and adoption of standard forms and tools a key supply chain indicators. On the facility level, there are bins and stock cards (Shewarega et al., 2015).

2.3 Conceptual framework

Supply chain performance is the ability of the entire supply chain to meet end-customer needs, associated with ensuring the availability of products, delivering them on time in the right way, and ensuring appropriate inventory levels.

The independent variables were the five performance indicators, i.e., reliability, responsiveness, agility, costs, and supply chain asset management efficiency.

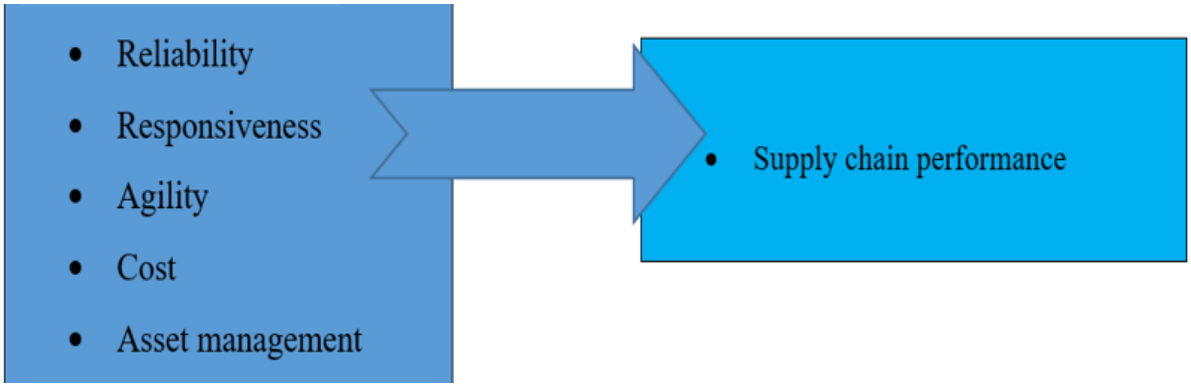


Figure 2: Conceptual Framework From the literature (2024)

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Description of Study Area and Study Period

The study was undertaken at the Tikur Anbessa Specialization Hospital to evaluate pharmaceutical supply chain performance. The hospital was located in Addis Ababa's Lideta sub-city and had over 3200 employees, 680 inpatient beds, and 45 specialty and sub-specialty clinics. On average, the hospital saw over 831,600 patients per year, more than 69,300 per month, and more than 120 new registrations or referrals per day. The study was carried out from April 20 to May 20, 2024.

3.2 Research Approach

According to (Kothari (2004), the study method depicts how issues concerning aims might be investigated. There are two types of inquiries concerning procedures: quantitative and qualitative inquiries into techniques. Qualitative research is used to collect data and interpret people's perspectives on the world, whether as individuals or groups. It is described as subjective, having a focus on meanings, interactions, and so on. Quantitative research is a form of investigation approach that seeks to gather real facts and assess the relationships between truths, as well as how such truths relate to hypotheses and discoveries from previous investigations. Next, ask a quantitative question on the strategy used in response to a query.

To conduct this study, the researcher used mixed approach; both quantitative and qualitative research approach

3.3 Research Design

The research design helps to reconstruct the research by illustrating how all of the essential components of the research project, sample, or group work together to answer the research question. The study used a cross-sectional descriptive research design. The researcher chose this design because it allows him to describe the facility's current state by gathering information from each individual about the performance of the hospital's pharmaceutical supply chain. Descriptive research is largely focused on describing the present state of affairs.

3.4 Sample design

3.4.1 Source Population and Sample

The whole staff at Tikur Anbessa Specialized Hospital served as the study's source population. The study's target group included all pharmacist staff members, pharmaceutical store employees, pharmaceutical procurement staff, and high-level pharmacy management personnel who worked at TASH during the study period.

Inclusive: All employees are working in the pharmacy department, store unit, pharmaceutical procurement unit, and top pharmacy management of the hospital.

Exclusive: All employees who had not enough knowledge on attributes, less practical experience on pharmaceutical activities and less than 5 months of work experience at TASH at the study period and other professional staff like nurses, doctors, and lab technicians working in TASH were excluded from the study. An employee who had less than 5 months of work experience had not enough knowledge about the whole system and operation of the hospital activities.

3.4.2 Sampling Technique

Due to the small target population of the study in the hospital, the researcher decided to employ a census technique to gain insight on pharmaceutical supply chain performance.

3.4.3 Sampling Procedure

Before data collection began, a cooperative letter from the School of Commerce was submitted to Tikur Anbessa Specialized Hospital. Data collection began after receiving approval from a hospital administrator. Data for the study were gathered using structured questionnaires designed to assess pharmaceutical supply chain performance in TASH. The questionnaire was distributed to all volunteers of hospital pharmacy personnel who meet the inclusive criteria at their jobs. The study also utilized the interview data-gathering approach, particularly with key informants.

During data collection, the researcher provided the aims, objectives, and methods, and they are explaining any areas that respondents did not understand. They were given the consent form to sign following an explanation and confirmation that they understood the contents of the document.

3.5 Data Sources

3.5.1 Primary Source

The major source is first hand data. Primary data were obtained from the collected questionnaires, interviews, and field observations. Daily office activity was observed to find out how the hospital manages the supply chain. The aim of interviews and observation of daily activity in each unit is to get a clear explanation and information about the work flow process, job description, issues or problems that occurred, expectations for the other department, and their performance. In general, this study relies heavily on primary data sources, such as hospital pharmacy employees. The researcher acquired primary data from the hospital using a questionnaire and an interview. Observation occurred concurrently with data collection.

3.5.2 Secondary Source

Secondary data for this study were derived from other relevant documents, such as journals, research reports, record documents, Standard Operation Procedure (SOP), the hospital annual report, the hospital biography, and other available books related to the study.

3.6 Data Collection Methodology

The study relied significantly on primary data. The primary data was gathered via a structured questionnaire, observation, and interviews with the target population. Questionnaires provide for greater uniformity in how questions are posed, resulting in more compatible responses. The questionnaire is divided into two sections. The first section describes the respondent's demographics, while the second section comprises the primary research questions.

3.7 Data Collection Instrument

The data collection tools for the assessment of pharmaceutical supply chain performance at Tikur Anbesa Specialized Hospital were written in English because each participant had at least a diploma.

Questionnaires: In this study, questionnaires contain structural questions. The questionnaires have two sections: demographic and main research questions.

Interview: To get the necessary information, the key informant interview was given more attention, and personal observation and experience of the study area helped the researcher understand the assessment of

the pharmaceutical supply chain in Tikur Anbessa Specialized Hospital. The questionnaires had a pre-test to check their reliability.

3.8 Data Analysis Methods

The gathered data were cleaned and analyzed with SPSS version 21. Descriptive data were reported using frequency tables, percentages, and measures of central tendency.

3.9 Validity and Reliability

The research's reliability determines its consistency. The validity of the research is used to determine the study's accuracy. There are several methods for measuring reliability; in this study, Cronbach's alpha was used to determine consistency. Cronbach alpha is a coefficient of reliability that assesses the scale's internal consistency. According to Tavakol & Dennick (2011), a scale with a coefficient of 0.7 or higher suggests fair reliability for the study.

Table 1: Reliability Statistics

	Cronbach's Alpha	N
Responsiveness	.859	11
Reliability	.755	6
Flexibility	.740	4
Cost	.870	6
Asset management	.768	5

Source: own survey (2024)

3.10 Research Ethics

To maintain the confidentiality of the data provided by the participants, the subjects were assured that their responses would be used only for the research study and that the institutional review committee of Addis Ababa University, the School of Commerce, sent a cooperative letter to Tikur Anbessa Specialized Hospital to treat their responses strictly confidential.

The director received authorization. In addition, every study participant provided informed consent to indicate their willingness to participate. We offer them clear information on the study's objectives, self-administered respondents, and confidentiality. Following that, we began data collection.

Chapter Four: Data Analysis, Results and Discussion

4.1 Results

4.1.1 Response Rate

A total of 74 pharmacy employees were in TASH during data collection period. Among those, six lack sufficient knowledge about supply chain activities and excluded from the study. 60 questionnaires were distributed to the respondents; out of those, 55 were filled correctly and returned, 2 were not returned and 3 were incomplete. Three respondents were key informants. So, the response rate of this study is 85.29%. Therefore, the study analysis depended on the respondents—those who filled questionnaires correctly and returned.

4.1.2 Demographic characteristics of the respondents

The demographic characteristics of the respondent include sex, age, educational background, work experience and work position.

Table 2: percentage of the respondents by sex

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	32	58.2	58.2	58.2
	Female	23	41.8	41.8	100.0
	Total	55	100.0	100.0	

Source: own survey (2024)

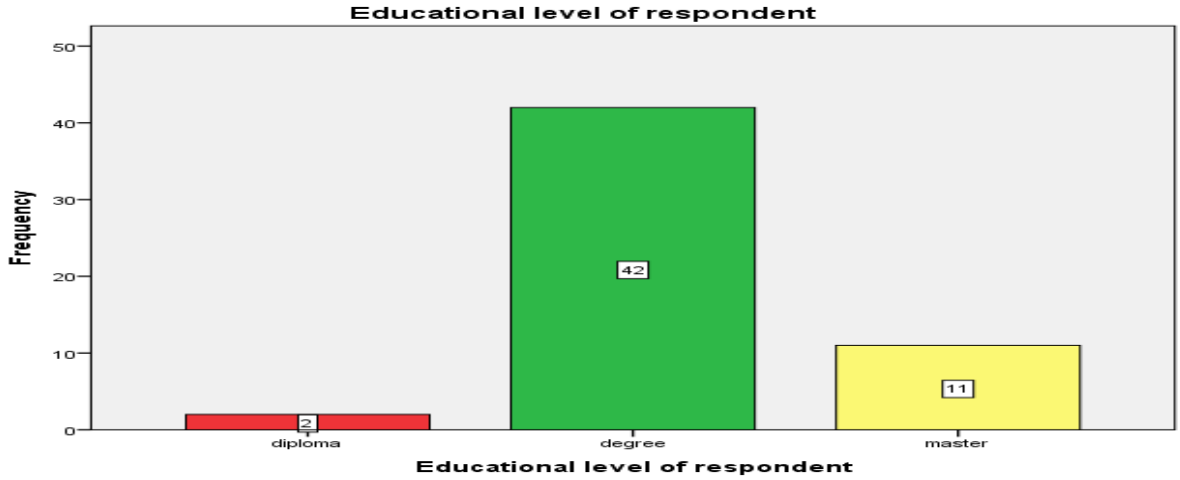
Table 2 above, illustrates that among 55 participants of the pharmacy employees—32 (58.2%)—were males and 23 (41.8%) were females. Males were greater in numbers than females. It was observed that in most dispensary units, more males were found than females.

Table 3: percentage of the respondents by age

		Frequency	Percent	Valid Percent	Cumulative Percentage:
Valid	26-35	37	67.3	67.3	67.3
	36-45	16	29.1	29.1	96.4
	above 46	2	3.6	3.6	100.0
	Total	55	100.0	100.0	

Source: own survey (2024)

Table 3 shows that 37 (67.3%) of the respondents were between the ages of 26 and 35, 16 (29.1%) were between the ages of 36 and 45, and the remaining 2 (3.6%) were over the age of 46. Two-thirds of the respondents were between the ages of 26 and 35, which is considered the productive age.



Source: own survey (2024)

Figure 3: Educational level of respondents

As the result showed in Figure 3 above, 42(76.36%) of the respondents were holding a bachelor's degree, 11(20 %) of the respondents had MSC degree, and 2(3.64%) were holding a diploma. The hospital gave free educational opportunities for its employees to upgrade themselves and to assure quality service for the patients.

Table 4: Service years of respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than one year	5	9.1	9.1	9.1
	1-5	14	25.5	25.5	34.5
	6-10	21	38.2	38.2	72.7
	more than 10 years	15	27.3	27.3	100.0
	Total	55	100.0	100.0	

Source: own survey (2024)

Table 4 showed that 38.2% of respondents had job experience between 6 and 10 years, 27.3% had work experience greater than 10 years, 25.5% had experience between 1 and 5 years, and only 9.1% had work experience for less than a year. Most of the employees had work experience ranging from six to ten years, with more than ten years accounting for 65.5% of the total. As a result, an overwhelming number of responders were well prepared to provide accurate and appropriate information about the hospital's supply chain processes.

Table 5: work position of respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	store manager, unit	4	7.3	7.3	7.3
	pharmacy coordinators	5	9.1	9.1	16.4
	Pharmacist in dispensary unit	44	80.0	80.0	96.4
	Pharmacy case team leader	2	3.6	3.6	100.0
	Total	55	100.0	100.0	

Source: own survey (2024)

As we show in Table 5, Most of the respondents (80%) were pharmacists, and the others (9.1%), 7.3%, and 3.6% of the respondents were pharmacy coordinators, store managers, and case team leaders, respectively. Pharmacists working in the dispensary unit were the most dominant of the respondents. So, the dispensary unit needed more human power. According to key informants, employees who work in store are knowledgeable about recording, reporting and requesting hospital practices compared to those in the dispensing unit.

4.1.3 Assessment of the general SC practice of TASH

A bin card is a record that contains information on a single product, identified by its batch number. Stock cards are used to record information on products in the store, whereas the bin cards for each patch size are retained in the store area. RRF is used by hospitals and health centers to report and order pharmaceutical products. The health facility sent its RRF to EPSA and received the pharmaceutical supply. IFRR is used to capture data on the products that were reported and resupplied as part of the hospital schedule. IFRR should be kept in the dispensing unit and completed when a service provider is scheduled to come for resupply within the facility. Despite IFRR, FRRF is used without the facility.

Table 6: Availability IPLS/LMIS for documenting, reporting/requesting in TASH

Questions	Response	Frequency	Percent	Valid percent
Bin cards are available	Yes	55	100	100
IFRR are available	Yes	55	100	100
RRFs are available	Yes	55	100	100
FRRFs are available	Yes	45	81.8	81.8
	No	10	18.2	18.2
stock cards are available	Yes	21	38.2	38.2
	No	34	61.8	61.8

According to the data in Table 6, all respondents (100%) stated that the hospital used and had a bin card, an internal facility report and request form (IFRR), and a request and resupply form. The response rate results for the availability of FRRF and stock cards were 81.8%, and 38.2%, respectively. During data collection day, the investigator observed all the above reporting and recording documents. All are available except

stock cards, which are presently replaced by the “I-care” or “IWKET-care” electronic systems, and each health provider had an IWKET-care account to write patients progress, history, procedure, transfer unit to unit, referral, prescribed medications, and supplies for patients. The hospital used both electronic and manual/paper forms for requesting, reporting, and prescribing pharmaceutical supply products. The programmed and non-programmed pharmaceutical supply products were requested by RRF, and chemotherapy pharmaceutical products/medicine were requested by letter.

Table 7: Employees training taken for record/documentation frequencies

		Responses		Percent of Cases
		N	Percent	
Employees training for record-keeping and documentation	Formal training	28	41.8%	50.9%
	Pre service training	9	13.4%	16.4%
	Other formal training	2	3.0%	3.6%
	on-the-job training in the facility	9	13.4%	16.4%
	On-the-job training outside the facility	11	16.4%	20.0%
	Never trained	8	11.9%	14.5%
Total		67	100.0%	121.8%

Source: own survey (2024)

According the Table 7 above, most of the employees received training in different formats and perspectives. Some employees were trained more than one times. However, 14.5% of respondents did not receive training.

Table 8: Frequency of RRF report Sent to higher level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Monthly	30	54.5	54.5	54.5
	Every two months	15	27.3	27.3	81.8
	Quarterly	10	18.2	18.2	100.0

	Total	55	100.0	100.0	

Source: own survey (2024)

As noted in Table 8, the majority the respondents (54.5%) said that the request and resupply form sent to EPSA monthly, 27.3% bimonthly, and 18.2% quarterly. From the finding, we can say the frequency of RRF at higher level had a probability of sending monthly and, in some contexts, bimonthly.

Table 9: Mechanisms of RRF report send to higher level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	sent through mail	27	49.1	49.1	49.1
	by supervisor	1	1.8	1.8	50.9
	hands carried by facility staff	27	49.1	49.1	100.0
	Total	55	100.0	100.0	

Source: own survey (2024)

According to the Table 10 above, both respondents on the questionnaires about the mechanisms of RRF report sent to higher level by mail and facility staff were equally 49.1%. According to the finding, we says that the hospital sent RRF to higher level by both through mail and hand-carried by facility staff.

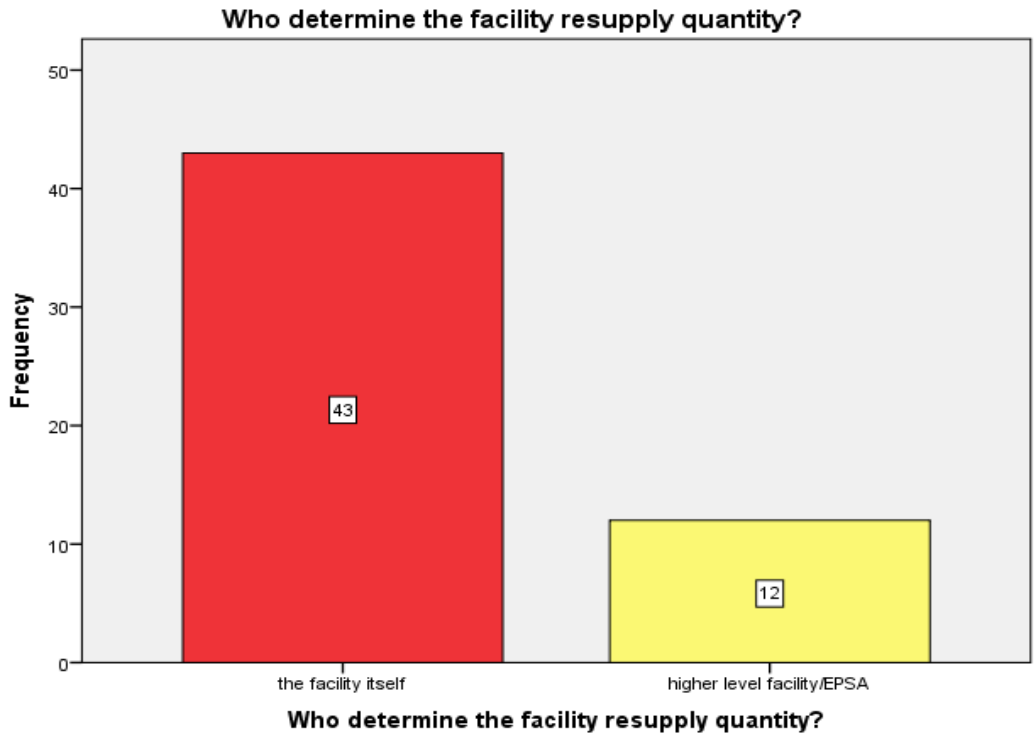


Figure 4: Determinants of the hospital resupply quantity

As shown in Figure 4 above, 43 (78.18%) respondents said that the determinants of the hospital resupply were the facility itself, and 12 (21.8%) were determined by other higher-level facilities like EPSA. The finding indicated the predominant determinant of the hospital's facility resupply quantity was the facility itself.

4.1.4 Assessment of Pharmaceutical SC with Performance Indicators

Pharmaceutical supply chain assessment based on performance attributes/indicators using a 5-Likret scale response for agreement in each statement related to TASH's current pharmaceutical supply chain. The scale range is 1–5. 1-strongly agree (SA), 2-agree (A), 3-neutral (N), 4-disagree (D), and 5-strongly disagree (SD). The mean is calculated in each dimension to analyze and conclude the performance of the hospital supply chain. To conclude the hospital's overall performance in each attribute, it is important to give the average mean range. Therefore, 1-1.80 is very good, 1.81–2.6 is good, 2.61–3.4 is moderate/average, 3.41–4.2 is low, and 4.21–5 is very low.

4.1.4.1 Supply chain responsiveness

Responsiveness is a customer-focused attribute that describes the speed at which activities are completed. Responsiveness refers to the consistent speed with which services are provided for clients.

Table 10: supply chain responsiveness descriptive statistics (n=55)

Supply chain responsiveness Questions	SA %	Agree%	Neutral%	Disagree%	SD %	Mean	Std.
TASH rely on few dependable suppliers	54.5	36.4	5.5	3.6	0	1.58	.76
TASH rely on few high quality suppliers	3.6	25.5	27.3	25.5	18.2	3.29	1.15
TASH consider quality as number one criterion in selecting suppliers	10.9	32.7	27.3	25.5	3.6	2.78	1.07
TASH establish long term partnership with its suppliers	18.2	36.4	27.3	18.2	0	2.45	.99
TASH has a continual improvement program that includes its main suppliers.	3.6	23.6	36.4	23.6	12.7	3.18	1.06
TASH helps its suppliers to enhance the quality of their products.	7.3	29.1	30.9	25.5	7.3	2.96	1.07
TASH engages its main suppliers in pharmaceutical supply chain planning and goal-setting activities of PSC.	5.5	34.5	34.5	16.4	9.1	2.89	1.05
TASH routinely interacts with consumers to establish reliability, responsiveness, and other requirements.	0	30.9	27.3	25.5	16.4	3.27	1.08
TASH frequently measures and evaluates customer satisfaction	5.5	9.1	25.5	27.3	23.6	3.45	1.2
TASH frequently determine future customer expectations	7.3	18.2	32.7	21.8	20	3.3	1.2

TASH frequently evaluates the formal and informal complaints of its customers	5.5	21.8	23.6	13(23.6)	14(25.5)	3.42	1.24
Average mean	2.96						

Source: own survey result (2024)

In table 10 above, illustrated that 54.5% of the participants strongly agreed that TASH relied on a few dependable suppliers (M = 1.58 and SD = 0.76), followed by 36.4% who agreed. Key respondents stated that EPSA is the only supplier of pharmaceuticals, medicine, supplies, and other reagents. On the reliability of a few high-quality suppliers, 27.3% of respondents were neutral, 25.5% agreed and disagreed equally, and 18.2% strongly disagreed, with a mean score of 3.29 and Std. of 1.15. With the selection of suppliers considering quality as the number one criteria, 32.7% of the respondents agreed, 27.5% were neutral, followed by 25.5% who disagreed, and 3.6% strongly disagreed, with a mean score of value 2.78 and Std. of 1.07.

Regarding the hospital's attempts to create long-term partnerships with its suppliers, the respondents' mean value was 2.45, with a standard deviation of 0.99. Along with continual enhancement programs involving major suppliers, the hospital assists its suppliers to enhance product quality. The respondents' mean scores were 3.18 and 2.96, respectively.

According to the findings, the hospital frequently engages with customers to establish its reliability, responsiveness, and other requirements; frequently measures and evaluates customer satisfaction; frequently determines future customer expectations; and frequently evaluates its customers' formal and informal complaints, which were 3.27, 3.45, 3.3, and 3.42. According to key informants, "pharmaceutical supply requests and resupplies occur in three ways. These include programmed pharmaceuticals, chemotherapeutic pharmaceuticals, and non-programmed pharmaceuticals”.

4.1.4.2 Supply Chain Reliability

The reliability performance characteristic is a customer-oriented attribute that addresses the ability to execute as expected. Reliability refers to the predictability of a process's output. Typical reliability criteria include on-time delivery, the proper amount, and the right quality. Furthermore, performance is linked to

whether the correct product is delivered to the correct location, in the correct quantity, at the correct time, with the correct documentation, and to the correct client.

Table 11: supply chain reliability Descriptive Statistics							
	SA %	A %	N %	DA%	SD%	Mean	Std.
Supply chain results in higher sale rate	36.4	30.9	16.4	14.5	1.8	2.15	1.13
Supply chain results in higher order fill rate	36.4	29.1	16.4	16.4	1.8	2.18	1.16
supply chain results on time delivery	32.7	29.1	14.5	18.2	5.5	2.35	1.27
Supply chain results in higher customer response time	23.6	43.6	10.9	10.9	10.9	2.42	1.27
Supply chain solve the customer complaints	12.7	27.3	23.6	16.4	20	3.04	1.33
Supply chain results not in higher lead time	7.3	30.9	20	23.6	18.2	3.15	1.25
Average mean	2.55						

Source: own survey (2024)

According to the findings in Table 11, most of the participants strongly agreed and agreed (67.3%) on the statement sale rate, with a mean score of 2.15 and std. of 1.13. On the statement of order fill rate, the majority of the respondents also strongly agreed (65.5%) with a mean value of 2.18 and a standard deviation of 1.16. similarly, the mean scores of on-time delivery and high customer response rate were 2.35 and 2.42, respectively. Otherwise, in terms of customer complaints and longer lead times, the mean values of the respondents were 3.04 and 3.15, respectively. According to the pharmacy performance report of the hospital, the fill rate was 63% for non-programmed pharmaceutical supply from EPSA, 67% for programmed pharmaceutical supply, and 86% for revolving drug fund. The hospital also requests and receives pharmaceutical products from donors.

4.1.4.3 Supply chain agility/flexibility

Agility is a customer-focused trait that refers to the ability to respond to external factors, namely the ability and rate at which change occurs. External influences include unanticipated increases or decreases in demand, suppliers or partners going out of business, natural disasters, cyber terrorism, the availability of financial resources (the economy), and labor issues.

Table 12: supply chain agility Descriptive Statistics

	N	Mean	Std. Deviation
TASH has ability to respond to and accommodate fluctuations in demand and seasonality.	55	2.5273	.97856
TASH is capable of responding to and accommodating demand during periods of poor supplier delivery.	55	3.0182	.97165
TASH can respond and accommodate demand during a period of poor supplier performance.	55	3.0909	.90825
TASH can respond to and satisfy demand for a new product, new market, or new competitors.	55	3.3818	1.02724
Valid N	55		
Average mean	**3.005**		

Source: own survey (2024)

As shown in Table 12, the mean score of the statement on the facility's ability to respond to and accommodate fluctuations in demand was 2.53, with a standard deviation of 0.98. The respondent's capacity to respond to and accommodate demand during the supplier's poor delivery time was 3.02 and a standard deviation of 0.97. The mean score for the ability to respond and accommodate demand for the period of supplier performance was 3.09, with a standard deviation of 0.91. Finally, the mean score on the statement of ability to adjust and accommodate new goods, markets, and competitors was 3.38, with a standard deviation of 1.03.

4.1.4.4 Supply chain cost

Cost is an internally oriented attribute that cost process operates. The cost expenditure includes labor, materials, and transportation. Total cost to serve is the most important cost performance metric.

Table 13: supply chain cost descriptive statistics

	SA %	A %	N %	D %	SD %	Mean	Std.
Total cost of resource used	23.6	36.4	21.8	16.4	1.8	2.36	1.08
Total cost of distribution (transport & handling)	20	43.6	18.2	14.5	3.6	2.38	1.08
Total cost of SC (labor, transport and rework)	23.6	43.6	16.4	12.7	3.6	2.29	1.08
Cost associated with holding inventory	20	45.5	27.3	1.8	5.5	2.27	0.99
Minimizing waste	14.5	32.7	30.9	10.9	10.9	2.71	1.18
Return on investment	20	32.7	25.5	16.4	5.5	2.55	1.18
Average mean	**2.43**						

Source: own survey (2024)

As shown in Table 13, most of the participants agreed or strongly agreed on the entire cost of the hospital's resources (36.4% and 23.6%, respectively). 21.8% were neutral, 16.4% disagreed, and only 1.8% strongly disagreed with this statement, with a mean score of 2.36 and a standard deviation of 1.08. Similarly, 43.6% of respondents agreed that the overall cost of distribution (transport and handling) and the total cost of SC (labor, transport, and rework) are identical but had different mean values. 45.5 percent of respondents agreed on the facility cost of inventory storage, 27.3% were neutral, 20% strongly agreed, 5.5% strongly disagreed, and 1.8 disagreed, for a mean score of 2.27 on this issue. In the context of facilities waste minimization, 32.7% agreed, 30.9% were neutral, 14.5% strongly agreed, and 10.9% disagreed and strongly disagreed, giving a mean value of 2.71 and SD of 1.18. In terms of the facility's return on investment, 32.7% agreed, 25.5% were neutral, 20% strongly agreed, 16.4% disagreed, and 5.5% strongly disagreed with the mean score of 2.55 and a similar standard deviation for waste minimization.

According to key informants, the transportation, loading and unloading costs covered by the hospital and the activities performed by its permanent employees (porters) for non-programmed pharmaceutical products.

The transportation costs of programmed pharmaceutical products (ART, malaria, TB drugs, and maternal supply) were covered by EPSA.

4.1.4.5 Asset management

Asset management efficiency is an internally focused attribute that indicates an organization's capacity to use assets efficiently. Inventory reduction and in-sourcing vs. outsourcing are two asset management strategies used in supply chain management. Asset measurements include inventory days of supply and capacity utilization.

Table 14: asset management descriptive statistics

	Strongly agree %	Agree %	Neutral %	Disagree %	Strongly disagree %	Mean	SD
The hospital has enough resources	9.1	23.6	14.6	23.6	29.1	3.4	1.37
The hospital use its current asset properly	1.8	16.4	21.8	32.7	27.3	3.67	1.11
The hospital properly utilize assets	7.3	21.8	20	34.5	16.4	3.31	1.2
The hospital optimizes assets	0	14.5	18.2	43.6	23.6	3.76	0.98
The hospital's assets are properly managed	3.6	12.7	12.7	38.2	32.7	3.84	1.13
Average mean	3.60						

Source: own survey (2024)

According to the descriptive analysis in Table 14, 29.1% of participants strongly disagreed that the hospital had sufficient resources, including human and capital resources. On the other way, 23.6% of participants agreed and disagreed similarly. 14.6% of respondents were neutral, while 9.1% strongly agreed, with a mean score of 3.4 and a std. of 1.37. The majority of respondents (60%) disagreed or strongly disagreed with the statement that the hospital uses its current assets properly, with a mean value of 3.67 and a std. value of 1.11.

In terms of the hospital's proper asset utilization, 34.5% of respondents disagreed and 21.8% agreed. Similarly, 20% of respondents were neutral, while 16.4% strongly disagreed on this issue, with a mean score of 3.31. The findings on hospital asset optimization revealed that more than two-thirds of respondents

disagreed and strongly disagreed (67.2%). However. 18.2% of respondents were neutral, 14.5% agreed, and the mean value for this statement was 3.76. Concerning to the hospital assets being appropriately managed, 38.2% of respondents disagreed, and 32.7% strongly disagreed, with a mean score of 3.84 and a standard deviation of 1.13.

Based on the key informants and researcher observation, the facility had sixteen, including community-based pharmacy dispensing units and 3 stores (medicine, supply, and instrumental store). The pharmacy employees rotated to work in all dispensing units. Most of the dispensing units were opened for 24 hours. We had seen that the human resources in the pharmacy unit were not enough when they were divided into each unit to work properly, and it had impact on the pharmacy service in the facility.

4.2 Discussion

The study focused on the assessment of the pharmaceutical supply chain performance and practice of Tikur Anbessa Specialized Hospital using performance attributes that include responsiveness, reliability, flexibility, supply chain cost, and asset management.

The general supply chain practice of TASH

The availability bin cards, request and resupply forms (RRF), and internal facility reports and requests (IFRR) were 100% in the hospital, and the facility used this documentation for logistics management information system reporting and requesting. In addition, 81.8 percent of the respondents said that there was FRRF in the hospital. Based on the findings, there was good documentation practice in TASH. In a similar study by Haymanot (2019), bin cards and IFRR were 100% available, which is the same as this study, but little difference was seen in the availability of RRF, which was 93.3%. Even though most of the employees took training for recording pharmaceutical supplies, there were not a few who didn't take training (14.5%). This implies that the employees may start working without training in the facility. Giving service without preservice and other training had impacts on pharmaceutical service and the distribution of pharmaceutical supplies.

On the frequency of RRF reporting to higher levels, 54.5% of respondents said that the report was sent monthly. 27.3% said the report was sent bimonthly and 18.2% quarterly. This implied that most of the time, the report is sent to a higher level monthly. However, on the mechanism of requesting and resupplying

reports sent to EPSA, 49.1% of respondents said that the reports were sent through mail and facility staff. According to the response, we concluded that the report was sent to EPSA by both mechanisms, i.e., through mail and facility staff. According to a study by Haymanot (2019), the results of requesting and resupplying reports sent to EPSA were 46.5% monthly and 23.3% every two months. The result showed that in both studies, most of the respondents agreed that the report should be sent to a higher level monthly. This result strengthens the formulation that the RRF form can be sent via mail, email, courier, or hand delivery (PFSA, 2017).

Supply chain responsiveness

As previously stated, the statement on the hospital is based on a few dependent suppliers; the mean value was 1.58 with a standard deviation of 0.76. The results showed that there was strong agreement that the hospital relied on one supplier, EPSA. However, the hospital's statement is based on high-quality suppliers, and since quality is considered a main criterion in supplier selection, the mean values are 3.29 and 2.78, with standard deviations of 1.15 and 1.07. The results showed gaps in the narration of customer satisfaction, complaints, and the program's continual improvement (see Table 10). The findings suggested that the hospital relied on a few suppliers, with less consideration of product quality and supplier capacity and less concerned with patient satisfaction, complaints, and progressive improvement. The study by Georgebush (2019) at Howassa Comprehensive Hospital indicated that the supply of pharmaceuticals was EPSA, and patients had looked into alternative hospitals due to the drugs' decreased perfect order fulfillment.

In other ways, respondents agreed moderately on all statements except the subject matter of the facility frequently measuring and evaluating customer satisfaction and evaluating formal and informal customer complaints, with mean values of 3.45 and 3.42, respectively. This conclusion was similar to Adane's (2017) research of Addis Pharmaceutical Factory, which found that the company failed to respond to customer orders, lacked a good communication system, and did not conduct customer surveys to monitor customer satisfaction levels. In general, the hospital performed moderately in terms of supply responsiveness, with an average mean value of 2.96.

Supply chain reliability

The majority of respondents strongly agreed or agreed (67.3%) on the statement of sale rate, which had a mean value of 2.15 and a standard deviation of 1.13. On the statement about order fill rate, most of the

respondents highly agreed and agreed (65.5%), with a mean value of 2.18 and a standard deviation of 1.16. However, respondents were another dimension of the response to customers complaining and longer production wait times, with mean values of 3.04 and 3.15 respectively. According to key informants, programmed pharmaceutical supply had a higher fill rate in TASH than non-programmed. The delivery time and fill rate were different between programmed and non-programmed. This stated the fact that all public health institutions got non-program pharmaceutical supplies within two weeks of their request (Woldehitsan, 2018). This finding is close to the hospital performance fill rate of the supply (see Table 11 and the document below). Muia (2013) identified irregularities in medication supplies in Kenyan government hospitals. In other cases, there existed a disparity between the demand and supply of medicinal items in developing and industrialized nations. These issues are caused by unaffordable costs, inaccessibility of pharmaceutical products, irrational medication use, a budget shortage, and an inconsistent pharmaceutical supply and distribution system (OMS, 2004). This finding demonstrated that the overall performance of supply chain reliability was good with a weighted mean value of 2.55. The demand-supply imbalance in TASH raises concerns about the pharmaceutical supply chain's reliability.

Supply chain flexibility

More than half of respondents believed that a hospital can adjust to and handle demand fluctuations and seasonality. The proportional responses ranged from neutral to disagree on the statement about the hospital's ability to respond to and accommodate the demand for new products and markets.

Based on the key informants, the hospital procured pharmaceutical products only from EPSA. This implies that the hospital had less probability to procure pharmaceutical products from other sectors. Therefore, the supply chain of the hospital was not flexible for procurement. Similarly, the study by Haymanot (2019) also indicated that the procurement of the pharmaceutical supply was not agile and procured only EPSA.

Supply chain costs and asset management

As the findings indicated, the mean value of the supply chain cost ranges from 2.27 to 2.71 on each statement (see table 13). A relatively high level of disagreement was shown in the statement on waste minimization in the supply chain and return on investment, with a mean score 2.71 and 2.55 respectively, and a standard deviation of nearly similar value (1.18). This suggested that among the statements on cost supply waste minimization and return on investment need more concentration to improve. In whatever manner, the

average mean value of supply cost on the whole statement was 2.43, which is less than 2.6. Based on the average mean value, the hospital performed well in terms of supply chain costs.

Table 14 showed that respondents in all statements of asset management questionnaires were very disagreeable, with a mean score value ranging from 3.31 to 3.84. These findings suggested that there were significant gaps in supply chain asset management. Teferi G. et al. (2016) found that poor pharmaceutical sector management in Ethiopia has resulted in problems managing pharmaceuticals at all levels of healthcare. Medicines were not chosen and prioritized using established procedures and techniques, resulting in frequent stockouts and the expiration of life-saving drugs. Furthermore, pharmaceutical services weren't systematized to allow for efficient workflow and drug use counseling during distribution, which limited treatment outcomes and patient satisfaction. Services were not properly documented or standardized. As a result, no relevant reports were prepared or distributed to the appropriate entity to assist decision-making. Pharmaceutical supply chain management has gotten increasingly difficult because it concerns human lives and requires the engagement of various stakeholders, such as pharmaceutical manufacturers, wholesalers, distributors, and customers, information service providers, and regulatory agencies (Kapoor, 2018).

The mean value of all asset management statements was 3.6. Based on this, the findings indicate that the hospital's asset management performance was inadequate and required improvement.

Chapter Five: Conclusion, Recommendation, Limitation and Future Study

5.1 Conclusion

The study sheds light on the effectiveness of the pharmaceutical supply chain. The goal of this research is to evaluate the pharmaceutical supply chain's performance at Tikur Anbessa Specialized Hospital using five attributes or metrics. Based on the findings, the following conclusions are drawn: The hospital used various IPLS/LMIS systems for requests, reports, and resupply of pharmaceutical supplies. The facility used both manual and electronic reporting and requesting, and it sent requests for medicinal items and received them from EPSA.

The supply chain reliability analysis revealed the sale rate, fill rate, on-time delivery, and customer response rate; the average value of each statement falls between 2.18 and 2.42, which is less than 2.6. There were greater gaps in the reliability declarations regarding customer complaints and lead time. Furthermore, the reliability performance of those propositions was good. Despite this, dependability performance was moderately correlated with customer complaint response time and lead time. The total average mean value of the complete reliability supply chain was 2.55. Based on this finding, we can conclude that TASH had a good supply chain performance.

The study's supply chain responsiveness found that the hospital relies on just a few suppliers, specifically EPSA. The hospital responds that it aims to create long-term partnerships with its suppliers, with less consideration of quality as a primary criterion in supplier selection. However, the finding on the statement that TASH routinely measures and assesses customer satisfaction, as well as formal and informal customer complaints, was low, with a scored mean value of 3.45 and 3.42, respectively. However, deficiencies were discovered in the description of quality selection criteria, the connection with the supplier, and quality improvement. However, the overall average mean value of the responsiveness supply chain was 2.96. We can deduce that the performance was moderate in the facility based on the average mean value.

On supply chain flexibility, the result revealed that the hospital tried to accommodate demand variations and seasonality, but it didn’t procure pharmaceutical products rather than EPSA.

The supply chain costs include labor, materials, and transportation. The transportation costs of the programmed pharmaceutical products were covered by EPSA. However, all the costs of non-programmed pharmaceutical products are covered by the facility itself. As indicated in the statements of cost supply, a relatively large gap was seen in waste minimization in the cost supply chain. The average mean value of cost supply was 2.43, and we conclude that the cost supply performance was good.

The majority of respondents disagreed or strongly disagreed with the overall claims about supply chain asset management. The average mean value for the asset management statements was 3.60. As a result, we conclude that the hospital performed poorly in terms of supply chain asset management.

5.2 Recommendation

- The study implied the need for the involvement of the supplier and client in supply management practices and performance.
- It is recommended that pre-training and other training be provided for the facility employees to provide proper recording, reporting, and requesting.
- To ensure the responsiveness of the pharmaceutical chain, it is important that the hospital closely interact with its supplier and work collaboratively for the success of providing appropriate health care.
- It is important for the hospital to recommend seeing patients complain, evaluating client's satisfaction, and identifying customer expectations to achieve its goal and improve health care performance.
- To enhance the availability of the pharmaceutical supply chain, it is recommended that the hospital look into alternative suppliers for offering better healthcare.
- In order to maintain asset supply chain management efficiently, TASH develops a strategy for proper use of resources, utilizes resources, optimizes its assets, and works on its weaknesses.

5.3 Limitations and Future Research

The performance of SC requires a variety of organizational actions and stakeholders. However, this study focused on the pharmaceutical supply chain at one organization with a small sample size of pharmacy personnel at TASH. The findings revealed low patient satisfaction, poor asset management, and a gap of quality concern with the supplier in the facility. Other studies are advised on the performance of the

pharmaceutical supply chain in terms of supplier performance, patient satisfaction, resource management of the facility, and the relationship between the supplier and the hospital. The other study that the researcher will recommend is the effect of electronic technology on the performance of pharmaceutical supply.

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Annex

Consent form

Good morning/ Good afternoon

Hello, my name is Adafir Tadesse, MA student in logistics and supply chain management at AAU School of Commerce. I am here today to collect data on Analysis of Pharmaceutical Supply Chain Performance in the case of Tikur Anbessa Specialized hospital. The objective of this study is to assess the performance of pharmaceuticals supply chain in Tikur Anbessa specialized Hospital. You are being asked to take part in this study and respond genuinely.

I have been informed that the purpose of this study is to assess the performance of pharmaceutical supply chain. I have understood that participation in this study is entirely voluntarily. I have be tell that my answers to the question will not be given to anyone else and no reports of this study ever identify you in any way. I have also be informing that my participation or non- participation or any refusal to answer question will have no effect on me. I understand that participation in this study does not involve risk. You have read this form or it has been read in the language you understand, all conditions stated above.

Therefore, are you willing to participate in this study?

- I agree to participate
- I don't agree to participate

Date of interview_____ time started _____ time completed_____

Contact: adafirt40@gmail.com

Section one: personal background

Q. no.	Question	Alternative
1	Sex	A, Male B. Female
2	Age	18- 25 B. 26-35 C.36- 45 D. 46 and above

3	Education back ground	Diploma B. Degree C. Master D. PhD and above Other specify……..
4	year of service in TASH hospital	Less than one year 1-5 years 6-10 years More than 10 years
5	Please indicate your current position	A. Pharmacy head B. Store manager C. pharma coordinator D. Pharmacy profession E. Others specify…….

Section two: assessment of overall SC of the TASH

No.	Questions	Alternative
1	Are the following Logistic Management Information System LMIS formats, Job Aids and SOPs are available at the facility?	
1a.	bin card	A. Yes B. No
1b.	internal facility report & requisition form (IFRR)	A. Yes B. No
1c.	facility report & requisition form (FRRF)	A. Yes B. No
2	Do you use the following stock keeping logistics formats to manage health products in this Facility? (Must be verified by checking sample completed bin cards)	
2a	Bin card	A. Yes B. no
2b	Stock card	A. Yes B. no
2c	Others (specify)……..	……

3	What LMIS forms do you use for reporting/ordering? Multiple response are possible (must be verified with completed reports)	
3A	IFRR	A. Yes B. no
3B	RRF	A. Yes B. no
3D	Others (specify)…….	A. Yes (specify… B. no
4	The Hospital compiles and sends RRF reports to higher level?	A. Yes B. no, if no, go to question no.7
5	If yes, to whom? Multiple response are possible	A.PFSA B. RHB C.Zone health office D. WHO E. Don't know F. Other….
6	If Yes, How often are these LMIS reports (RRF reports) sent to the higher level? Multiple responses are possible.	A Monthly B. Everytwo month C. Quarterly D. Sumi-annual E. Annually F. Other…..
7	When was the last time the Hospital sent RRF report? (Must be verified with completed reports)	A Never B. Within the last month C. Month ago D. two month a go
8	Do all columns in RRF are completed for all medicines? (Must be verified with completed reports)	A. Yes_____ B. No_____ C. Completed reports not available
9	What is the mechanism that your Hospital sends RRF report to the higher level?	A. Sent through mail B. Picked up by supervisor C. Picked up by other higher level staff D. Hand carried by facility's staff E. Other (specify)_____

10	Does the Hospital has a resupply schedule for dispensing units?	A. Yes B. No, If Yes, Check posted Schedule …….. If No, specify the reason……..
11	If yes, do the dispensing units follow their regular schedule?	Yes__ B. No__ If yes, Observe filled IFRR with their schedule, If no reason
12	How did you learn to complete the forms/records used at this facility? Multiple responses are possible	A. Formal Trainings IPLS B. Pre service Trainings C. Other formal trainings (Specify) D. On-the-job training (other staff from facility) E. On-the-job training (someone outside facility F. Never been trained
13	How many emergency orders have you placed in the last three months? If available ask for documents to verify using RRF	A. None B. 1 C. 2 D. 3 E. More than 3 F. NA_____
14	What type of formats have you used to place emergency orders?	A. Using RRF B. using letter C. Through phone D. Orally E. Other (specify)……
15	Who determines this facility resupply quantity? Multiple responses are possible	**A.** The facility itself **B.** Higher-level facility (Health Center, PFSA/Woreda/Zone/RHB) **C**. Other (Specify) …..

Section 3: supply chain analysis based on supply chain operation reference (SCOR) model
Choose only one level of agreement for each statement related to the current pharmaceutical supply chain practice of TASH. Tick (/) Key =1-Strongly Agree (SA), 2- Agree (A), 3-Netrual (N), 4Disagree (D), 5-Strongly Disagree (SD).

Supply chain responsiveness Questions		1	2	3	4	5
1	The hospital rely on few dependable suppliers					
2	The hospital rely on few high quality suppliers					
3	TASH consider quality as number one criterion in selecting suppliers					
4	The hospital strive to establish long term relationship with its suppliers					
5	The hospital has continuous improvement programs that include its key suppliers					
6	The hospital helps its suppliers to improve their product quality					
7	The hospital include its key suppliers in its planning and goal setting activities of pharmaceutical supply chain					
8	Your organization frequently interacts with customers to set its reliability, responsiveness, and other standards					
9	Your organization frequently measures and evaluates customer satisfaction					
10	Your organization frequently determine future customer expectations					
11	Your organization frequently evaluates the formal and informal complaints of its customers					
supply chain reliability analysis questions		1	2	3	4	5
1	Supply chain results in higher Sales rate					
2	Supply chain results in higher Order fill rate					
3	Supply chain results in On time delivery					
4	Supply chain results in higher Customer response time					
5	Supply chain results in solve customer complain					
6	Supply chain not results in longer lead time					
Supply chain flexibility		1	2	3	4	5

1	TASH has ability to respond to and accommodate fluctuations in demand and seasonality.					
2	TASH is capable of responding to and accommodating demand during periods of poor supplier delivery.					
3	TASH can respond and accommodate demand during a period of poor supplier performance.					
4	TASH can respond to and satisfy demand for a new product, new market, or new competitors.					
supply chain cost analysis question		1	2	3	4	5
1	Total cost of resources used					
2	Total cost of distribution, including transportation and handling cost					
3	Total cost supply chain, including labor, transportation and re-work cost					
4	Cost associated with held inventory					
5	TASH supply chain has the ability to minimize waste					
6	Return on investment					
Supply chain asset management questions		1	2	3	4	5
1	TASH have enough resources including human and capital resources					
2	TASH uses its current assets properly					
3	TASH Properly utilize assets					
4	TASH optimize assets					
5	TASH assets are properly managed					