



**FACTORS AFFECTING EFFECTIVENESS OF SUPPLY CHAIN
MANAGEMENT PRACTICES: A CASE OF SELECTED
PHARMACIES AND DRUG STORES IN HAWASSA CITY
SIDAMA REGION, ETHIOPIA**

MBA THESIS

BY

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**HAWASSA UNIVERSITY
COLLEGE OF BUSINESS AND ECONOMICS
DEPARTMENT OF MANAGEMENT**

**MARCH 2024
HAWASSA, ETHIOPIA**

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**A THESIS SUBMITTED TO DEPARTMENT OF MARKETING COLLEGE
OF BUSINESS AND ECONOMICS, SCHOOL OF GRADUATE STUDIES
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OF MASTER OF ART IN MARKETING MANAGEMENT**

**HAWASSA UNIVERSITY
COLLEGE OF BUSINESS AND ECONOMICS
DEPARTMENT OF MANAGEMENT**

**MARCH 2024
HAWASSA, ETHIOPIA**

DECLARATION

I, the undersigned, declare that this thesis entitled “*FACTORS AFFECTING EFFECTIVENESS OF SUPPLY CHAIN MANAGEMENT PRACTICES: A CASE OF SELECTED PHARMACIES AND DRUG STORES IN HAWASSA CITY SIDAMA REGION, ETHIOPIA*” is my own original work and has not been presented in any other University. All sources of materials used for this thesis have been duly acknowledged.

Name: MARGIR YIRGU

Signature_____

Date_____

ADVISOR'S APPROVAL SHEET

This is to certify that the thesis entitled “*Factors Affecting Effectiveness of Supply Chain Management Practices: A Case of Selected Pharmacies and Drug Stores in Hawassa City, Sidama Region, Ethiopia,*” submitted in partial fulfillment of the requirements for the degree of Master of Art in Marketing Management, has been carried out by Margir Yirgu under my supervision. Therefore, I recommend that the student has fulfilled the requirements and, hence, submit the thesis to the Department of Marketing Management.

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APPROVAL OF THE THESIS

As members of the Board of Examiners of the final Master’s thesis open defense examination, we certify that we have read and evaluated the thesis prepared by Margir Yirgu entitled “*FACTORS AFFECTING EFFECTIVENESS OF SUPPLY CHAIN MANAGEMENT PRACTICES: A CASE OF SELECTED PHARMACIES AND DRUG STORES IN HAWASSA CITY, SIDAMA REGION, ETHIOPIA*” and examined the candidate. We recommend that the thesis be accepted as fulfilling the thesis requirement for the degree of master of marketing management.

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Acronyms and Abbreviations

EDI	Electronic data interchange
EOQ	Economic order quantity
ERP	Enterprise resource planning
FDA	Food and Drug Administration
LSP	Logistic Service Provider
RFID	Radio frequency identification
WHO	World health organization
MoH	Ministry of health
JIT	Just-in-time
TQM	Total quality management
GDP	Good distribution practice.
VMI	Vendor management inventory
CPFR	Collaborative planning forecasting and replenishment.
IFPMA	International federation of pharmaceutical manufacturers and associations
PSCS	Pharmaceutical supply chain strategy
PFSA	Pharmaceutical fund and supply agency
SCM	Supply chain management
GMP	Good manufacturing practice
OECD	Organization for Economic Cooperation and Development
FID	Radio frequency identification
ROP	Re-order point
PR	Periodic review
JIT	just in time
VMI	Vendor-managed inventory
MCDM	Multi-criteria decision making
TOPSIS	Technique for order preference by similarity to ideal solution
AHP	Analytic hierarchy process
SRM	Supplier relationship management
DEA	Drug enforcement administration

FDA	food and drug administration
NABP	National associations of boards of pharmacy
EDI	Electronic data interchange
IOT	Internet of things
AI	Artificial intelligence
GPS	Global positioning System
ICT	Information and communication technology
NABP	National associations of boards of pharmacy

Abstract

Supply chain management is the coordination and management of activities involved in the production and delivery of products or services to customers. The main objective of this study is to investigate factors affecting the effectiveness of supply chain management practices at selected pharmacies and drug stores in Hawassa City, Sidama Region, Ethiopia. Independent variables namely; counterfeiting, global economic condition, inventory management, procurement process, regulatory requirements, technology utilization, transport, and logistics, were identified and examined. The effectiveness of supply chain management practices was a dependent variable in the study.

To achieve study objectives, quantitative and qualitative research approaches with an explanatory and descriptive research design were used. The study used the judgmental sampling method, considering certain characteristics. The primary data was collected from 154 respondents by using Likert-scale survey questionnaires. Qualitative data was also collected through a semi-structured interview. Quantitative data was analyzed using descriptive and inferential statistics with the help of Statistical Package for Social Science (SPSS) version 25 software. The correlation result of the study indicates that all independent variables have a positive and significant relationship with the dependent variable. The regression result also shows that, except for counterfeiting, the remaining independent variables have a positive effect on the effectiveness of supply chain management practices. The study concluded that there was a significant and positive association between all independent variables and the dependent variable. All independent variables positively and significantly affect the effectiveness of supply chain management practices, except counterfeiting. Counterfeiting negatively affects the effectiveness of supply chain management practices at selected pharmacies and drug stores in Hawassa City. To enhance the effectiveness of supply chain management practices, the study forwarded recommendations to key stakeholders such as regulatory authorities, pharmacy associations and professional organizations, government and development agencies, and educational institutions.

Key words: supply chain management; SCM Practices, counterfeiting

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

The supply chain is a system of organizations, people, technology, activities, Information, and resources involved in moving products or services from supplier to customer. Supply chain activities transform natural resources, raw materials, and components into a finished product that is delivered to the end customer (Chopra & Meindl, 2016). It is a critical component of modern business operations, encompassing, and a wide range of activities from sourcing to delivery (Nurmilaakso et.al, 2021).

Supply chain management is the coordination and management of activities involved in the production and delivery of products or services to customers. In the 1980s and 1990s, SCM began to gain widespread recognition as a key driver of business performance. It includes the planning, sourcing, manufacturing, transportation, storage, and distribution of goods and services, as well as the management of information related to these activities. Effective supply chain management is critical to the success of business in various Industries by reducing costs, improve efficiency, and enhance customer satisfaction (Council of SCM professional, 2021).

The world health organization (WHO) has played a key role in shaping the concepts of supply chain management in the health care industry and its focus was emphasizing the importance of effective supply chain management in ensuring access to essential medicines (WHO, 2011). Effective supply chain management practices can lead to improved customer satisfaction, increased profitability, response more quickly to demand and market trends and reduces wastes (WHO 2016).

According to the International federation of Pharmaceutical Manufacturers and Association (IFPMA), the continued growth of the pharmaceutical industry, pharmaceutical supply chain management practices has become increasingly complex and requires close collaboration between manufacturers, distributors, pharmacists, hospitals, and other stakeholders to manage the entire supply chain process. However, the complex nature of the pharmaceutical supply chain, coupled with issues such as counterfeit drugs, drug shortages, and pricing fluctuations has led to challenges in managing supply chains (IFPMA, 2017).

According to a report of world health organization (WHO) in 2021, more than 2 billion people around the world lack access to essential medicines, with the majority of these individuals living in developing countries.

Over the last several decades, the largest share of the world population has not benefited from simple, safe, and effective supply chain management practices. In recent years, there has been an increasing focus on improving supply chain management practices in the pharmaceutical industry, particularly in developing countries where access to essential medicines is often limited. Moreover specifically the WHO report shows that the availability of essential medicines in Ethiopia is low, with many areas of the country experiencing a shortage of essential medicines (WHO, 2017). Similarly, as a report of 2023, a significant proportion of the population in developing countries still lack regular supply chain management practices in pharmacies; this has resulted from the challenges related to the supply chain management practice (WHO, 2023).

Furthermore, reports from the Ministry of health in Ethiopia (MoH) in 2019, clarified the key factors affecting the supply chain management practice of selected pharmacies, including issues of counterfeiting, global economic conditions, inventory management, procurement process, regulatory requirements, Technology utilization, transportation, and logistics, these research aim to explore these factors and how they impact the supply chain in selected pharmacies and possible strategies to mitigate them (MoH, 2019). In addition, the Ethiopia Federal Ministry of Health has developed the pharmaceutical supply chain strategy (PSCS) to improve the availability and accessibility of essential medicines in the country to strengthen the pharmaceutical supply chain management practices at all levels of the health system, including the private sector (Federal MoH, 2015).

The Ethiopian Government has established the pharmaceutical fund and supply Agency (PFSA) to improve the procurement, storage, and distribution of pharmaceutical products in the country. The PFSA is responsible for coordinating the supply chain management practices of pharmaceutical products, including Quality control, Inventory management, and distribution to health facilities and pharmacies (PFSA, 2021).

1.2. Statement of the Problem

Supply chain management plays a crucial role in the pharmaceutical industry, ensuring the availability, quality, and timely delivery of medications to patients. According to World Health Organization report, many low and middle-income countries encountered different challenges such as: lack of adequate infrastructure, limited access to information, lack of data visibility, poor quality control, lack of trained personnel in supply chain management, limited financing, and lack of investments in supply chain infrastructure (WHO, 2018). In addition to this, the African Development Bank (2020) reports that many pharmaceutical companies in Ethiopia face challenges in managing their supply chains effectively due to a lack of inadequate transport and logistics, technology and automation, inadequate data management, and limited collaboration between stakeholders. Similarly, according to USAID (2018), the pharmaceutical supply chain in Ethiopia is characterized by a lack of visibility and control, which leads to delays, losses, and spoilage of products.

The Federal Democratic Republic of Ethiopia, Ministry of Health (2018) also reports that the Ethiopian pharmaceutical supply chain has several challenges, including inadequate infrastructure, limited access to finance, a lack of skilled workers, especially supply chain managers and quality control specialists, regulatory challenges, and political instability, which encounters non-availability, unaffordability, poor inventory management, and weak distribution systems, which pose health facilities with a problem in getting the right products, the right quantity, and the right quality at the right time, in the right place, and at the right cost due to weak supply chain management practices.

Furthermore, limited studies have shed light on various factors that affect supply chain management in the pharmaceutical sector in Ethiopia. For instance, research conducted by Tadesse et al. (2018) identified challenges such as counterfeit drugs, poor inventory management, and regulatory compliance in the Ethiopian pharmaceutical sector. Likewise, Gebrehiwot et al. (2017) highlighted issues related to lead time, stockouts, and transportation logistics in the Ethiopian healthcare sector. While these studies provide valuable insights into the general challenges within the industry, there is a research gap regarding the specific challenges faced by selected pharmacies and drug stores in Hawassa City, Ethiopia. The existing literature lacks a comprehensive understanding of the unique challenges encountered

by selected pharmacies and drug stores in Hawassa City. These challenges may be influenced by contextual factors such as infrastructure limitations, regional logistic challenges, and specific regulatory requirements. Understanding these challenges is crucial for improving supply chain effectiveness and addressing the specific needs of the local pharmaceutical industry in Hawassa City. Therefore, there is a need to identify and analyze the specific problems faced by selected pharmacies and drug stores.

Additionally, the main reason that motivated the researchers to conduct this study was inspired by the challenges encountered while working within a public hospital in Hawassa City as a pharmacy professional. Therefore, identifying and analyzing specific problems are crucial to developing certain strategies and interventions which can improve the supply chain management practices of selected pharmacies and drug stores in Hawassa City.

Improving the effectiveness of supply chain management practices in pharmacies and drug stores is crucial for ensuring the efficient and reliable delivery of medications to patients. By investigating the specific challenges faced by selected pharmacies in Hawassa City, this research will provide valuable insights into the unique contextual factors that impact supply chain management practices in the local pharmaceutical industry. The findings will contribute to the development of strategies and interventions that can enhance supply chain performance, optimize inventory management, streamline procurement processes, meet regulatory requirements, leverage technology utilization, and improve transport and logistics.

The study aims to understand the effects of identified factors such as counterfeiting, global economic conditions, inventory management, procurement process, regulatory requirements, technology utilization, and transport and logistics on the overall effectiveness of supply chain management practices. Hence, this study examined factors affecting the effectiveness of supply chain management practices of selected pharmacies and drug stores in Hawassa City.

1.3. Research Questions

1. What are the current supply chain management practices of pharmacies and drug stores in Hawassa City?
2. What are the factors affecting the supply chain management practices of pharmacies and drug stores in Hawassa City?

3. How can technology be utilized to enhance and optimize supply chain management practices in pharmacies and drug stores in Hawassa City?

1.4. Objective of the Study

1.4.1. General objective

The general objective of this study is to examine factors affecting the effectiveness of supply chain management practices of pharmacies and drug stores in Hawassa City.

1.4.2. Specific objectives

1. To describe the specific supply chain management practices of pharmacies and drug stores in Hawassa City.
2. To examine factors affecting effectiveness of supply chain management practices of pharmacies and drug stores in Hawassa City
3. To explore the current utilization of technology in supply chain management practices among pharmacies and drug stores in Hawassa City.

1.5. Significance of the Study

1.5.1. For Individuals

A well-functioning supply chain management system is crucial in ensuring that individuals receive proper and quality medications. This means that patients can be confident that the medications they are receiving are safe and effective, leading to improved patient outcomes and high-quality patient care. Furthermore, an efficient supply chain management system can help to reduce waste, minimize excess inventory, and improve overall supply chain efficiency, leading to cost reduction. This can ultimately result in increased profitability for healthcare providers, which can be reinvested into the healthcare system to further improve patient care.

Moreover, an efficient supply chain management system can also help to ensure that medications are distributed properly and in a timely manner. This means that healthcare providers can respond quickly to supply chain disruptions, such as shortages or recalls, and better meet changing patient demands. Additionally, a transparent supply chain management system can help to improve communication and collaboration across the healthcare sector, leading to improved patient outcomes and safer medication application.

Overall, the study highlights the importance of implementing an efficient supply chain management system in the healthcare industry. By doing so, healthcare providers can improve patient outcomes, reduce costs, and enhance the overall quality of patient care.

1.5.2. For the community

The study's findings and recommendations have the potential to bring about numerous benefits to the community, including improved supply chain performance, development of best practices, satisfied customers, increased quality of public health, and improved policy-making decisions. By implementing the study's recommendations, pharmacy retail shops in Hawassa City can improve their supply chain management practices, leading to improved patient outcomes, increased customer satisfaction, and ultimately, the growth and success of the businesses. Additionally, the study's findings can inform policy-making decisions related to health care supply chains, enabling policy makers to improve regulations and standards for stock management and circulation, leading to better health outcomes for the community. Overall, the study's findings and recommendations have the potential to positively impact the community by improving the efficiency and effectiveness of the supply chain management practices in pharmacy retail shops, leading to better health outcomes and increased customer satisfaction.

1.5.3. For pharmaceutical sectors

The study's findings and recommendations have significant implications for the pharmaceutical sector, particularly in identifying the critical factors that hinder effective supply chain management. By examining the weaknesses in the supply chain management practices of pharmacy retail shops, the study helps to identify bottlenecks and areas for improvement. This information can be used to optimize supply chain management practices, increase speed, reduce operational costs, and ultimately improve profitability. Additionally, the study's findings can shape market strategies and policies, providing benchmarks and best practices for the pharmaceutical sector. This can help to improve the overall efficiency and effectiveness of the supply chain management practices in the sector, leading to better patient outcomes and increased customer satisfaction. Furthermore, the study's findings can inform policy-making decisions related to health care supply chains, enabling policy makers to improve regulations and standards for stock management and circulation, leading to better health outcomes for the community. Overall, the study's findings and recommendations have

the potential to positively impact the pharmaceutical sector by improving the efficiency and effectiveness of supply chain management practices, leading to better patient outcomes and increased customer satisfaction.

1.5.4. For Policy makers and practitioners

The study's findings and recommendations have significant implications for policy makers and practitioners in the field of supply chain management. By examining the critical factors that affect the efficiency and effectiveness of supply chain operations in pharmacy retail shops, the study provides valuable insights that can inform decision-making and help optimize existing operations.

Firstly, the study helps policy makers and practitioners identify key drivers of supply chain performance, such as inventory management, logistics, and supplier selection. By understanding the impact of these drivers on supply chain performance, policy makers and practitioners can make informed decisions to improve supply chain operations and develop strategies to overcome potential obstacles.

Secondly, the study provides insights into the optimization of existing operations and the development of more efficient and effective strategies to manage supply chains. By analyzing the data collected from the case study, policy makers and practitioners can identify areas for improvement and develop strategies to address them.

Thirdly, the study's findings can inform policy making by providing regulators with best practices for supply chain management. By understanding the key drivers of supply chain performance and the challenges faced by pharmacy retail shops, regulators can develop policies and regulations that promote efficient and effective supply chain management practices.

Lastly, the study's findings can help policy makers and practitioners identify opportunities for improvement by considering the potential impact of various internal and external factors on pharmacy operations. By analyzing the data collected from the case study, policy makers and practitioners can identify potential areas for improvement and develop strategies to address them.

Overall, the study's findings and recommendations have significant implications for policy makers and practitioners in the field of supply chain management. By providing valuable insights into the critical factors that affect supply chain performance, the study can help

inform decision-making and optimize existing operations, leading to more efficient and effective supply chain management practices.

1.5.5. For the Researcher

The study's findings and recommendations have significant implications for various stakeholders, including researchers, policy makers, pharmacy managers, and owners.

For researchers, the study provides valuable insights into enhancing the efficiency and effectiveness of pharmacy supply chain management. The study's findings on the critical factors that affect supply chain performance, such as inventory management, logistics, and supplier selection, can help researchers develop strategies to improve supply chain operations. Additionally, the study's analysis of the impact of internal and external factors on pharmacy supply chains can help researchers identify areas for future research and development.

For policy makers, the study's findings have significant implications for policy and decision making. The study helps health care policy makers perform informed decisions that improve overall health care access and affordability by identifying the key drivers of supply chain efficiency. For example, policy makers can develop programs that incentivize pharmaceutical manufacturers and distributors to ensure a steady supply of drugs to pharmacies. Additionally, the study's findings can help policy makers develop regulations and standards that promote efficient and effective supply chain management practices.

For pharmacy managers and owners, the study's findings have important commercial implications. The study identifies inefficiencies in pharmacy supply chains and provides insights into how to reduce costs, increase the speed of drug delivery to patients, improve customer satisfaction, and increase profitability for pharmacies. By implementing the study's recommendations, pharmacy managers and owners can improve their supply chain operations and enhance their overall business performance.

Finally, the study contributes to the existing literature on supply chain management and provides useful insights into the unique dynamics of pharmaceutical supply chains in developing countries. The study's findings can help researchers and practitioners better understand the challenges and opportunities facing pharmaceutical supply chains in developing countries and develop strategies to address them.

Generally, the study's findings and recommendations have significant implications for various stakeholders, including researchers, policy makers, pharmacy managers, and owners. By implementing the study's recommendations, stakeholders can improve pharmacy supply chain management, enhance patient safety and satisfaction, and increase the overall efficiency and effectiveness of health care delivery.

1.6. Scope and Delimitation of the Study

The scope of this study is delimited to geographical, conceptual and theoretical, methodological, population, and time frame.

- **Conceptual and theoretical Scope:** Supply chain management encompasses enormous areas of managerial practices which deal with external and internal supply chain networks. Numerous factors affect effectiveness of supply chain management practices of pharmacies. However, it is unmanageable to conduct all aspects and factors in this study. Therefore, the scope of this research is delimited to selected factors which affect the effectiveness of SCMPs (counterfeiting, global economic condition, procurement process, inventory management, technology utilization, regulatory requirement, and transportation and logistics).
- **Methodological Scope:** The study used both quantitative and qualitative research approaches with explanatory and descriptive research designs. Under the quantitative research approach, an explanatory research design was used with the help of a survey questionnaire. This is due to the variables of the study constructed to collect appropriate data from the study area. Qualitative data also collected through interviews to supplement quantitative data. Therefore, this advanced research design or mixed method is essential to assess and examine factors affecting effectiveness of SCMPs.
- **Population Scope:** Effective supply chain management practices are very important to gain competitive advantage and achieve organizational performance. Even though assessing and investigating SCMPs of different sectors is very important to the development of economic growth of the Country. However, in order to be manageable the scope of the study, this research delimited to private pharmacies retail shops and drug stores operating in Hawassa City.

- **Geographical Scope:** The study covers an area of 50.52 square kilometers or 19.49 square miles as of (CSA, 2021) with a total population of 409,810 peoples (Hawassa City Health Bureau). It was covered eight sub-cities.
- **Time Scope:** the study is cross-sectional type in which relevant data collected at one time.

1.7. Operational Definition of Terms

Here are operational definitions of key terms used in the study discussed as follows.

- **Supply chain management practices:** In this study, supply chain management practices refer to the processes, procedures, and strategies that pharmacies use to manage their supply chain, including inventory management, transportation and logistics, regulatory compliance, and supplier management (Meltzer et al., 2001).
- **Counterfeit products:** Counterfeit products refer to products that are deliberately and fraudulently produced to resemble genuine products, with the intent of deceiving customers and profiting from the sale of counterfeit products.
- **Inventory management:** Inventory management refers to the processes and strategies that pharmacies use to manage their inventory levels, including demand forecasting, safety stock management, and just-in-time (JIT) inventory systems (Ohio, 1988).
- **Regulatory compliance:** Regulatory compliance refers to the adherence to relevant regulations and guidelines governing the pharmaceutical industry, including Good Distribution Practice (GDP) standards, which require pharmacies to maintain the integrity of their supply chain and to prevent the distribution of counterfeit products (WHO, 2014).
- **Lead time:** Lead time refers to the amount of time it takes for a pharmacy to receive a product from its supplier, from the point of order placement to the point of delivery.
- **Stock outs:** Stock-outs refer to a situation where a pharmacy is out of stock of a particular product, which can result in lost sales and dissatisfied customers.
- **Transportation and logistics:** Transportation and logistics refer to the processes and strategies that pharmacies use to move products from their suppliers to their customers, including the use of transportation modes, such as trucks and planes, and the optimization of routes and delivery schedules (Meltzer et al., 2001).

- **Just-in-time (JIT) inventory system:** A JIT inventory system refers to an inventory management strategy where pharmacies only order and receive products from their suppliers when they are needed, rather than holding excess inventory (Ohio, 1988).
- **Demand forecasting:** Demand forecasting refers to the process of estimating the future demand for a product, based on historical sales data, market trends, and other factors (Armstrong et al., 2001).
- **Good Distribution Practice (GDP) standards:** GDP standards refer to a set of guidelines developed by the World Health Organization (WHO) that outline the requirements for the distribution of pharmaceutical products, including the maintenance of product quality and integrity throughout the supply chain (WHO, 2014).
- **Regulatory authorities:** refer to government agencies and organizations responsible for regulating and overseeing the pharmaceutical industry, including the approval of new products, the enforcement of regulations and guidelines, and the monitoring of product safety and efficacy (FDA, 2021).
- **Centralized ordering:** refers to a process where orders for products are placed from a central location for multiple pharmacies or locations. This allows for greater control over inventory and can lead to cost savings due to increased buying power (Vonderem et al., 2010).
- **Vendor management:** Vendor management refers to the processes and strategies that pharmacies use to manage their relationships with suppliers, including supplier selection, negotiation of contracts, and monitoring supplier performance (Ell ram, 1996).
- **Logistics:** Logistics refers to the processes and strategies that pharmacies use to move products from their suppliers to their customers, including transportation, warehousing, and inventory management (Christopher, 2016).
- **Collaboration:** Collaboration refers to the process of working together with other stakeholders in the supply chain, such as suppliers, manufacturers, and distributors, to share information and resources and to develop effective strategies for managing the supply chain (Fawcett et al., 2008).
- **Supply chain complexity:** Supply chain complexity refers to the degree of difficulty involved in managing a supply chain, including the number of suppliers, the level of customization required, and the level of demand variability (Lee et al., 1997).

- **Demand variability:** Demand variability refers to the degree of change in customer demand for a product over time. It can be caused by a variety of factors, such as seasonality, changes in customer preferences, or changes in the economy (Cachou & Terwiesch, 2009).

1.8. Organization of the Study

The study organized into five chapters.

- **Chapter One:** this the first chapter introduce the main topics and comprises background of the study, statement of the problem, objective of the research, research question, significance of the study, scope and limitations of the study, operational definition of key terms, and organization of the study.
- **Chapter Two:** this chapter is deals with review of related literature. Hence, it includes theoretical and conceptual review of literature, empirical literature, and conceptual framework of the study.
- **Chapter Three:** this chapter focuses on the general methodology of the study. It comprises description of study area, research design and philosophy, total population and sampling method, type of data and method of data collection, data analysis method, validity and reliability of the data, and research ethical considerations.
- **Chapter Four:** this chapter deals with the data analysis, interpretation and presentation. Under this chapter the collected data were analyzed through descriptive and inflectional statics.
- **Chapter Five:** This last chapter present summary of major findings, conclusion, and followed by recommendation of the study.

CHAPTER TWO

2. REVIEW OF RELATED LITERATURE

Introduction

This chapter focuses on reviewing previous research studies and evaluates the available literature to give a wider perspective on factors affecting supply chain management practice in pharmaceutical sector.

2.1. Theoretical Literature Review

2.1.1. Overview of supply chain management

Supply chain management is an essential component of the pharmaceutical industry, as it involves the coordination and management of activities related to the production, distribution, and delivery of drugs and other medical supplies. The pharmaceutical supply chain is complex and involves multiple stakeholders, including manufacturers, distributors, wholesalers, retailers, and healthcare providers (Fattahi et al., 2021). Effective supply chain management in the pharmaceutical industry is essential for ensuring that drugs and medical supplies are available when and where they are needed. It involves the efficient management of inventory, transportation, and logistics, as well as the effective coordination of activities among stakeholders (Gao & Wang, 2021).

In recent years, there has been growing interest in the use of technology to improve supply chain management in the pharmaceutical industry. For example, the use of RFID technology has been shown to improve inventory management and reduce the risk of counterfeit drugs entering the supply chain (Karami & Farhangi, 2020).

However, there are also significant challenges associated with supply chain management in the pharmaceutical industry. These include the risk of counterfeiting, regulatory requirements, and global economic conditions, all of which can impact the effectiveness of the supply chain (Le & Nguyen, 2020; Wang & Guo, 2021).

Effective supply chain management is crucial for the success of pharmaceutical firms. The pharmaceutical industry is highly regulated, and drug manufacturers must comply with strict quality control and safety regulations to ensure that drugs are safe and effective for patients.

Effective supply chain management plays a critical role in ensuring that drugs are produced, distributed, and delivered in compliance with these regulations (Goyal & Rahman, 2019). One of the key benefits of effective supply chain management in pharmaceutical firms is improved inventory management. By effectively managing inventory levels, firms can reduce the risk of stock outs and overstocking, which can result in lost sales or excess inventory costs. Effective inventory management can also improve supply chain efficiency, reduce lead times, and improve customer satisfaction (kumar & Goyal, 2016).

Effective supply chain management also plays a key role in controlling costs in the pharmaceutical industry. By optimizing transportation and logistics processes, firms can reduce transportation costs and improve delivery times. Effective supply chain management can also help firms identify cost-saving opportunities, such as reducing waste and improving process efficiency (Lee & Ramanathan, 2015).

Effective supply chain management can help firms improve their responsiveness to customer demand. By ensuring that drugs are available when and where they are needed, firms can improve customer satisfaction and loyalty. Effective supply chain management can also help firms respond more quickly to changes in market demand, such as the introduction of new drugs or the emergence of new competitors (Okafor, 2013; Pereira & Smith, 2014).

Supply chain management (SCM) is a discipline that focuses on the coordination and management of activities involved in the production and delivery of goods and services to customers. It involves the integration of processes, people, technology, and resources across the entire supply chain to achieve operational excellence and customer satisfaction (Chopra & Meindl, 2015).

SCM includes a range of activities, such as procurement, production, inventory management, transportation, and logistics. These activities are interdependent and require effective coordination and communication among stakeholders to ensure that products are delivered to customers in a timely, cost-effective, and high-quality manner.

Effective SCM requires a holistic approach to the management of the supply chain, recognizing that each activity is interconnected and that efficiency and effectiveness in one area can impact the entire supply chain. It also requires an understanding of the needs and preferences of customers, suppliers, and other stakeholders, as well as the ability to adapt to

changes in the market, such as new demand patterns or changes in regulations (Simatupang & Sridharan, 2017).

There are many benefits to effective SCM, including reduced costs, improved quality, increased customer satisfaction, and enhanced competitiveness. By optimizing supply chain processes and improving communication and collaboration among stakeholders, firms can improve their operational efficiency and effectiveness, which can result in increased profitability and market share.

Effective supply chain management (SCM) is critical in optimizing performance and enhancing competitive advantage in today's global business environment. SCM impacts all aspects of a business, from procurement and production to distribution and customer service. By optimizing supply chain processes, firms can improve their operational efficiency, reduce costs, and enhance their ability to compete in the marketplace (Christopher, 2016).

One of the primary benefits of effective SCM is improved efficiency. By optimizing supply chain processes, firms can reduce lead times, improve inventory management, and increase the speed and reliability of their delivery processes. This can result in significant cost savings, as well as improved customer satisfaction.

Effective SCM can also improve the quality of products and services, which can enhance customer satisfaction and loyalty. By ensuring that products are delivered in a timely and reliable manner, firms can improve their reputation and brand image, which can lead to increased sales and market share.

In addition, effective SCM can enhance a firm's ability to respond to changes in the market, such as new demand patterns or changes in regulations. By improving communication and collaboration among stakeholders in the supply chain, firms can better anticipate and respond to changes in the market, which can enhance their competitiveness and help them stay ahead of the competition (Fawcett et al., 2014).

2.1.2. Activities of supply chain management

Supply chain management (SCM) involves the coordination and management of activities involved in the production and delivery of goods and services to customers. It is a complex process that involves multiple stakeholders, including suppliers, manufacturers, distributors,

retailers, and customers (Mentzer et al., 2018). The key components and activities involved in SCM include:

- **Planning:** This involves the development of a strategic plan for the supply chain, including decisions about sourcing, production, inventory management, transportation, and logistics. It also involves forecasting demand and identifying potential risks and opportunities.
- **Sourcing:** This involves identifying and selecting suppliers, negotiating contracts, and managing supplier relationships. It also involves ensuring that suppliers comply with quality and safety standards.
- **Production:** This involves the actual manufacturing of products, including managing the production process, ensuring quality control, and managing inventory levels.
- **Inventory management:** This involves managing inventory levels to ensure that products are available when and where they are needed. It also involves developing strategies to reduce inventory costs and improve efficiency.
- **Transportation and logistics:** This involves managing the movement of products from the manufacturer to the customer, including selecting carriers, managing transportation routes, and tracking shipments.
- **Customer service:** This involves managing customer relationships and ensuring that products are delivered in a timely and reliable manner. It also involves managing returns and resolving customer complaints. Effective SCM requires effective coordination and communication among stakeholders in the supply chain. It also requires the use of technology and data analytics to improve efficiency and effectiveness. By optimizing supply chain processes and improving communication and collaboration among stakeholders, firms can improve their operational efficiency, reduce costs, and enhance their competitive advantage (Monczka et al., 2015).

2.1.3. Factors Affecting Supply Chain Management in the Pharmaceutical Sector

2.1.3.1. Counterfeiting Issues

Counterfeit drugs are a significant challenge in the pharmaceutical supply chain. Counterfeit drugs are defined as products that are deliberately and fraudulently mislabeled with respect to

identity and/or source, posing a threat to patient safety, public health, and the reputation of pharmaceutical firms.

Counterfeit drugs pose significant challenges in the pharmaceutical supply chain, including patient safety, regulatory compliance, brand reputation, economic impact, and globalization. Effective supply chain management can help in addressing these challenges by implementing traceability, transparency, and security measures, ensuring compliance with regulatory requirements, implementing brand protection measures, and implementing global supply chain security measures (WHO, 2017).

- **Patient safety:** Counterfeit drugs pose a significant threat to patient safety, as they may contain harmful or ineffective ingredients that can result in adverse drug reactions, treatment failure, or even death. Patients may also receive incorrect dosages, leading to underdoing or overdosing. Effective supply chain management can help in addressing this challenge by improving traceability, transparency, and security in the supply chain, enabling the tracking of pharmaceutical products from the manufacturer to the end-user (WHO 2017).
- **Regulatory compliance:** Counterfeit drugs are illegal and violate regulatory requirements such as Good Manufacturing Practices (GMP) and Good Distribution Practices (GDP). Pharmaceutical firms are required to comply with these regulations to ensure the safety and efficacy of their products and avoid legal and financial penalties. Effective supply chain management can help in addressing this challenge by ensuring compliance with regulatory requirements, implementing a robust quality management system, and conducting regular audits and inspections (USA Food and Drug Administration, 2021).
- **Brand reputation:** Counterfeit drugs can damage the reputation of pharmaceutical firms and erode consumer trust. Patients may associate adverse reactions or treatment failure with the genuine pharmaceutical product, leading to a loss in market share and revenue. Effective supply chain management can help in addressing this challenge by implementing brand protection measures such as anti-counterfeiting technologies, secure packaging, and authentication systems (European Medicines Agency 2019).
- **Economic impact:** Counterfeit drugs can have a significant economic impact on pharmaceutical firms, governments, and healthcare systems. Pharmaceutical firms may

lose revenue due to reduced demand for their products, while governments and healthcare systems may incur additional costs due to increased healthcare utilization and treatment costs. Effective supply chain management can help in addressing this challenge by implementing cost-effective measures such as risk-based inspections and targeted enforcement efforts (Li et al., 2020).

- **Globalization:** The global nature of the pharmaceutical supply chain makes it vulnerable to counterfeit drugs, as products may pass through multiple countries and jurisdictions before reaching the end-user. Effective supply chain management can help in addressing this challenge by implementing global supply chain security measures such as harmonized regulations, international cooperation, and information sharing (Mackey et al., 2015).

Impact of Counterfeit drugs on the revenue and trust of pharmaceutical companies

- **Revenue loss:** Counterfeit drugs can lead to significant revenue loss for pharmaceutical companies. Counterfeiters often sell fake pharmaceutical products at a lower price than the genuine product, which can reduce demand for the genuine products and lead to decreased sales revenue. According to a report by the Organization for Economic Cooperation and Development (OECD), the global sales of counterfeit drugs are estimated to be around USD 200 billion per year, which represents a significant loss for pharmaceutical companies (OECD, 2016).
- **Trust within the industry:** Counterfeit drugs can also erode trust within the pharmaceutical industry. Patients may associate adverse reactions or treatment failure with the genuine pharmaceutical product, leading to a loss of trust in the company. This can result in decreased demand for the company's products, damage to its reputation, and a loss of market share. In addition, counterfeit drugs can also lead to legal and regulatory penalties, which can further damage the company's reputation (Li et al., 2020).

Effective supply chain management can help in addressing the impact of counterfeit drugs on revenue loss and trust within the industry. Measures such as implementing traceability, transparency, and security in the supply chain, implementing brand protection measures, and conducting regular audits and inspections can help in ensuring the safety and efficacy of pharmaceutical products, maintaining regulatory compliance,

and protecting the reputation of pharmaceutical companies (USA Food and Drug Administration 2021).

Counterfeiting is a growing problem in the pharmaceutical industry, and various strategies and technologies have been developed to combat this issue.

- **Serialization:** Serialization is the process of assigning a unique code to each individual product, which enables tracking and tracing of the product throughout the supply chain. Serialization helps to prevent counterfeiting by enabling the identification of counterfeit products and the removal of these products from the supply chain.

Studies have shown that serialization can be an effective strategy for combating counterfeiting. Serialization can help to prevent counterfeiting by enabling the tracking and tracing of pharmaceutical products, improving supply chain visibility, and reducing the risk of counterfeit products entering the supply chain (Wang et al., 2019).

- **Track and trace systems:** Track and trace systems are designed to enable the tracking and tracing of pharmaceutical products throughout the supply chain. These systems enable the identification of counterfeit products and the removal of these products from the supply chain.

Studies have shown that track and trace systems can be an effective strategy for combating counterfeiting. Track and trace systems can help to prevent counterfeiting by enabling the tracking and tracing of pharmaceutical products, improving supply chain visibility, and reducing the risk of counterfeit products entering the supply chain (Shah & Desai, 2018).

- **Anti-counterfeiting technologies:** Anti-counterfeiting technologies are designed to enable the identification of counterfeit products and the removal of these products from the supply chain. These technologies include security features such as holograms, barcodes, and RFID tags.

Studies have shown that anti-counterfeiting technologies can be an effective strategy for combating counterfeiting. Anti-counterfeiting technologies can help to prevent counterfeiting by enabling the identification of counterfeit products, improving supply chain visibility, and reducing the risk of counterfeit products entering the supply chain (Jasuja et al., 2017; Chaudhary et al., 2020).

2.1.3.2. Global Economic Conditions

Global economic conditions can have a significant impact on supply chain management practices in the pharmaceutical sector.

- **Economic fluctuations:** Economic fluctuations can impact supply chain management practices in the pharmaceutical sector. For example, during a recession, demand for pharmaceutical products may decrease, resulting in excess inventory and increased supply chain costs. In contrast, during an economic boom, demand for pharmaceutical products may increase, leading to supply chain capacity constraints and increased costs (Bapuji et al., 2014). Studies have shown that economic fluctuations can impact supply chain management practices in the pharmaceutical sector. Economic fluctuations can impact inventory management practices, production planning, and supplier selection in the pharmaceutical sector.
- **Currency exchange rates:** Currency exchange rates can impact supply chain management practices in the pharmaceutical sector. Fluctuations in exchange rates can impact the cost of raw materials, transportation, and manufacturing, which can impact the overall cost of pharmaceutical products. Studies have shown that currency exchange rates can impact supply chain management practices in the pharmaceutical sector. Currency exchange rates can impact supply chain decisions, such as sourcing strategies, transportation modes, and inventory management (Yano et al., 2018).
- **Government regulations:** Government regulations can impact supply chain management practices in the pharmaceutical sector. Changes in regulations can impact the manufacturing, storage, and distribution of pharmaceutical products, which can impact supply chain costs and lead times. Studies have shown that government regulations can impact supply chain management practices in the pharmaceutical sector. Government regulations can impact supply chain decisions, such as supplier selection, inventory management, and transportation modes (Ghasemi et al., 2018). Effective supply chain management practices can help to mitigate the impact of global economic conditions on the pharmaceutical sector. For example, by implementing effective inventory management practices, production planning, and supplier selection, pharmaceutical companies can reduce supply chain costs and improve supply chain responsiveness (Sria et al., 2012; Oke, 2013).

Globalization, market dynamics, trade policies, and economic fluctuations are all important topics that can have significant implications for supply chain management.

- **Globalization:** Globalization has led to increased competition and complexity in the pharmaceutical industry, which can impact supply chain management. Globalization has also led to increased outsourcing of manufacturing and distribution activities, which can lead to increased supply chain risks. Globalization can impact supply chain management practices in the pharmaceutical industry. Globalization has led to increased complexity in the pharmaceutical supply chain, which can impact supply chain responsiveness and efficiency (Bapuji et al., 2014).
- **Market dynamics:** Market dynamics, such as changes in customer demand and product innovation, can impact supply chain management practices in the pharmaceutical industry. Changes in customer demand can impact inventory management practices, while product innovation can impact production planning and supplier selection. Studies have shown that market dynamics can impact supply chain management practices in the pharmaceutical industry. Product innovation can impact production planning and supplier selection (Ghasemi et al., 2018).
- **Trade policies:** Trade policies, such as tariffs and trade agreements, can impact supply chain management practices in the pharmaceutical industry. Changes in trade policies can impact sourcing strategies, transportation modes, and inventory management practices (Sria et al., 2012).
- **Economic fluctuations:** Economic fluctuations, such as recessions and booms, can impact supply chain management practices in the pharmaceutical industry. Economic fluctuations can impact demand for pharmaceutical products, which can impact inventory management practices and production planning.

Studies have shown that economic fluctuations can impact supply chain management practices in the pharmaceutical industry. For example, a study found that economic fluctuations can impact inventory management practices and production planning (Yano et al., 2018). Effective supply chain management practices can help to mitigate the impact of globalization, market dynamics, trade policies, and economic fluctuations on the pharmaceutical industry.

2.1.3.3. Inventory Management

Effective inventory management is essential in the pharmaceutical supply chain as it helps to ensure that pharmaceutical products are available when and where they are needed (Chauhan et al., 2018).

- **Ensuring product availability:** Effective inventory management helps to ensure that pharmaceutical products are available when and where they are needed. This is essential for ensuring that patients have access to the medications they need, particularly in the case of life-saving medications (Ghasemi et al., 2018).

Studies have shown that effective inventory management is important for ensuring product availability in the pharmaceutical supply chain.

- **Reducing supply chain costs:** Effective inventory management can help to reduce supply chain costs in the pharmaceutical industry. By minimizing inventory levels and improving inventory accuracy, pharmaceutical companies can reduce inventory holding costs and improve cash flow (Jasinki & kozak, 2017).

Studies have shown that effective inventory management is important for reducing supply chain costs in the pharmaceutical industry. Effective inventory management can help to reduce supply chain costs and improve supply chain performance (Xie et al., 2017).

- **Improving supply chain responsiveness:** Effective inventory management can also help to improve supply chain responsiveness in the pharmaceutical industry. By improving inventory accuracy and visibility, pharmaceutical companies can better respond to changes in customer demand and market conditions (Wang et al., 2019).

Technologies such as RFID, ERP, and inventory management software play a crucial role in improving the efficiency and effectiveness of inventory management in the pharmaceutical sector (Ghasemi et al., 2015).

- **RFID:** RFID (Radio Frequency Identification) technology is widely used in the pharmaceutical sector to improve inventory management practices. RFID tags can be attached to pharmaceutical products, allowing for real-time tracking and monitoring of inventory levels and movement. Studies have shown that RFID technology can improve inventory accuracy, reduce inventory-holding costs, and improve supply chain responsiveness in the pharmaceutical sector.

- **ERP:** (Enterprise Resource Planning) systems are widely used in the pharmaceutical sector to integrate and streamline inventory management processes. ERP systems can provide real-time visibility into inventory levels, production planning, and supplier performance.

Studies have shown that ERP systems can improve inventory accuracy, reduce inventory holding costs, and improve supply chain responsiveness in the pharmaceutical sector.
- **Inventory management software:** Inventory management software is specifically designed to help pharmaceutical companies manage their inventory levels and supply chain operations. Inventory management software can provide real-time visibility into inventory levels, demand forecasting, and supplier performance.

Studies have shown that inventory management software can improve inventory accuracy, reduce inventory holding costs, and improve supply chain responsiveness in the pharmaceutical sector.

Inventory control models, demand forecasting techniques, and inventory optimization strategies are essential for efficient and effective inventory management in the pharmaceutical sector (Xie et al., 2017).
- **Inventory control models:** Inventory control models are used to determine optimal inventory levels based on factors such as demand, lead time, and ordering costs. Various inventory control models have been used in the pharmaceutical sector, including the Economic Order Quantity (EOQ) model, the Reorder Point (ROP) model, and the Periodic Review (PR) model.

Studies have shown that inventory control models can help to improve inventory accuracy, reduce stock outs, and minimize inventory holding costs in the pharmaceutical sector.
- **Demand forecasting techniques:** Demand forecasting techniques are used to predict future demand for pharmaceutical products, which can help to optimize inventory levels and production planning. Various demand forecasting techniques have been used in the pharmaceutical sector, including time series analysis, regression analysis, and artificial neural networks.

Studies have shown that demand forecasting techniques can help to improve inventory accuracy, reduce stock outs, and minimize inventory holding costs in the pharmaceutical sector.

- **Inventory optimization strategies:** Inventory optimization strategies are used to improve inventory management practices by optimizing inventory levels, production planning, and supplier performance. Various inventory optimization strategies have been used in the pharmaceutical sector, including just-in-time (JIT) inventory management, vendor-managed inventory (VMI), and consignment inventory.

Studies have shown that inventory optimization strategies can help to improve inventory accuracy, reduce stock outs, and minimize inventory holding costs in the pharmaceutical sector.

2.1.3.4. Procurement Issues

Procurement is a critical function in the pharmaceutical sector, as it involves acquiring the raw materials, supplies, and services necessary for the production and distribution of pharmaceutical products. Challenges in procurement in the pharmaceutical sector are:

- **Supply chain complexity:** The pharmaceutical supply chain is highly complex, involving multiple stakeholders, including raw material suppliers, manufacturers, distributors, and retailers. Managing this complex supply chain can be challenging, as it requires coordination and collaboration among these stakeholders (Croom & Brandon-Jones, 2007).
- **Regulatory compliance:** The pharmaceutical industry is heavily regulated, and procurement activities must comply with various regulations, such as Good Manufacturing Practices (GMP) and Good Distribution Practices (GDP). Failure to comply with these regulations can result in significant penalties and reputational damage (Giunipero & Brand, 2019).
- **Cost management:** Procurement in the pharmaceutical sector can be expensive, as high-quality raw materials and supplies are required to produce pharmaceutical products. Managing costs while ensuring the quality of raw materials and supplies can be challenging (Narayanan et al., 2018).

Best practices in procurement in the pharmaceutical sector:

- **Collaborative supplier relationships:** Developing collaborative relationships with suppliers can help to improve procurement processes in the pharmaceutical sector. Collaborative supplier relationships can help to improve supplier performance, reduce lead times, and improve product quality (Richy et al., 2015).
- **Advanced technology:** Using advanced technologies, such as electronic procurement systems, can help to streamline procurement processes and improve supply chain visibility in the pharmaceutical sector. Electronic procurement systems can help to automate procurement processes, reduce errors, and improve data accuracy.
- **Risk management:** Effective risk management practices can help to mitigate supply chain risks in the pharmaceutical sector. Risk management practices can include conducting supplier risk assessments, implementing contingency plans, and monitoring supplier performance (Upton et al., 2018).

Supplier selection, strategic sourcing, supplier relationship management, and supply chain collaboration are critical components of procurement and supply chain management in various industries, including the pharmaceutical sector (Aksoy et al., 2017).

- **Supplier selection:** Supplier selection is the process of identifying and evaluating potential suppliers based on various criteria, such as quality, cost, and delivery performance. Effective supplier selection can help organizations to reduce costs, improve quality, and mitigate supply chain risks (Giunipero et al., 2015).
- **Strategic sourcing:** Strategic sourcing is the process of identifying, evaluating, and selecting suppliers to ensure that organizations have access to the best products and services at the best prices. Strategic sourcing can help organizations to reduce costs, improve quality, and mitigate supply chain risks. Studies have shown that various methods can be used for strategic sourcing, including global sourcing, supplier consolidation, and make-or-buy analysis. Global sourcing can help to reduce costs and improve product quality in the pharmaceutical sector (Handfield et al., 2015).
- **Supplier relationship management:** Supplier relationship management (SRM) is the process of managing relationships with suppliers to ensure that organizations have access to the best products and services at the best prices. Effective SRM can help organizations

to improve supplier performance, reduce costs, and mitigate supply chain risks (Kamalahmadi & Parast, 2016).

- **Supply chain collaboration:** Supply chain collaboration is the process of coordinating and collaborating with supply chain partners to improve supply chain performance. Effective supply chain collaboration can help organizations to improve product quality, reduce costs, and mitigate supply chain risks (kwon et al., 2017). Studies have shown that various strategies can be used for supply chain collaboration, including information sharing, joint planning, and coordination. For example, information sharing can help to improve supply chain performance and reduce supply chain risks in the pharmaceutical sector (Li et al., 2006).

Procurement practices have a significant impact on overall supply chain efficiency, cost reduction, and quality assurance in pharmaceutical firms.

- **Supply chain efficiency:** Effective procurement practices can improve supply chain efficiency by ensuring that the right products are available at the right time and at the right cost. Procurement practices such as strategic sourcing, supplier selection, and supply chain collaboration can help to improve supply chain efficiency in pharmaceutical firms (Giunipero et al., 2015).
- **Cost reduction:** Effective procurement practices can help to reduce costs by ensuring that pharmaceutical firms have access to high-quality raw materials, supplies, and services at the best prices. Procurement practices such as global sourcing, make-or-buy analysis and supplier consolidation can help to reduce costs in pharmaceutical firms (Handfield et al., 2015).
- **Quality assurance:** Effective procurement practices can help to ensure that pharmaceutical firms have access to high-quality raw materials, supplies, and services. Procurement practices such as supplier quality management, supplier development programs, and supplier performance monitoring can help to ensure quality assurance in pharmaceutical firms (kwan et al., 2017).

2.1.3.5. Regulatory Requirement

The regulatory landscape that affects supply chain management in the pharmacy sector is complex and highly regulated.

1. Good Manufacturing Practices (GMP): Good Manufacturing Practices (GMP) are a set of regulations and guidelines that ensure that pharmaceutical products are manufactured, processed, and packaged in a consistent and controlled manner to ensure their safety, efficacy, and quality. GMP regulations cover all aspects of the manufacturing process, including facilities, equipment, personnel, quality control, and documentation (USA Food and Drug Administration, 2021).

2. Good Distribution Practices (GDP): Good Distribution Practices (GDP) are a set of regulations and guidelines that ensure that pharmaceutical products are transported, handled, and stored in a consistent and controlled manner to ensure their safety, efficacy, and quality. GDP regulations cover all aspects of the supply chain, including transportation, warehousing, handling, and documentation (National Association of Boards of pharmacy, 2021).

3. Drug Enforcement Administration (DEA) regulations: The Drug Enforcement Administration (DEA) regulates the distribution and handling of controlled substances, including prescription drugs, in the United States. DEA regulations cover all aspects of the supply chain, including manufacturing, distribution, dispensing, and record keeping (United States Department of Justice 2021).

4. Food and Drug Administration (FDA) regulations: The Food and Drug Administration (FDA) is responsible for regulating all aspects of the pharmaceutical industry in the United States, including supply chain management. FDA regulations cover all aspects of the drug development process, from preclinical testing to post-market surveillance. FDA regulations also cover all aspects of the supply chain, including manufacturing, distribution, labeling, and advertising (United States Department of Health and Human Services 2021).

5. National Association of Boards of Pharmacy (NABP) regulations: The National Association of Boards of Pharmacy (NABP) is a professional organization that provides guidance and support to state boards of pharmacy in the United States. NABP regulations cover all aspects of pharmacy practice, including supply chain management. NABP regulations also provide guidance on the handling and distribution of prescription drugs, including the use of electronic prescribing and prescription drug monitoring programs (WHO, 2014).

Quality standards, regulations related to Good Manufacturing Practices (GMP), Good Distribution Practices (GDP), serialization, and product traceability are critical components of supply chain management in the pharmaceutical industry.

- **Quality standards:** Quality standards are a set of guidelines and procedures that ensure that pharmaceutical products are safe, effective, and meet the required quality standards. Quality standards include various regulations such as GMP, GDP, ISO 9001, and ISO 13485 (Food and Drug Administration 2021).
- **Good Manufacturing Practices (GMP):** GMP regulations are a set of guidelines and procedures that ensure that pharmaceutical products are manufactured, processed, and packaged in a consistent and controlled manner to ensure their safety, efficacy, and quality. GMP regulations cover all aspects of the manufacturing process, including facilities, equipment, personnel, quality control, and documentation (International Organization for Standardization 2021). Studies have shown that compliance with GMP regulations can help to improve product quality, reduce costs, and mitigate supply chain risks.
- **Good Distribution Practices (GDP):** GDP regulations are a set of guidelines and procedures that ensure that pharmaceutical products are transported, handled, and stored in a consistent and controlled manner to ensure their safety, efficacy, and quality. GDP regulations cover all aspects of the supply chain, including transportation, warehousing, handling, and documentation (United States Pharmacopeia 2021). Studies have shown that compliance with GDP regulations can help to improve product quality, reduce costs, and mitigate supply chain risks. For example, a study published in the Journal of Pharmaceutical Innovation found that compliance with GDP regulations can help to improve the quality of pharmaceutical products and reduce the risk of product recalls.
- **Serialization:** Serialization is the process of assigning a unique identification code to each unit of a product to ensure product traceability throughout the supply chain. Serialization is becoming increasingly important in the pharmaceutical industry to improve supply chain visibility, reduce counterfeiting, and ensure patient safety (Yu et al., 2018).
- **Product traceability:** Product traceability is the ability to track and trace the movement of a product throughout the supply chain, from the manufacturer to the end user. Product

traceability is critical in the pharmaceutical industry to ensure patient safety, reduce counterfeiting, and improve supply chain efficiency (Zhang et al., 2018).

2.1.3.6. Technology Utilization

Technology adoption and utilization have had a significant impact on supply chain management in the pharmaceutical sector (kshetri, 2018).

1. Serialization

Serialization is the process of assigning a unique identification code to each unit of a product to ensure product traceability throughout the supply chain. Serialization is becoming increasingly important in the pharmaceutical industry to improve supply chain visibility, reduce counterfeiting, and ensure patient safety (Yu et al., 2018).

Technology, such as serialization software and barcode scanners, can help to improve the efficiency and accuracy of serialization.

2. Electronic data interchange (EDI)

Electronic data interchange (EDI) is the exchange of business documents, such as purchase orders and invoices, between trading partners in a standardized electronic format. EDI is becoming increasingly important in the pharmaceutical industry to improve supply chain efficiency and reduce errors and delays (Wang et al., 2016).

Technology, such as EDI software and electronic invoicing systems, can help to improve the efficiency and accuracy of EDI.

3. Internet of Things (IoT)

The Internet of Things (IoT) is the network of physical devices, vehicles, and other items embedded with electronics, software, sensors, and connectivity that enable these objects to collect and exchange data. IoT is becoming increasingly important in the pharmaceutical industry to improve supply chain visibility, reduce waste, and improve patient outcomes (Lv et al., 2020). Technology, such as IoT sensors and smart packaging, can help to improve the efficiency and accuracy of supply chain management. IoT technology can help to reduce supply chain costs, improve supply chain visibility, and improve patient outcomes (Hubner et al., 2018).

In recent years, technologies such as **block chain, internet of things (IoT), big data analytics, and artificial intelligence (AI)** have been increasingly adopted in supply chain management practices to improve efficiency, visibility, and decision-making.

- **Block chain:** Block chain is a distributed ledger technology that allows secure and transparent transactions without the need for intermediaries. Block chain has been increasingly adopted in supply chain management practices to improve transparency, traceability, and accountability (Li et al., 2019).
- **Internet of Things (Iota):** The Internet of Things (Iot) is a network of physical devices, vehicles, and other items embedded with electronics, software, sensors, and connectivity that enable these objects to collect and exchange data. Iota has been increasingly adopted in supply chain management practices to improve visibility, efficiency, and decision-making (Lv et al., 2020).
- **Big Data Analytics:** Big data analytics refers to the process of analyzing large and complex data sets to uncover patterns, correlations, and insights that can inform decision-making. Big data analytics has been increasingly adopted in supply chain management practices to improve decision-making, efficiency, and customer satisfaction (Fosso wamba et al., 2017; Akter et al., 2016).
- **Artificial Intelligence (AI):** Artificial intelligence (AI) refers to the ability of machines to perform tasks that typically require human intelligence, such as language understanding, image recognition, and decision-making. AI has been increasingly adopted in supply chain management practices to improve decision-making, efficiency, and customer satisfaction (Wang et al., 2021).

Benefits of technology utilization in the pharmacy sector:

- **Improved patient outcomes:** Technology utilization can improve patient outcomes by improving medication adherence, reducing medication errors, and providing personalized medication therapy. For example, electronic prescribing systems can reduce medication errors and improve patient safety (Carayon et al., 2015)
- **Operational efficiency:** Technology utilization can improve operational efficiency by reducing costs, improving workflow, and increasing productivity. For example, automated dispensing systems can reduce dispensing time and improve inventory management (Aitken et al., 2017).
- **Regulatory compliance:** Technology utilization can improve regulatory compliance by ensuring that pharmaceutical products meet regulatory requirements. serialization

technology can improve supply chain visibility and reduce the risk of counterfeit drugs (Carayon et al., 2015)

Challenges of technology utilization in the pharmacy sector:

- **Cost:** Technology utilization can be costly, particularly for small and medium-sized enterprises. The cost of technology can include the cost of equipment, software, maintenance, and training (Kesselheim et al., 2016).
- **Security and privacy:** Technology utilization can raise concerns about security and privacy, particularly in the context of electronic health records and patient data. Ensuring the security and privacy of patient data is critical to maintaining patient trust (Lv et al., 2020).
- **Resistance to change:** Technology utilization can be challenging due to resistance to change among healthcare providers and patients. Resistance to change can be due to concerns about the reliability of technology, the impact on workflow, and the need for additional training (Lv et al., 2020).

2.1.3.7. Transport and Logistics

Transportation and logistics are critical components of the pharmaceutical supply chain, as they ensure the timely and safe delivery of drugs and other medical products to patients. However, the transportation and logistics of pharmaceuticals present unique challenges due to the need for temperature-controlled shipping, regulatory compliance, and security concerns.

Challenges related to transportation and logistics within the pharmaceutical supply chain:

- **Temperature control:** Pharmaceutical products are often temperature-sensitive and require temperature-controlled shipping to maintain their quality and efficacy. Temperature excursions during shipping can result in product degradation, which can compromise patient safety and efficacy (Al-Mubarak et al., 2019).
- **Regulatory compliance:** Pharmaceutical products are subject to strict regulatory requirements, including product labeling, documentation, and tracking. Failure to comply with regulatory requirements can result in fines, product recalls, and damage to brand reputation (Bate et al., 2018).

- **Security concerns:** Pharmaceutical products are often targeted by criminals due to their high value and potential for resale. Security concerns include theft, counterfeiting, and diversion.

Strategies for addressing transportation and logistics challenges within the pharmaceutical supply chain:

1. Temperature monitoring and control: Temperature monitoring and control systems can help to ensure that pharmaceutical products are shipped within the required temperature range. These systems can include temperature sensors, data loggers, and temperature-controlled containers (Keog et al., 2019).

2. Regulatory compliance management: Regulatory compliance management systems can help to ensure that pharmaceutical products are shipped in compliance with regulatory requirements. These systems can include documentation management, quality control, and regulatory tracking.

3. Supply chain security: Supply chain security strategies can help to reduce the risk of theft, counterfeiting, and diversion. These strategies can include security seals, GPS tracking, and real-time monitoring (WHO, 2020).

In addition to these strategies, collaboration and information sharing between supply chain partners can help to address transportation and logistics challenges within the pharmaceutical supply chain. For example, the World Health Organization (WHO) has launched the Global Pharma Health Fund (GPHF), which is a public-private partnership aimed at improving the quality and availability of pharmaceutical products in developing countries.

Transportation routes, temperature-controlled logistics, cold chain management, and last mile delivery are critical components of the pharmaceutical supply chain, as they ensure the timely and safe delivery of drugs and other medical products to patients.

1. Optimization of transportation routes

Optimization of transportation routes is a critical issue in the pharmaceutical supply chain, as it can reduce transportation costs, improve delivery times, and ensure product safety. Studies have shown that optimization of transportation routes can be achieved through the use of mathematical models and algorithms (Ivanov et al., 2017).

2. Temperature-controlled logistics

Temperature-controlled logistics is critical in the pharmaceutical supply chain, as it ensures the quality and efficacy of temperature-sensitive pharmaceutical products. Temperature-controlled logistics can be achieved through the use of various technologies, such as temperature sensors, data loggers, and temperature-controlled containers (Keogh et al., 2019).

3. Cold chain management:

Cold chain management is critical in the pharmaceutical supply chain, as it ensures the quality and safety of temperature-sensitive pharmaceutical products. Cold chain management can be achieved through the use of various strategies, such as temperature monitoring, training of personnel, and risk management (Lai et al., 2018).

4. Last mile delivery

Last mile delivery is critical in the pharmaceutical supply chain, as it ensures the timely and safe delivery of pharmaceutical products to patients (Wang et al., 2019).

Emerging technologies such as **autonomous vehicles, drones, and predictive analytics** are rapidly transforming the transport and logistics industry, including the pharmacy sector. These technologies offer numerous benefits, including increased efficiency, reduced costs, improved safety, and faster delivery times.

1. Autonomous vehicles:

Autonomous vehicles have the potential to revolutionize the transport and logistics industry, including the pharmacy sector. Autonomous vehicles can reduce delivery times and costs, improve accuracy, and increase safety. For example, autonomous vehicles can be used to transport temperature-controlled pharmaceuticals without the need for human intervention, ensuring that they are delivered safely and efficiently (Guillen et al., 2019).

2. Drones:

Drones are a promising technology for improving transport and logistics efficiency in the pharmacy sector. Drones can be used for last-mile delivery, reducing delivery times and costs. Drones can also be used for remote delivery, providing access to medicines in rural or remote areas. Drones can be used to deliver medical supplies, including pharmaceuticals, to remote areas in Rwanda (Kulkarni et al., 2020).

3. Predictive analytics:

Predictive analytics can help to improve transport and logistics efficiency in the pharmacy sector by providing real-time data and insights. Predictive analytics can be used to optimize transport routes, reduce delivery times, and improve inventory management. Predictive analytics can improve inventory management and reduce costs in the pharmaceutical industry (Kamal et al., 2019).

The impact of emerging technologies on supply chain management practices:

While there has been some research on the impact of emerging technologies, such as autonomous vehicles, drones, and predictive analytics, on supply chain management practices in the pharmacy sector, there is still a need for further investigation. Specifically, more research is needed on the effectiveness of these technologies and their impact on supply chain efficiency, cost, and safety (Guillen et al., 2019; Kamal et al., 2019; Lai et al., 2018).

2. Supply chain risk management:

Supply chain risk management is critical for ensuring the timely and safe delivery of pharmaceutical products to patients. While there has been some research on supply chain risk management in the pharmacy sector, there is still a need for further investigation. Specifically, more research is needed on the identification and management of supply chain risks, such as counterfeit products, product shortages, and natural disasters (Bate et al., 2018; Keogh et al., 2019).

3. Patient-centric supply chain management:

Patient-centric supply chain management is an emerging trend in the pharmacy sector, where the focus is on meeting the needs of patients. While there has been some research on patient-centric supply chain management, there is still a need for further investigation. Specifically, more research is needed on the implementation and effectiveness of patient-centric supply chain management strategies, such as personalized medicine and patient engagement (Ivanov et al., 2017; Wang et al., 2019).

4. Sustainability in the pharmaceutical supply chain:

Sustainability is an increasingly important issue in the pharmaceutical industry, with a focus on reducing the environmental impact of pharmaceutical products and supply chain operations. While there has been some research on sustainability in the pharmaceutical supply chain, there is still a need for further investigation. Specifically, more research is

needed on the implementation and effectiveness of sustainability strategies, such as green logistics and eco-design (Al-Mubarak et al., 2019; Lai et al., 2018).

2.2. Empirical Literature Review

Supply chain management (SCM) is a critical aspect of business operations for organizations in various industries, including the pharmaceutical sector. Effective SCM enables organizations to ensure the timely and efficient delivery of products to customers, reduce costs, and improve customer satisfaction. The Pharmaceutical supply chain is complex and involves multiple stakeholders, including manufacturers, wholesalers, distributors, and retailers. Effective supply chain management practice can improve supply chain efficiency, cost, and safety, while also ensuring the high quality of pharmaceutical products. However, the effectiveness of SCM practices can be influenced by various factors, including organizational, operational, and environmental factors.

Tesfaye et al. (2018) assess the supply chain management practices of pharmacies in Hawassa City, Ethiopia. The study used a cross-sectional survey design and collected data from 100 pharmacies. The study found that the majority of pharmacies in Hawassa City had inadequate supply chain management practices, which resulted in stock outs, overstocking, and expired medications. The study also identified lack of supply chain visibility, inadequate transportation infrastructure, and poor inventory management as major factors affecting supply chain management practices. The study recommended the implementation of an effective supply chain management system to improve the efficiency and effectiveness of pharmacy operations in Hawassa City.

Tadesse et al. (2019) assesses the effect of supply chain management practices on the performance of pharmacies in Hawassa City, Ethiopia. The study used a quantitative approach and collected data from 120 pharmacies in Hawassa City using a structured questionnaire. The study found that the majority of pharmacies in Hawassa City had inadequate supply chain management practices, which resulted in stock outs, overstocking, and expired medications. The study also found that supply chain management practices had a significant positive effect on pharmacy performance, including increased customer satisfaction, reduced inventory costs, and improved operational efficiency.

The study identified several factors that affected supply chain management practices in pharmacies in Hawassa City, including lack of supply chain visibility, inadequate

transportation infrastructure, and poor inventory management. The study also found that the use of technology, such as supply chain management software, had a positive effect on supply chain management practices.

Kassa et al. (2018) evaluates the impact of supply chain management practices on customer satisfaction in pharmacies in Hawassa City, Ethiopia. The study used a quantitative approach and collected data from 150 customers who visited pharmacies in Hawassa City using a structured questionnaire. The study found that the majority of customers were satisfied with the services provided by pharmacies in Hawassa City, but identified areas for improvement, including the availability of medications, waiting time, and staff courtesy.

One important aspect of supply chain management in the pharmaceutical sector is the regulation of pharmaceutical products. Regulatory compliance is critical for ensuring patient safety and preventing the distribution of counterfeit or substandard pharmaceutical products. The adoption of track and trace systems and barcode scanning can improve regulatory compliance and prevent the distribution of counterfeit products (Bate et al., 2018).

Another important aspect of supply chain management in the pharmaceutical sector is cold chain management. Many pharmaceutical products, such as vaccines and biologics, require temperature-controlled storage and transportation to maintain their efficacy. Cold chain management involves the use of temperature monitoring systems and data loggers to ensure that pharmaceutical products are stored and transported within the appropriate temperature range (Al-Mubarak et al., 2019; Rejeb et al., 2019).

Information sharing and collaboration are also critical for effective supply chain management in the pharmaceutical sector. The adoption of cloud-based platforms and block chain can improve information sharing and collaboration among stakeholders, leading to more efficient supply chain operations and improved patient outcomes (Esmaïllou et al., 2017; Wang et al., 2019).

Several studies have highlighted the importance of pharmacies in the pharmaceutical supply chain. For example, a study by Wang et al. (2019) identified last-mile logistics innovations in the era of e-commerce, including the use of pharmacies as a pickup point for medication delivery. This study emphasized the importance of pharmacies in providing accessible and convenient healthcare services to patients.

Another study by O'Kane et al. (2019) focused on enhancing the security of the pharmaceutical supply chain through an innovative ICT solution. In this study, pharmacies were identified as a critical point in the supply chain where counterfeit pharmaceutical products can enter the market. The study highlighted the importance of implementing effective supply chain management practices in pharmacies to prevent the distribution of counterfeit products and ensure patient safety.

Several studies have investigated the factors affecting supply chain management practices in the pharmacy sector. For example, a study by Ivanov et al. (2017) analyzed the impact of block chain technology on global supply chain security and identified the potential benefits and challenges of adopting block chain in the pharmaceutical industry. Another study by Al-Mubarak et al. (2019) reviewed the challenges and opportunities facing the pharmaceutical cold chain, including the use of temperature monitoring systems and data loggers.

Furthermore, a study by Bate et al. (2018) highlighted the need for transparency in the global pharmaceutical supply chain and identified the potential benefits of adopting track and trace systems and barcode scanning. Similarly, a study by Keogh et al. (2019) emphasized the importance of good distribution practices for temperature-controlled products in the pharmaceutical supply chain, including the use of temperature monitoring and data logging devices.

The scope of the literature review is to investigate the factors affecting supply chain management practices in pharmacies in Hawassa city, Ethiopia. The review will focus on the specific factors related to supply chain management in the pharmacy sector, including regulatory compliance, cold chain management, information sharing, and collaboration among stakeholders.

Bifftu et al. (2017) assessed the quality of pharmaceutical products in Ethiopia and identified the need for better regulation and enforcement of regulatory compliance in the pharmaceutical supply chain. Another study by Gebrehiwot et al. (2018) analyzed the challenges and opportunities facing the pharmaceutical supply chain in Ethiopia and proposed strategies for improving supply chain efficiency and effectiveness.

Furthermore, a study by Zeleke et al. (2019) investigated the factors affecting the implementation of cold chain management in the Ethiopian pharmaceutical supply chain and identified the need for capacity building and infrastructure development. Similarly, a study

by Mekonnen et al. (2018) assessed the implementation of information and communication technology (ICT) in the Ethiopian pharmaceutical supply chain and identified the potential benefits and challenges of adopting ICT solutions.

For example, studies such as Gebrehiwot et al. (2018) and Zeleke et al. (2019), provided insights into the challenges and opportunities facing the pharmaceutical supply chain in Ethiopia and the factors affecting the implementation of cold chain management in the Ethiopian pharmaceutical supply chain. These studies provided valuable insights into the current state of supply chain management practices in the pharmaceutical sector in Ethiopia and were included in the literature review. Regulatory compliance, cold chain management, information sharing, and collaboration among stakeholders are the key factors affecting supply chain management practices in pharmacies in Hawassa city, Ethiopia. These factors are interrelated and can have a significant impact on the efficiency and effectiveness of the pharmaceutical supply chain.

Regulatory compliance refers to adherence to regulatory requirements and standards related to the pharmaceutical sector. Compliance with regulatory requirements is essential for ensuring the quality and safety of pharmaceutical products. Lack of compliance can result in the distribution of substandard or counterfeit drugs, which can have serious health consequences.

Cold chain management is another critical factor affecting supply chain management practices in pharmacies. It involves maintaining the integrity of temperature-sensitive products such as vaccines and biologics throughout the supply chain. Proper cold chain management is essential for ensuring the quality and efficacy of these products.

Counterfeit drugs are a significant problem in the pharmaceutical supply chain, particularly in low- and middle-income countries where regulatory oversight may be weaker. Counterfeit drugs are defined by the World Health Organization (WHO) as medicines that are deliberately and fraudulently mislabeled with respect to identity and/or source (WHO, 2017). The prevalence of counterfeit drugs in the pharmaceutical supply chain varies by region and country, but estimates suggest that as many as 10% of all medicines in low- and middle-income countries could be counterfeit (WHO, 2017).

Table 2.1 Summary of empirical studies

Author (s)	Title	Objective	Key findings
Bereket and Gizachew (2022)	Pharmaceutical Supply Chain Practices and Its Associated Factors in Public Health Facilities, West Gojjam Zone, Ethiopia	To assess the status of the pharmaceutical supply chain practices and associated factors	Supplier relationship management and information sharing and technology were underperformed. Whereas, inventory management was a better-performed supply chain practice
Rejeb et al. (2019)	Leveraging the Internet of Things and Blockchain Technology in Supply Chain Management	To identify the role of Blockchain technology in supply chain management	Blockchain technology enhances supply chain integrity and improves operational performance.
Zelege et al. (2019)	Implementation fidelity and challenges of optimal cold chain management in Assossa district health system, Benshangul-Gumuz region, Western Ethiopia	To identify factors affecting the implementation of cold chain management in the Ethiopia pharmaceutical supply chain	Staff development, availability and utilization of equipment and related finances were major fidelity implementation challenges of cold chain management.
Esmaeillou et.al (2017)	Identifying Factors Affecting the Pharmaceutical Supply Chain Management in Iran	To identify factors affecting the management of pharmaceutical supply chain in Iran.	A significant and direct relationship between independent and dependent variables of medicine supply chain management.
Tesfaye et al. (2018)	The Study Of Ethiopia Public Health Supply Chain Management: Before and After Pharmaceuticals Fund and Supply Agency (PFSA)	To assess the strength, weakness and challenges of the Ethiopia public health SCM and compare it before and after PFSA	Lack of supply chain technical capabilities, lack of data visibility, lack of strong coordinating body, unavailability of enterprise wide business information system, lack accountability and clarity of roles and responsibility, and lack of private sector engagement and

			role.
Moniruzaman (2016)	Supply Chain Management in Pharmaceutical Industries: A Study on Eskayef Bangladesh	To assess the extent to which the supply chain function	Only 3% of the drugs are imported, the remaining 97% come from local companies.
Moosivand and Ghatari (2019)	Supply Chain Challenges in Pharmaceutical Manufacturing Companies: Using Qualitative System Dynamics Methodology	To explore pharmaceutical supply chain (PSC) challenges and the dynamics behavior of variables playing a special role in PSC.	Inaccuracy in forecasting, long lead times, lack of optimum target inventory, and high SC costs are the most important PSC problems.
Al-Hawawsheh (2019)	Impact of Pharmaceutical Supply Chain Factors Effectiveness on Drug Availability in Public Hospitals	To investigate the impact of pharmaceutical supply chain factors effectiveness on drugs availability in public hospital.	There is statistical a significant impact of pharmaceutical supply chain factors and its dimensions (demand uncertainty , prolong lead time , inventory level, risk level, Legislative & regulation issues) on drug availability in public hospitals

2.3. Conceptual Framework

The conceptual framework that explains the relationships between the dependent variable effectiveness of supply chain management practices and independent variables namely; counterfeiting issues, global economic condition, inventory management, procurement process, regulatory requirement, technology utilization, and transportation and logistics.

1. Counterfeiting issues

Counterfeiting issues can have a significant impact on various aspects of the pharmaceutical supply chain, including inventory management, procurement process, regulatory compliance, and technology utilization. According to Yang et al. (2018), the use of block chain technology can also help to improve inventory management and procurement processes, by providing real-time information and visibility into the supply chain. This can help to reduce

the risk of stock outs, overstocking, and expired products, and can improve the overall efficiency and effectiveness of the supply chain.

2. Economic conditions

The economic conditions can have a significant impact on the supply chain, affecting the availability and cost of raw materials, finished goods, and transportation. Therefore, it is crucial to have efficient supply chain management practices in place to mitigate the impact of economic conditions. According to Almkhalalati et al. (2019), efficient supply chain management practice can lead to cost savings and improved patient outcomes. By optimizing the supply chain, pharmaceutical companies can reduce waste, minimize costs, and ensure that medicines are available when needed. Moreover, robust optimization models can help pharmaceutical companies make informed decisions about supply chain coordination in the face of demand and price uncertainty, as stated by (Ghasemi et al., 2019).

3. Inventory management

Inventory management is a critical aspect of the supply chain that can have a significant impact on economic conditions, procurement, and transportation and logistics.

Effective inventory management can help ensure that medicines are available when needed, reducing the risk of stock outs and improving patient outcomes. On the other hand, ineffective inventory management can lead to inventory buildup, waste, and shortages, ultimately affecting the bottom line of the organization (Li et al., 2017),

4. Procurement issues

According to Al-Saleh et al. (2019), efficient procurement practices can help organizations reduce costs, improve inventory management, and optimize supply chain performance.

Moreover, multi-objective supplier selection models can help optimize pharmaceutical supply chain management. Wang et al. (2020) note that these models can help organizations balance competing objectives, such as cost, quality, and delivery time, to select the best suppliers and improve supply chain performance.

5. Regulatory requirements:

Regulatory requirements can have a significant impact on inventory management, procurement processes, and technology utilization. Compliance with regulatory requirements is crucial for ensuring access to quality medicines, as stated by the World Health Organization (WHO, 2021). Regulatory requirements set by government agencies and

international organizations ensure that pharmaceutical companies adhere to strict standards for the production, distribution, and storage of medicines.

6. Technology utilization

Technology utilization can have a significant impact on inventory management, procurement processes, and regulatory compliance. The use of technology can improve supply chain traceability, enabling real-time monitoring of products throughout the supply chain. This can help to reduce the risk of counterfeit medicines, which is a significant concern in the pharmaceutical industry (Yang et al., 2018).

7. Transport and logistics:

Transport and logistics can have a significant impact on economic conditions, inventory management, and procurement. Efficient transport and logistics practices can lead to cost savings and improved patient outcomes. Dubey et al. (2020) note that efficient transport and logistics practices can help to reduce costs associated with transportation, storage, and inventory management, ultimately leading to improved patient outcomes. Moreover, novel approaches such as cold chain transportation management can improve pharmaceutical supply chain performance. Tavakoli et al. (2019) noted that cold chain transportation management involves the use of specialized equipment and technology to maintain a consistent temperature throughout the transportation process, ensuring that temperature-sensitive pharmaceuticals remain effective and safe for use.

Independent variables

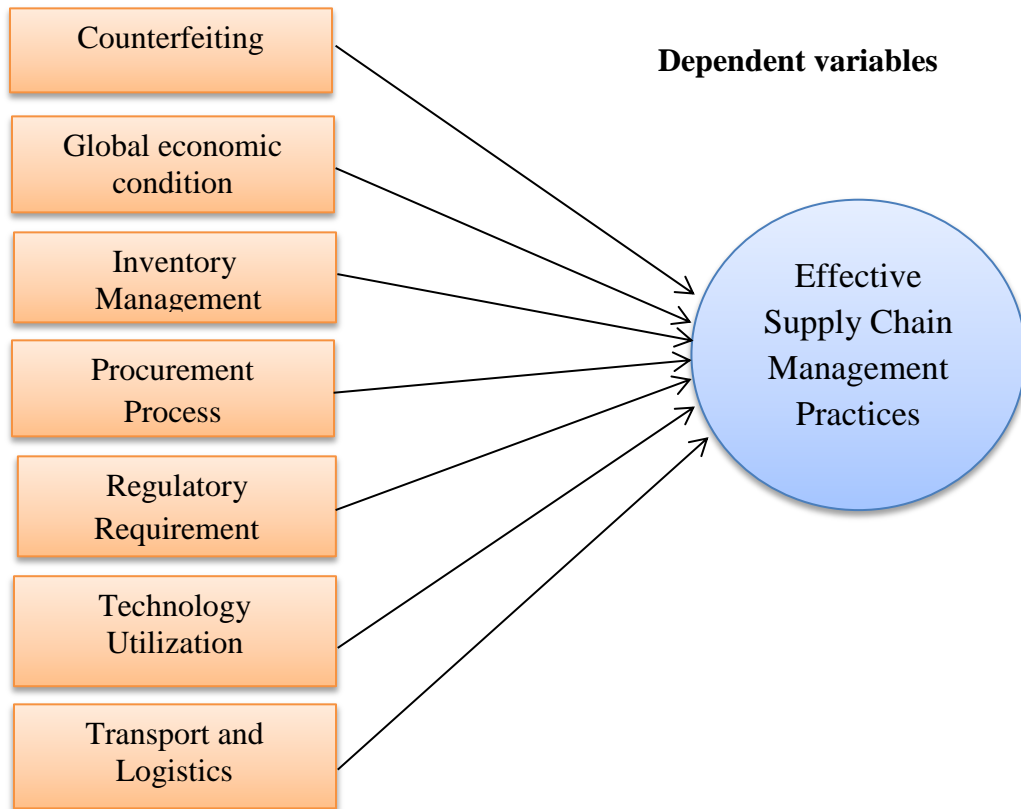


Figure 2.1 Conceptual framework developed by the researcher

CHAPTER THREE

RESEARCH METHODOLOGY

Introduction

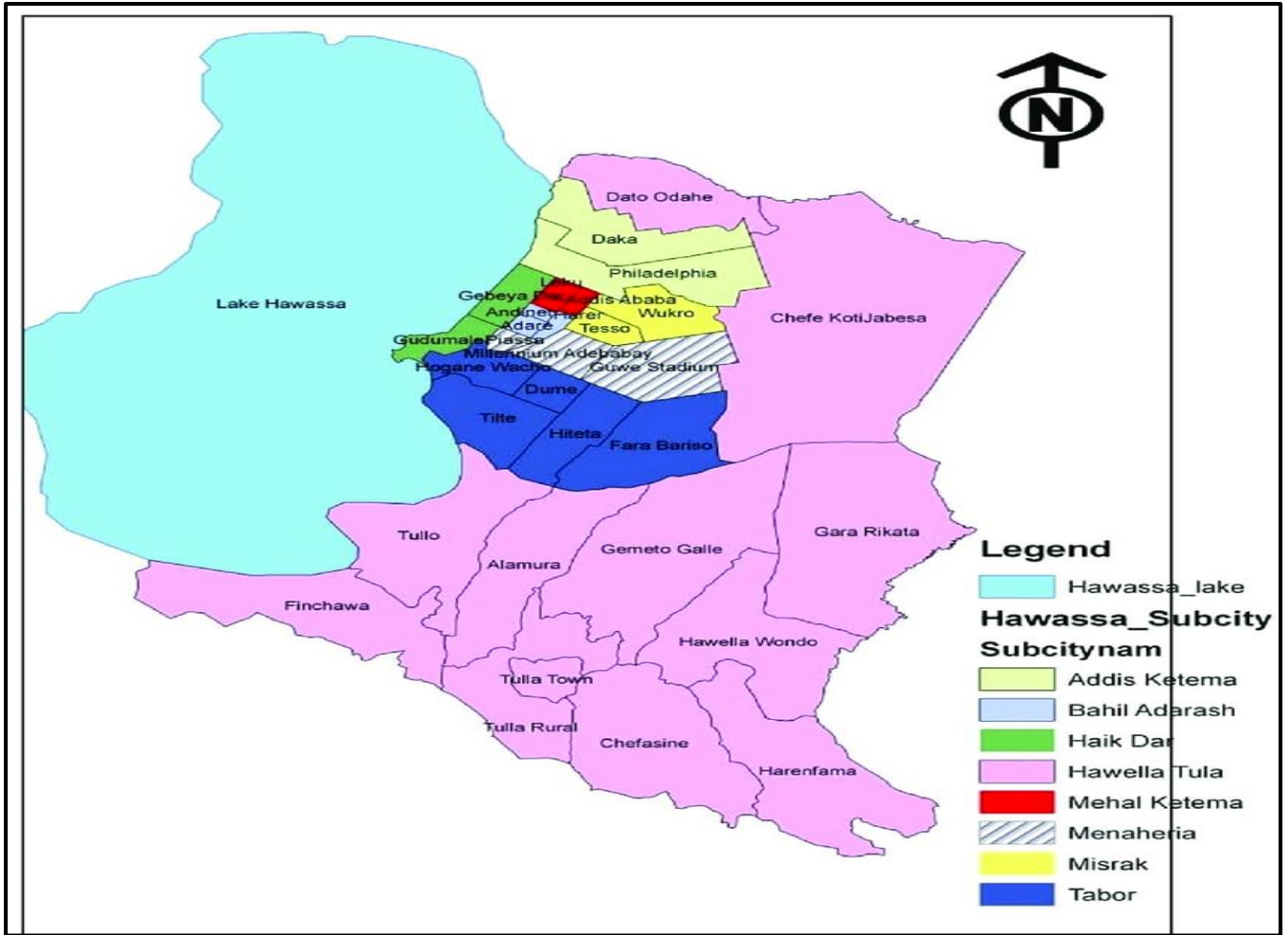
This chapter deals with the general methodology that was applied for the study. It involves study area, research design and approach, population of the study, sampling techniques, source of data and collection method, method of data analysis, validity and reliability of the data, and ethical consideration of the study.

3.1. Study Area

Hawassa city is located at a distance of 275 km away from Addis Ababa, the capital. It is bounded by Lake Hawassa on the west and north-west, Chelelaka swampy area on the east and south-east, Tikur Wuha River on the north, and Alamura Mountain on the south. Hawassa city has got its name from “Hawassa Lake”, which in the Sidama language stands for “large or wide water body”. Before the establishment of the city, the locality used to be known as “Adare”, which in Sidama language means “field of cattle” (Ethiopian Cities Association [ECA], 2024).

According to projections of the central statistics authority of Ethiopia, Hawassa’s population is estimated to be 436,992 in 2012E.C. The City’s population gender breakdown will be relatively evenly split between male (224,907 /51.4 %/) and female (212,085 /48.6% /). Out of the total number of the Population of the city administration 292,525 people live in urban area, while the remaining 144,467 peoples live in the rural area of the administration (ECA, 2024).

Hawassa has a young population. Around 65% of the people are under 25 years of age, and only about 5.5% of the population is over 50 years of age. The city of Hawassa is one of the fast-growing cities in the region. The city administration has an area of 157.2 (sq.kms), divided in to 8 sub-cities and 32 Kebeles. Currently, the City is serving as the seat of Sidama Region & Hawassa City Administration (ECA, 2024).



Source: Development data collection and dissemination process, finance and economic development department, Hawassa City Administration.

3.2. Research Approach

In this study, mixed-methods approach was used due to the fact that mixed-method approach involves combining both qualitative and quantitative research methods to provide a more comprehensive understanding of the factors affecting the effectiveness of supply chain management practices of the selected pharmacies and drug stores. Qualitative research methods, such as in-depth interviews can help to explore the experiences and perspectives of participants, while quantitative research methods, such as structured questionnaires, can help to identify trends and patterns in the data.

3.3. Research Design

Descriptive and explanatory research design was used in this study. Descriptive research design was used in order to understand and examine the factors affecting the effectiveness of supply chain management practices of pharmacies and drug stores in Hawassa City. Whereas, an explanatory research design was used to examine the cause and effect relationship between dependent and independent variables.

3.4. Population of the Study

According to Bryan and Bell (2021), a total population of a study is the entire group of individuals, events, or objects to which the researcher wishes to generalize the findings. In this context, the population of this study consists of all the pharmacies operating in Hawassa City. As data obtained from Hawassa City health bureau, there were 212 registered private pharmacies retail shops including drug stores operating by fulfilling the legal requirement and guidelines set by Ethiopian Ministry of Health. Therefore, the researcher used this total population to determine the sample size based on the certain criteria.

3.5. Sampling Procedure and Technique

The units' analyses of the study were of pharmacies retail shops and drug Stores operating in Hawassa City. For this study the non-probability sampling particularly judgmental sampling technique was used due to different factors that were considered by the researcher. Judgmental sampling involves selecting participants who have specific characteristics or experiences that are relevant to the research questions and objectives. Hence, from the total population of the study 154 pharmacies retail shops and drug stores were selected as the sample of the study. The selected pharmacies retail shops and drug stores were chosen based on certain criteria such as professional experience, year of establishment, and their distribution throughout the City. Concerning their distribution, all pharmacies operating in eight sub-cities were included. Also, considering their experience and year establishment, the researcher includes pharmacies operating at least for 5 years to obtain relevant data considering the characteristics of the supply chain management practices of pharmaceutical sectors. In addition to these the size of the retail shops, the volume of sales, and the availability of inventory management system were taken in to account to select the sample.

3.6. Sources of Data

To achieve the research specified objective, both primary and secondary data sources were used. The primary data was collected from respondents who were working in selected pharmacies through questionnaire and interview. In addition to the primary data, secondary data was gathered from published and unpublished sources.

3.7. Data Collection Method

In order to investigate factors affecting the effectiveness of supply chain management practices of selected pharmacies and drug stores in Hawassa City, both quantitative and qualitative data collection methods were used. The researcher collected relevant data through survey questionnaire and key informant interview. Qualitative data was collected through interview to gain a deeper understanding of the challenges faced by pharmacies in managing their supply chain, how they currently manage their supply chains, and effective strategies for improving supply chain management practices.

Quantitative data was collected through survey questionnaire which was designed in Likert scale. This structured questioners used to provide more generalizable insights into the effectiveness of supply chain management practices of pharmacies in Hawassa City.

3.8. Data Analysis Method

To analyze the collected data, mixed-methods approach that combines both qualitative and quantitative data analysis methods would be most appropriate.

Qualitative data collected through in-depth interviews or focus group discussions can be analyzed thematically using techniques such as content analysis or narrative analysis. This can help to identify common themes and patterns in the data, which can be used to develop theories and generalizations based on the analysis of the data. Quantitative data collected through structured questionnaires can be analyzed using statistical methods such as descriptive statistics or inferential statistics. This can help to identify trends and patterns in the data, as well as test hypotheses developed from the qualitative data. The analysis supported with Statistical Package for Social Science (SPSS) software version 25.

In terms of data presentation, the study uses a combination of written narratives, diagrams, and tables to present the results of the data analysis. The written narratives can be used to provide a detailed description of the findings, while diagrams and tables can be used to

present the data in a clear and concise format. Data visualization methods such as graphs or charts can also be used to highlight patterns or trends in the data and make it more accessible to a wider audience.

3.9. Validity and Reliability

3.8.1. Validity Test

Validity is the degree to which the study results obtained from the analysis of the data actually represents the phenomenon under investigation. For this study content validity was used to ensure the adequacy of measuring instrument through discussing their contents with colleagues and key stakeholders of pharmaceutical supply chain management. The test of the instrument focused on eliminating or minimizing the effect of extraneous influences, variables and explanations that might detract the accuracy of the ultimate findings.

3.8.2. Reliability Test

Reliability refers to the consistent of measurements throughout the entire finding of the study and it is a determination of obtaining the same results within the sample respondents. Therefore, the reliability checks for internal consistency of variables were tested. The internal consistency of the instrument tested through Cronbach Alpha. According to Joseph and Rosemary (2003), Cronbach’s alpha reliability coefficient (α) normally ranges between 0 and 1. And they further stated that, there is a greater internal consistency of the items if the Cronbach’s alpha coefficient closes to 1.0.

Table 3.1 Reliability Test

Variables	Cronbach Alpha	No of items
Counterfeiting	0.711	3
Global economic condition	0.721	3
Inventory management	0.878	3
Procurement process	0.715	3
Regulatory requirement	0.802	3
Technology utilization	0.805	3
Transport and logistics	0.765	3
Effectiveness of SCMPs	0.843	3

Source: SPSS output 2024

Based on the rule of thumb of George and Mallery (2003), if “ α ” > 0.9 = “Excellent”, “ α ” > 0.8 = “Good”, “ α ” > 0.7 = “Acceptable”, “ α ” > 0.6 = “Questionable”, “ α ” > “0.5” = Poor, and “ α ” < 0.5 = “Unacceptable”. Table 3.1 shows the result of Cronbach’s Alpha coefficient. Hence, the minimum Cronbach’s alpha result indicate (α > 0.7) which was under acceptable level.

3.10. Ethical Consideration

The following ethical considerations were applied throughout this research process.

- **Informed consent:** Participants were fully informed about the nature and purpose of the study.
- **Confidentiality:** The privacy and confidentiality of participants were protected throughout the research process. This includes ensuring that any personal information collected is kept confidential and secure, and that participants cannot be identified from the data collected.
- **Respect for participants:** while data collection, the researcher treat participants with respect and dignity.
- **Ethical review:** the researcher obtained ethical review and approval from relevant institutional review boards or ethics committees before conducting the study, to ensure that the study meets ethical standards and guidelines. Overall, ensuring ethical considerations, upholds the integrity of the research process.

CHAPTER FOUR

DATA ANALYSIS PRESENTATION AND INTERPRETATION

Introduction

This chapter addresses the detailed data analysis, presentation and interpretation of the collected data. The main objective of this study is to examine factors affecting the effectiveness of supply chain management practices in the case of selected pharmacies and drug stores in Hawassa City. The chapter encompasses the response rate of the study, descriptive and inferential statistics result, and qualitative analysis of factors affecting the effectiveness of supply chain management practices in selected pharmacies and drug stores.

4.1. Response Rate

A response rate is completion rate or return rate, in which the number of people who answered the survey divided by the number of people in the sample. According to Richardson (2005), as cited in Nulty (2008) the response rate in social science research for survey type questionnaire 50% is regarded as an acceptable level. The total sample of the study was 154 respondents selected from pharmacies and drug stores operating in Hawassa City. The survey questionnaires distributed for all samples. Out of 154 questionnaires distributed; 110 appropriately filled and valid questionnaires were returned and used for the data analysis. This represents a response rate of 71.4%.

4.2. Descriptive Statistics

This section discusses the descriptive statistics and analysis of the study. It includes descriptive results of background of the respondents, and factors affecting the effectiveness of supply chain management practices of selected pharmacies and drug stores.

4.2.1. Backgrounds of the Respondents

Table 4.1 Backgrounds of the respondents

	Category	Frequency	Percentage
Gender	Male	73	66.4%
	Female	37	33.6%
	Total	110	100%
Age	18 – 25	15	13.6%
	26 – 40	57	51.8%
	41 – 60	36	32.8%
	Above 60	2	1.8%
Educational level	Diploma	26	23.6%
	Degree	78	70.9%
	Masters	6	5.5%
Work experience	1 – 5 year	5	4.5%
	6 – 10year	69	62.7%
	11 – 15year	13	11.8%
	Above 15year	23	21%

Source: Survey questionnaires’ 2024, SPSS output

Table 4.1 indicates the general background of respondents’ information. In terms of gender, 37 (33.6%) of respondents were female and 73 (66.4%) of respondents were male. This shows that the number of male respondents were greater than female respondents. In terms of age, 15 (13.6%) of respondents are between 18 to 25years of age, 57 (51.8%) of respondents are between 26 to 40 years of age, 36 (32.8%) of respondents are between 41 to 60 years of age and the remaining 2 (1.8%) of respondents were 48above 60 years.

With regards to respondents educational level; 26 (23.6%) received a diploma, while 78(70.9%) have first degree, 6(5.5%) have master’s degrees. When considering at the respondent’s years of experience, 5 (4.5%) of respondents worked from 2 to 5 years, 69 (62.7%) of respondents have experience of 6 to 10 years, 13(11.8%) of respondents have experience of 11 to 15 years, and the remaining 23 (21%) of respondents served for above 10 years. This information implies majority of respondents’ were worked for longer.

4.2.2. Factors Affecting Effectiveness of Supply Chain Management Practices

Respondents were asked to fill and rate their responses on items that describe factors affecting the supply chain management practices. The questionnaires were prepared based on a five-point Likert scale ranging from 1 to 5 which indicate different level of agreement.

The mean statistical value approaching and interpretation were based on the following assumptions: if the mean value is between (0 to 1.5) this implies the respondents strongly disagreed, if the mean value is between (1.50 to 2.50) it indicates the respondents disagreed, the mean value between (2.50 to 3.50) indicates the respondents were neutral, the mean value between (3.50 to 4.50) implies the respondents agreed and a mean value 4.50 and above shows the respondents strongly agreed (Burns & Burns, 2008).

Accordingly, the mean scores have computed for independent variable: counterfeiting, global economic condition, inventory management, regulatory requirement, technology utilization, and transportation and logistics. Also the dependent variable was effectiveness of supply chain management practices. The average mean and standard deviation result of each variable together with their respective variables is presented, analyzed and interpreted as follows:

4.2.2.1. Counterfeiting

Table 4.2 Descriptive statistics of counterfeiting

Items	Mean	Std. Deviation
How satisfied are you with the overall quality of the products you sell	4.05	.839
How effective is your pharmacy's supply chain management in preventing the distribution of counterfeit products	3.74	1.163
How concerned are you about the impact of counterfeiting on the supply chain management of pharmacies	3.51	1.225

Source: Survey questionnaires' 2024, SPSS output

Table 4.2 indicates the mean score value of counterfeiting. The participants were highly satisfied with the quality of the products they sell, mean score value indicates 4.05. Respondents were also perceived their pharmacy's supply chain management is moderately

effective in preventing the distribution of counterfeit products; mean score value indicates 3.74. Moreover, the participants expressed a moderate level of concern regarding the impact of counterfeiting on the supply chain management of pharmacies, mean score value indicates 3.51. These findings provide valuable insights into the perceptions of the selected pharmacies regarding counterfeiting.

4.2.2.2. Global Economic Conditions

Table 4.3 Descriptive statistics of global economic conditions

Items	Mean	Std. Deviation
How satisfied are you with the overall effectiveness of your pharmacy's supply chain management practices?	4.03	.923
How have global economic conditions affected your pharmacy's supply chain management practices?	4.03	.990
How concerned are you about the impact of global economic conditions on the supply chain management of pharmacies	3.97	1.009

Source: Survey questionnaires' 2024, SPSS output

Table 4.3 indicates respondents understanding on the global economic condition in relation to pharmacies supply chain management. The respondents were relatively satisfied with the overall effectiveness of their pharmacy's supply chain management practice considering global economic condition, mean score value indicates 4.03. Respondents perceived that global economic conditions have had high impact on their pharmacy's supply chain management practices, mean score value indicates 4.03. Furthermore, the respondents expressed a high level of concern regarding the impact of global economic conditions on the supply chain management of pharmacies, the mean score value indicates 3.97.

These results suggest that the selected pharmacies and drug stores in Hawassa City have an awareness of the influence of global economic conditions on their supply chain management practices. It is essential for these pharmacies to closely monitor and adapt to changes in the global economic landscape to ensure the resilience and effectiveness of their supply chain operations.

4.2.2.3. Inventory management

Tale 4.4 Descriptive statistics of inventory management

Items	Mean	Std. Deviation
How satisfied are you with the overall effectiveness of your pharmacy's Inventory management practices?	3.88	1.139
How does inventory management impact the supply chain management of pharmacies?	3.78	.961
How concerned are you about the impact of inventory management on the supply chain management of pharmacies?	4.32	.856

Source: Survey questionnaires' 2024, SPSS output

The above table 4.4 indicates that the mean score of inventory management of pharmacies and drug stores. Respondents were explained reported a high level of satisfaction with the overall effectiveness of their pharmacy's inventory management practices; the mean score value shows 3.88. The respondents' were also perceived a high impact of inventory management on the supply chain management of pharmacies and drug stores with mean score value 3.78. In addition, the respondents were expressed a relatively high level of concern regarding the impact of inventory management on the supply chain management of pharmacies mean score value indicates 4.32.

These results suggest that inventory management plays a crucial role in the supply chain management of pharmacies in Hawassa City. It is important for pharmacies to continuously evaluate and improve their inventory management practices to enhance efficiency and responsiveness throughout the supply chain.

The high level of concern expressed by the respondents indicates the significance of effective inventory management in mitigating risks, such as stock outs or excess inventory. It highlights the need for pharmacies to optimize inventory levels, implement robust inventory tracking systems, and establish effective supplier relationships to ensure a smooth and uninterrupted supply chain.

4.2.2.4. Procurement process

Table 4.5 Descriptive statistics of procurement process

Items	Mean	Std. Deviation
How satisfied are you with the overall effectiveness of your pharmacy's procurement process	3.97	1.009
How does the procurement process impact the supply chain management of pharmacies?	3.78	.961
How concerned are you about the impact of the procurement process on the supply chain management of pharmacies?	3.74	1.155

Source: Survey questionnaires' 2024, SPSS output

Table 4.5 indicates the mean score value of procurement process. Respondents explained a high level of satisfaction with the overall effectiveness of their pharmacy's procurement process, mean score value indicates 3.97.

Similarly the respondents perceived the high impact of the procurement process on their supply chain management; mean score value shows 3.78. In addition, the participants expressed high level of concern regarding the impact of the procurement process on the supply chain management of pharmacies, mean score value indicates 3.74.

The results suggest that an effective procurement process is essential for the smooth functioning of supply chain management in pharmacies and drug stores. It is crucial for pharmacies to ensure that their procurement process facilitates timely and cost-effective acquisition of goods, maintains supplier relationships, and minimizes risks such as stockouts or delays in product availability.

4.2.2.5. Regulatory Requirement

Table 4.6 Descriptive statistics of regulatory requirement

Items	Mean	Std. Deviation
How would you rate the overall impact of regulatory requirements on your pharmacy's supply chain management?	3.51	1.225
How do regulatory requirements impact the supply chain management of pharmacies?	4.00	.938
How concerned are you about the impact of regulatory requirements on the supply chain management of pharmacies?	3.85	1.167

Source: Survey questionnaires' 2024, SPSS output

Table 4.6 indicates that the average value of regulatory requirement. The respondents perceived a moderate impact of regulatory requirements on their pharmacy's and drug stores effectiveness of supply chain management with mean score value 3.51. The respondents perceived a relatively high impact of regulatory requirements on the supply chain management; mean score value indicates 4.00. Furthermore, the respondents explained a high level of concern regarding the impact of regulatory requirements on their supply chain management practices; mean score value indicates 3.85.

These results emphasize the importance of complying with regulatory requirements in the pharmaceutical industry. Regulatory requirements, such as quality standards, documentation, licensing, and product safety regulations, can significantly impact supply chain management practices. Pharmacies need to ensure strict adherence to these requirements to maintain compliance, avoid penalties, and uphold patient safety and product quality standards. The relatively high perceived impact of regulatory requirements indicates that pharmacies and drug store in Hawassa City understand the importance of regulatory requirement in their supply chain management practices.

4.2.2.6. Technology Utilization

Table 4.7 Descriptive statistics of technology utilization

Items	Mean	Std. Deviation
How would you rate the overall level of technology utilization in your pharmacy's supply chain management?	3.48	1.011
How concerned are you about the challenges and risks associated with technology utilization in the supply chain management of pharmacies?	3.89	1.120
How has technology utilization improved the efficiency of your pharmacy's supply chain management of pharmacies?	3.46	.983

Source: Survey questionnaires' 2024, SPSS output

Table 4.7 illustrates, the respondents perceived a moderate level of technology utilization in their pharmacy's supply chain management, with mean score value indicates 3.48. They also expressed a high level of concern about the challenges and risks associated with technology utilization, mean score value indicates 3.89 while recognizing a moderate improvement in efficiency due to technology adoption, mean score value indicates 3.46.

This implies that the level of technology utilization of pharmacies and drug stores were considered as good. They embraced technology to a certain extent in their supply chain management practices. However, there may be opportunities for further integration and optimization of technology to enhance efficiency, accuracy, and visibility throughout the supply chain.

In addition, pharmacies and drug stores in Hawassa City recognize potential challenges and risks associated with technology utilization. These challenges may include implementation costs, data security, system compatibility, and staff training. Pharmacies need to address these concerns by carefully selecting and implementing technology solutions, ensuring data privacy and security measures, and providing adequate training and support to employees.

The high improvement in efficiency due to technology utilization suggests that technology has positively impacted the supply chain management practices of pharmacies. Technology

solutions such as inventory management systems, automated ordering processes, real-time tracking, and data analytics can streamline operations, reduce errors, and improve decision-making.

4.2.2.7. Transport and logistics

Table 4.8 Descriptive statistics of transport and logistics

Items	Mean	Std. Deviation
How would you rate the overall effectiveness of your pharmacy's Transport & Logistics	3.75	1.027
How do transport and logistics impact the supply chain management of pharmacies?	4.32	.856
How concerned are you about the challenges and risks associated with transport & logistics in the supply chain management of pharmacies?	3.67	.987

Source: Survey questionnaires' 2024, SPSS output

As table 4.8 shows the mean score value of transportation and logistics of selected pharmacies and drug stores in Hawassa City. Hence, the respondents perceived a high level of effectiveness in their transport and logistics operations, mean score value indicates 3.75. They also recognized a relatively high impact of transport and logistics on their supply chain management, mean score value indicates 4.32 and explain a moderate level of concern about the associated challenges and risks with mean score value of 3.67.

The moderate level of effectiveness suggests that there may be room for improvement in the transport and logistics operations of the pharmacies in Hawassa City. Enhancing transportation planning, optimizing routing, and implementing efficient inventory management systems can help improve the overall effectiveness of transport and logistics in the pharmacy supply chain.

The relatively high perceived impact of transport and logistics on supply chain management highlights the critical role that transportation and logistics play in the pharmaceutical industry. Efficient transportation and logistics operations are essential for ensuring timely

delivery of medications, maintaining optimal inventory levels, and meeting customer demands. Pharmacies need to invest in robust transportation and logistics strategies to streamline operations, reduce costs, and improve customer satisfaction.

The moderate level of concern expressed by the participants indicates an awareness of the challenges and risks associated with transport and logistics in supply chain management. These challenges may include transportation delays, inventory spoilage, product damage, and regulatory compliance. Pharmacies should address these concerns by implementing risk management strategies, establishing contingency plans, and maintaining open communication with transportation and logistics partners.

4.2.2.8. Effectiveness of Supply Chain Management Practices

Table 4.9 Overall evocativeness of supply chain management practices

Items	Mean	Std. Deviation
How effective do you consider the pharmacy’s overall supply chain management?	4.03	.923
How satisfied are customers with the pharmacy’s supply chain management?	3.88	1.139
How likely are customers to recommend the pharmacy to others based on its supply chain management?	3.78	.961

Source: Survey questionnaires’ 2024, SPSS output

Table 4.9 show the mean score value of overall effectiveness of supply chain management practices of selected pharmacies and drug stores. As indicates that respondents perceived their overall supply chain management practices were effective; mean score value shows 4.03. Also, respondents highly agree with their customers satisfaction with their supply chain management; mean score value indicate 3.88. Moreover, respondents perceived their customer were highly recommended their pharmacies and drug stores for others; mean value shows 3.78.

The moderate level of customer satisfaction suggests that while customers are generally satisfied with the supply chain management practices, there may be areas for improvement. This could include aspects such as order fulfillment, product availability, delivery times, and

overall customer experience. Pharmacies should consider gathering feedback from customers and using it to identify and address any gaps in their supply chain management practices.

The moderate likelihood of customers recommending the pharmacy based on its supply chain management indicates that customers value the efficiency and effectiveness of the supply chain in their decision-making process. This highlights the importance of maintaining strong supply chain management practices as a competitive advantage and a driver of customer loyalty and positive word-of-mouth.

To enhance the overall effectiveness of supply chain management and further increase customer satisfaction, pharmacies can focus on areas such as optimizing inventory management, improving order accuracy and timeliness, enhancing communication and collaboration with suppliers and customers, and leveraging technology solutions for greater visibility and efficiency.

4.2.3. Overall Descriptive Statistics

Table 4.10 overall compression of mean score of dependent and independent variables

Variables	Mean	Std. Deviation
The overall effectiveness of supply chain management practices	3.91	.67447
Counterfeiting	3.70	.79897
Global Economic conditions	4.00	.79430
Inventory management	3.99	.76491
Procurement process	3.83	.63812
Regulatory Requirement	3.78	.81097
Technology Utilization	3.61	.60330
Transport and logistics	3.80	.57017

Source: Survey questionnaires' 2024, SPSS output

Table 4.10 suggests the overall comparison of descriptive statistics mean score value concerning each individual factor that affect the effectiveness of supply chain management

practices of selected pharmacies and drug stores. Hence, the overall effectiveness of supply chain management practices in selected pharmacies and drug stores is high, mean score value indicates 3.91. The low standard deviation suggests that the responses were relatively consistent, indicating a shared perception of effectiveness among the participants. Counterfeiting is perceived to be a high concern in the pharmacy supply chain as mean score value indicates 3.70. The slightly higher standard deviation indicates some variability in the responses, suggesting that participants may have had differing levels of concern regarding counterfeiting. Global economic conditions are perceived to have a relatively high impact on the pharmacy supply chain, mean score value indicates 4.00. The standard deviation suggests some variability in the responses, indicating that participants may have had differing perceptions of the impact of global economic conditions. Inventory management practices in the selected pharmacies are perceived to be relatively effective, mean score value 3.99. The procurement process in the pharmacy supply chain is generally perceived to be effective, mean score value shows 3.83. The regulatory requirements to be moderately challenging in the pharmacy supply chain mean score value shows 3.78. The table also suggests that technology utilization in the pharmacy supply chain is to be moderately effective, mean score value 3.61. Transport and logistics in the pharmacy supply chain are generally perceived to be effective, mean score value 3.80.

The overall descriptive statistics provide insights into the perceptions and variability of various factors related to the pharmacies and drug stores supply chain management practices.

4.3. Inferential Statistics

This section consists of inferential statistics results of factors affecting effectiveness of supply chain management practices of selected pharmacies and drug stores in Hawassa City. The section presents correlation and regression results and analysis of the study.

4.3.1. Correlation Analysis

This part of the study presents the relationship that exists between variables by using Pearson correlation coefficient. All the relationship that exist between all variables presented and interpretation given based on correlation coefficient interpretation of (Maceachron, 1982).

The Pearson correlation coefficient can take a range of values from -1 to +1 in which value greater than zero indicates a positive association; and value less than zero indicates a negative association. Table 4.11 shows the measures of associations of correlation coefficient interpretation developed by Maceachron.

Table 4.11 measures of correlation associations

0.00 to 0.20 ; -0.00 to – 0.20	Very weak or very low
0.20 to 0.40; -0.20 to – 0.40	Weak or low
0.40 to 0.60; -0.40 to – 0.60	Moderate
0.60 to 0.80; -0.60 to – 0.80	Strong or high
0.80 to 1.0; -0.80 to – 1.0	Very high or very strong

Source: (Maceachron, 1982)

Therefore, for this study, the interpretation of correlation coefficient is based on this standard of correlation coefficient.

Table 4.12 the result of correlation analysis

		Correlations							
		COUN	GEC	IM	PP	RR	TU	TL	ESCM
Counterfeiting	Pearson Correlation	1							
	Sig. (2-tailed)								
Global Economic conditions	Pearson Correlation	.647**	1						
	Sig. (2-tailed)	.000							
Inventory management	Pearson Correlation	.229*	.240*	1					
	Sig. (2-tailed)	.016	.012						
Procurement process	Pearson Correlation	.343**	.548**	.562**	1				
	Sig. (2-tailed)	.000	.000	.000					
Regulatory Requirement	Pearson Correlation	.750**	.758**	.530**	.494**	1			
	Sig. (2-tailed)	.000	.000	.000	.000				
Technology Utilization	Pearson Correlation	.182	.110	.368**	.197*	.342**	1		
	Sig. (2-tailed)	.056	.255	.000	.039	.000			
Transport and logistics	Pearson Correlation	.401**	.560**	.343**	.419**	.530**	.118	1	
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.221		
Effectiveness of SCMPs	Pearson Correlation	.433**	.567**	.837**	.656**	.775**	.431*	.539**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	
**.		Correlation is significant at the 0.01 level (2-tailed).							
*.		Correlation is significant at the 0.05 level (2-tailed). N=110							

Source: Survey questionnaires' 2024, SPSS output

- **Counterfeiting and effectiveness of supply chain management practices:** Based on the survey results and correlation test, the relationship between counterfeiting and the effectiveness of supply chain management practices is positive and significant ($r = .433^{**}$, $p < 0.01$). According to Maeachron (1982), the magnitude of correlation between the two variables is moderate. Moreover, the relationship between counterfeiting and other remaining independent variables i.e., global economic condition, inventory management, procurement process, regulatory requirement, technology utilization, and transport and logistics is also positive and significant.
- **Global economic condition and effectiveness of supply chain management practices:** as the result indicates the relationship between global economic conditions and the effectiveness of supply chain management practices is positive and significant ($r = .567^{**}$, $p < 0.01$). Hence, the magnitude of the correlation between the two variables was moderate. Moreover, the relationship between global economic condition and other independent variables i.e., inventory management, procurement process, regulatory requirement, and transport and logistics is also positive and significant.
- **Inventory management and effectiveness of supply chain management practices:** as the result of the correlation test indicates the relationship between inventory management and the effectiveness of supply chain management practices is positive and significant ($r = .837^{**}$, $p < 0.01$). Hence, the magnitude of the correlation between the two variables is also very strong. Moreover, the relationship between inventory management and other independent variables i.e., procurement process, regulatory requirement, technology utilization, and transport and logistics is also positive and significant.
- **Procurement process and effectiveness of supply chain management practices:** the result of the correlation test indicates the relationship between the procurement process and the effectiveness of supply chain management practices is positive and significant ($r = .656^{**}$, $p < 0.01$). Hence, the magnitude of the correlation between the two variables is also strong. Moreover, the relationship between the procurement process and other remaining independent variables i.e., regulatory requirement, and transport and logistics is also positive and significant.
- **Regulatory requirement and effectiveness of supply chain management practices:** the result of the correlation test indicates the relationship between regulatory requirements and the

effectiveness of supply chain management practices is positive and significant ($r = .775^{**}$, $p < 0.01$). The magnitude of the correlation between the two variables is also strong. Moreover, the relationship between regulatory requirements and other independent variables i.e., technology utilization, and transport and logistics is also positive and significant.

- **Technology utilization and effectiveness of supply chain management practices:** as the result indicates the relationship between technology utilization and the effectiveness of supply chain management practices is positive and significant ($r = .431^{**}$, $p < 0.01$). The magnitude of the correlation between the two variables is also moderate. Moreover, the relationship between the remaining independent variables, i.e., transport and logistics, is also positive and insignificant.
- **Transport and logistics, and effectiveness of supply chain management practices:** as the result indicates the relationship between transport and logistics, and the effectiveness of supply chain management practices is positive and significant ($r = .539^{**}$, $p < 0.01$). The magnitude of the correlation between the two variables is also moderate.

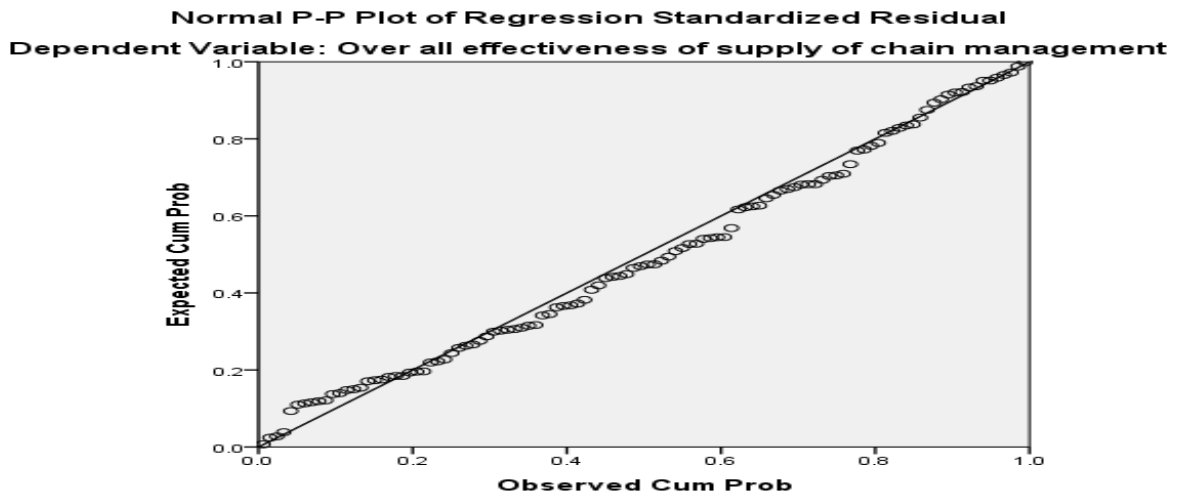
4.3.2. Multiple Regression Analysis

4.3.2.1. Regression Model Assumptions Tests

The multiple linear regression models need several basic assumptions to be tested. Before the regression analysis was employed, these assumptions were tested.

- **Linearity:** according to the linearity test, residuals should have a linear relationship with the predicted dependent variable scores. The assumption concerns a linear relationship between independent variables and dependent variables. The assumption can be examined by plotting scatter plots of the relationship between each explanatory variable and the dependent variable. Hence, for this study, it is observed that the scatter plot exhibits a linear relationship between variables.

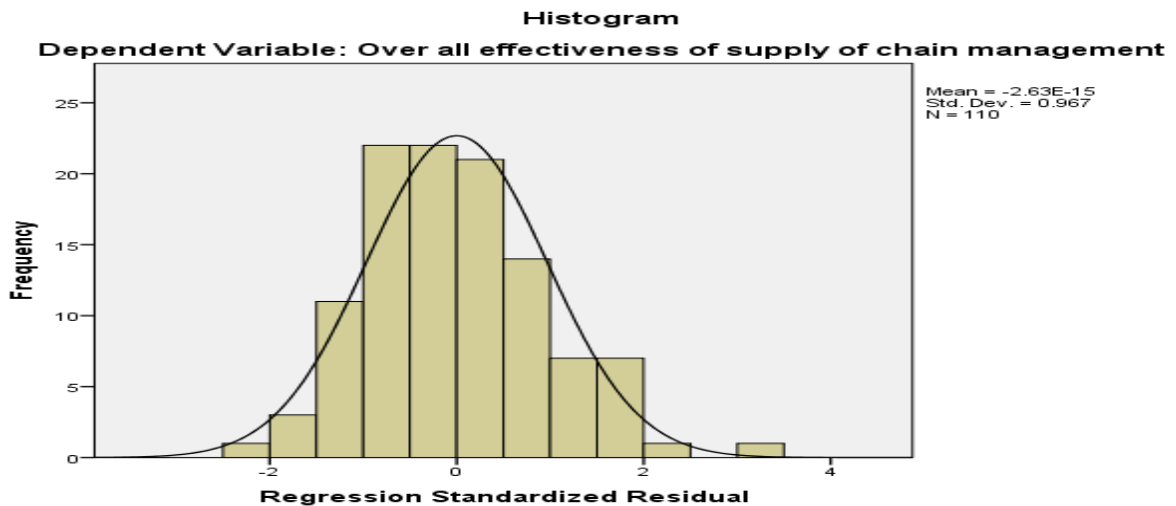
Figure 4.1 Linearity test



Source: Survey questionnaires' 2024, SPSS output

- **Normality Test:** One of the basic assumptions for multiple linear regressions is normality. Normality assumes that the data is normally distributed. The normal distribution of data characterized as bell-shaped means that the data has spread evenly. Therefore, it can represent the population. Data that is normally distributed, is symmetrical the median, mean, and mode have zero skewness (Ainiyah & Deliar, 2016). The assumption is checked by Histogram the frequency distribution of the standardized residual of small-scale enterprise performance. The result shows that as can be seen from the Histogram graph, in Figure 4.2 the distribution of the data is normally distributed and symmetric.

Figure 4.2 Normality test



Source: Survey questionnaires' 2024, SPSS output

- Autocorrelation:** The assumption of autocorrelation assumes that in the multiple linear regression model, the errors are independent of each other and not correlated (Hultema & Laraway, 2006). The assumption is tested by using Durbin – Watson; as a rule of thumb, the Durbin – Watson statistic should be between the range of 1.5 and 2.5 for the independent observation that is acceptable (Garson, 2012). For this study, the value of the Durbin – Watson statistic autocorrelation test result indicates 2.059. Hence, the result is between acceptable ranges.

Table 4.13 Normality test

Model Summary ^b					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.945 ^a	.893	.885	.22842	2.059

a. Predictors: (Constant), Transport and logistics, Technology Utilization, Counterfeiting, Procurement process, Inventory management, Global Economic conditions, Regulatory Requirement

b. Dependent Variable: Overall effectiveness of supply of chain management

- Multicollinearity:** refers to the strongest interrelated among explanatory (independent) variables. The assumption assumes that no multicollinearity or little collinearity exists among the independent variables. The assumption was tested through the Variance Inflation Factor (VIF). VIF is a tool to measure and quantify how much the variance is inflated. If the VIF = 1= not correlated, $1 < VIF \leq 5$ = moderately correlated, $VIF > 5$ = highly correlated (Daoud, 2017).

Hence, as indicated in the table of Collinearity Statistics test, obtained Variance Inflation Factor values of independent variables: Counterfeiting (2.553), global economic conditions (3.742), inventory management (2.381), procurement process (2.087), regulatory requirement (5.475), technology utilization (1.249), and transportation and logistics (1.575). Therefore, all independent variables are not highly correlated except regulatory requirements.

Table 4.14 **Multicollinearity** test

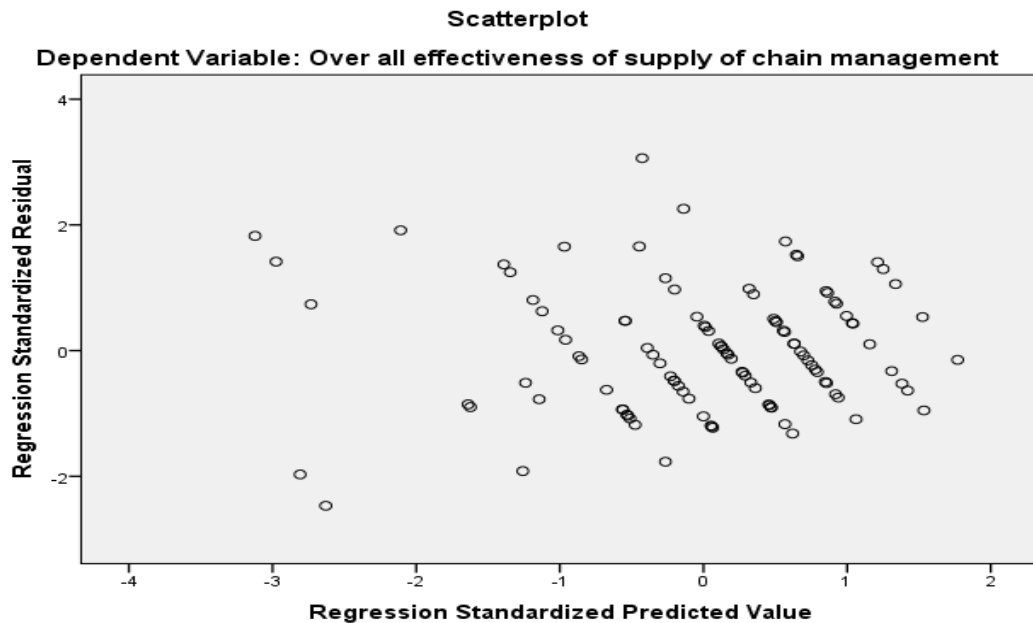
Coefficients^a			
Model		Collinearity Statistics	
		Tolerance	VIF
1	Counterfeiting	.392	2.553
	Global Economic conditions	.267	3.742
	Inventory management	.420	2.381
	Procurement process	.479	2.087
	Regulatory Requirement	.183	5.475
	Technology Utilization	.801	1.249
	Transport and logistics	.635	1.575

a. a. Dependent Variable: Overall effectiveness of supply chain management

Source: Survey questionnaires' 2024, SPSS output

- Homoscedasticity:** homoscedasticity assumption refers to equal variance of residuals (errors). The assumption assumes that the variance around the regression line is the same for all values of the predictor variable. For a basic analysis, it is worth plotting ZRESID (Y-axis) against ZPRED (X-axis), because this plot is useful to determine whether the assumptions of random errors and homoscedasticity have been encountered. As a decision rule: If there were certain variants, such as organized shaping dot (waves, fuse and narrow), therefore no homoscedasticity happened. If there were not certain variants, and dots spread above and below 0 numbers in axis Y, then homoscedasticity did happen (Pallant, 2010). Thus, the assumption is reasonably supported in this study.

Figure 4.3 Homoscedasticity test



Source: Survey questionnaires' 2024, SPSS output

After the regression assumptions were tested and fulfilled the remaining multiple regressions tests were performed between the dependent variable i.e., the effectiveness of supply chain management practices and independent variables (counterfeiting, Global Economic conditions, Inventory management, Procurement process, Regulatory Requirement, Technology Utilization, Transport and logistics) to determine regression model summary, ANOVA and Coefficients of determination. Table 4.15 shows the model summary of the regression.

4.3.2.2. Model Summary

Table 4.15 regression model summary

Model Summary^b					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.945 ^a	.893	.885	.22842	2.059

a. Predictors: (Constant), Transport and logistics, Technology Utilization, Counterfeiting, Procurement process, Inventory management, Global Economic conditions, Regulatory Requirement

b. Dependent Variable: Overall effectiveness of supply of chain management

The result of multiple regressions displayed in Table 4.15 model summary shows the regression model of the effectiveness of supply chain management practices. R value which is 0.945 implies the existence of a very strong correlation between independent variables and dependent variables.

The value of R Square which is 0.893 indicates how much the model explains the variations of effectiveness of supply chain management practices. Hence, the coefficient of determination R Square 89.3% of the variation in the effectiveness of supply chain management practices can be explained by the set of independent variables, namely counterfeiting, global economic condition, inventory management, procurement process, regulatory requirements, technology utilization, and transport and logistics.

The remaining 10.7% of variation in the effectiveness of supply chain management can be explained by other variables which not included in this model. This shows that the model has a very good fit since the value is above 50%. On the other hand, adjusted R-squared provides an adjustment to the R-squared statistic such that an independent variable that correlates with the dependent variable increases the adjusted R-squared and any variable without a strong correlation will make adjusted R-squared decrease.

4.3.2.3. Analysis of Variance (ANOVA)

Table 4.16. ANOVA

ANOVA ^a						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	44.263	7	6.323	121.197	.000 ^b
	Residual	5.322	102	.052		
	Total	49.585	109			
a. Dependent Variable: Overall effectiveness of supply chain management						
b. Predictors: (Constant), Transport and logistics, Technology Utilization, Counterfeiting, Procurement process, Inventory management, Global Economic conditions, Regulatory Requirement						

Source: Survey questionnaires' 2024, SPSS output

Table 4.16 shows the result of ANOVA which suggest the significance level of the model. As indicated the significance value of the model is $p < .000$; which is less than the significance level of 0.05 at a confidence level of 95%. Therefore, the model is statistically significant in predicting how independent variables affect the effectiveness of supply chain management practices. Since this value of F calculated is greater than the F critical (value = 121.197), at 5% level of significance, this shows that the overall model is significant.

4.3.2.4. Regression Coefficient

Table 4.17 regression coefficient

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.292	.211		-1.386	.169
	Counterfeiting	-.121	.044	-.143	-2.768	.007
	Global Economic conditions	.111	.053	.131	2.081	.040
	Inventory management	.453	.044	.514	10.273	.000
	Procurement process	.106	.050	.100	2.130	.036
	Regulatory Requirement	.318	.063	.382	5.032	.000
	Technology Utilization	.103	.041	.092	2.540	.013
	Transport and logistics	.108	.048	.092	2.250	.027

a. Dependent Variable: Overall effectiveness of supply chain management

Source: Survey questionnaires' 2024, SPSS output

Table 4.17 shows the coefficient independent variables which reveal their effect on the effectiveness of Supply chain management practices. The regression coefficient shows that the contribution of independent variables associated with it is contributing significance to the variance accounted for in the dependent variable.

$$Y = B_0 + B_1x_1 + B_2x_2 + B_3x_3 + B_4x_4 + B_5x_5 + B_6x_6 + B_7x_7 + e$$

Where:

Y = Effectiveness of Supply chain management practices (Effectiveness of SCMPs)

B₀ = constant point of intercept

B₁ ...B₇ slop of the line

(x₁=CO, x₂=GE, x₃ = IN, x₄ = PR, x₅ =RE, x₆ =TE, x₇ =TR)

Based on this regression model, variables on the study explained as:

$$Y = - 0.292 - 0.121CON + 0.111GE + 0.453IN + 0.106PR + 0.318RE + 0.103TE + 0.108TR + e$$

The effect of counterfeiting indicated (-0.121), implies that a percent increase in counterfeiting, the effectiveness of supply chain management of pharmacies will decrease by 12.1 percent while the other variables remain constant. It can be concluded counterfeiting has negative effect on the effectiveness of pharmacies and drug store in Hawassa City. Global economic condition indicated (0.111), implies that a one percent increase in global economic condition will increase by 11.1 percent in effectiveness of supply chain management.

In the same way, a one percent increase in inventory management, procurement process, regulatory requirement, technology utilization, and transportation and logistics will increase by 45.3 percent, 10.6 percent, 31.8 percent, 10.3 percent, and 10.8 percent.

Therefore, the finding shows that inventory management and regulatory requirement have greater effect on the effectiveness of supply chain management practices of pharmacies retail shops and drug store in Hawassa City.

4.4. Analysis of Qualitative data

In addition to quantitative data, the researcher gathers qualitative data through key informant interviews. The researcher conducted in deep- interview with the District Director of EPSA. The interview question was designed in semi-structured form. The interview guided with:

1. Can you provide an overview of the current supply chain management practices in your organization/department?
2. What are the key factors or challenges that affect the supply chain management in the pharmacy sector in Hawassa City?
3. How do external factors such as regulatory policies, market demand, or technological advancements influence your supply chain management practices?
4. How do you collaborate and coordinate with other stakeholders in the supply chain, such as suppliers, distributors, or wholesalers?

5. Can you provide insights into the current utilization of technology in the supply chain management practices of selected pharmacies in Hawassa City

The following section presents the result of key informant responses on the factors affecting the effectiveness of supply chain management practices.

1. *Can you provide an overview of the current supply chain management practices in your organization/department?*

Response: The District Director of EPSA, South Branch, Says that he oversees and manages the supply chain management practices within our organization. At EPSA, we have implemented a comprehensive supply chain management system that encompasses various activities from procurement to distribution.

The primary objective is to ensure the availability of essential pharmaceutical products to healthcare facilities and pharmacies within our district. To achieve this, we have established strong relationships with reliable suppliers and wholesalers, enabling us to maintain a steady flow of pharmaceutical products. Additionally, our inventory management practices involve monitoring stock levels, forecasting demand, and implementing just-in-time principles to minimize holding costs. We have also invested in advanced software systems that allow us to track and trace products throughout the supply chain, ensuring transparency and efficient operations.

2. *What are the key factors or challenges that affect the supply chain management in the pharmacy sector in Hawassa City?*

Response: In the pharmacy sector of Hawassa City, several notable challenges impact supply chain management. As the District Director of EPSA, he said that he is responsible for navigating and addressing these challenges. Firstly, regulatory policies and compliance requirements play a significant role. Ensuring compliance with permits, licenses, and pharmaceutical quality standards is crucial for us to operate effectively. Secondly, fluctuations in market demand and patient preferences can create uncertainties in forecasting and inventory management. We must remain agile and responsive to these changes while

ensuring we have adequate stock levels to meet patient needs without overstocking. Moreover, the rapid advancements in technology require continuous adaptation to new tools and systems, which can be a challenge for some pharmacies. As EPSA, we strive to support pharmacies in overcoming these challenges through training and guidance.

3. How do external factors such as regulatory policies, market demand, or technological advancements influence your supply chain management practices?

Response: External factors such as regulatory policies, market demand, and technological advancements have a profound influence on our supply chain management practices at EPSA, South Branch. As the District Director, he oversees the implementation of strategies to address these factors. Regulatory policies dictate the documentation, labeling, and storage requirements for pharmaceutical products. Compliance with these regulations is crucial to avoid penalties or disruptions in supply.

Market demand fluctuations require us to closely monitor trends and collaborate with healthcare facilities and pharmacies to ensure our inventory aligns with patient needs. Technological advancements have played a significant role in improving our supply chain management practices. We have implemented automated systems for inventory control, order processing, and data analysis, which have enhanced efficiency, accuracy, and decision-making.

4. How do you collaborate and coordinate with other stakeholders in the supply chain, such as suppliers, distributors, or wholesalers?

Response: Collaboration and coordination with stakeholders in the supply chain are fundamental aspects of our operations at EPSA, South Branch. As the District Director, he said that he is responsible for fostering these relationships. We maintain strong partnerships with our suppliers, conducting regular meetings to discuss demand forecasts, pricing, and delivery schedules.

5. Can you provide insights into the current utilization of technology in the supply chain management practices of selected pharmacies in Hawassa City?

Response: The utilization of technology in supply chain management practices is an important aspect of enhancing efficiency and effectiveness. In Hawassa City, selected pharmacies have started embracing technology to streamline their supply chain operations. Some pharmacies have implemented inventory management software that allows for real-time tracking of stock levels, automated reordering, and improved demand forecasting. This helps pharmacies optimize their inventory, reduce stock outs, and minimize wastage.

Additionally, selected pharmacies have adopted point-of-sale systems that integrate with their inventory management software. These systems enable seamless tracking of sales, and inventory updates, and provide insights into customer purchasing patterns. By leveraging such technology, pharmacies can make data-driven decisions, improve inventory accuracy, and enhance customer service.

Another technology trend observed in some pharmacies is the use of mobile applications or online platforms for ordering and delivery services. These platforms allow customers to place orders online, upload prescriptions, and choose delivery options. Pharmacies have integrated these systems into their supply chain operations, enabling efficient order processing, tracking, and home delivery services.

Furthermore, some pharmacies in Hawassa City have implemented temperature monitoring systems to ensure the integrity of temperature-sensitive medications. These systems use sensors and data loggers to monitor storage conditions and generate alerts if temperature deviations occur. This helps pharmacies maintain the quality of pharmaceutical products and comply with regulatory requirements.

However, it's important to note that not all pharmacies in Hawassa City have fully embraced technology due to various challenges, including limited resources, lack of technical expertise, and infrastructure constraints. Nonetheless, the utilization of technology in supply chain management is gradually gaining traction, and pharmacies are recognizing its potential to improve operational efficiency and patient care.

Discussion

Supply chain management (SCM) is a critical aspect of the pharmaceutical industry, ensuring the availability of genuine medications and addressing the challenges posed by counterfeiting, global economic conditions, and regulatory requirements. This study aimed to investigate the factors affecting the effectiveness of SCM practices in selected pharmacies and drug stores in Hawassa City.

The analysis reveals that counterfeiting has negatively affected the overall effectiveness of supply chain management in the selected pharmacies and drug stores. However, according to the study conducted by John Smith (2017), the finding revealed that counterfeiting issues affect supply chain management. Counterfeiting issues such as track-and-trace systems and serialization can help in identifying and preventing counterfeit products.

The study indicates that global economic conditions have a positive correlation and affect the overall effectiveness of supply chain management practices. This suggests that the selected pharmacies and drug stores should closely monitor and adapt to global economic trends to mitigate potential disruptions and optimize their supply chain strategies.

The study also revealed that global economic conditions play a significant role in SCM practices within the pharmaceutical sector. Fluctuations in the economy can impact the availability, pricing, and transportation of pharmaceutical products. This finding resonates with the research conducted by Johnson (2019), who highlighted the need for supply chain flexibility and robust risk management strategies in the face of economic uncertainties. Johnson's work emphasized the importance of diversifying suppliers, establishing alternative transportation routes, and monitoring market trends. This study supports these findings, suggesting that pharmacies in Hawassa City should adopt proactive measures to mitigate the impact of global economic conditions on their supply chains.

The analysis demonstrates that effective inventory management positively affects the overall effectiveness of supply chain management practices. It is recommended for the selected pharmacies and drug stores to adopt advanced inventory management systems and demand forecasting techniques to optimize inventory levels, reduce stock outs, and minimize carrying

costs. The findings also indicate that a streamlined and efficient procurement process positively impacts the overall effectiveness of supply chain management. It is advisable for the selected pharmacy retail shops to establish strong supplier relationships, implement supplier performance evaluation mechanisms, and ensure compliance with quality standards and delivery reliability.

Efficient inventory management and streamlined procurement processes emerged as critical factors influencing SCM practices in the selected pharmacies of Hawassa City. This study revealed that pharmacies with optimized inventory control systems and well-defined procurement processes experienced improved supply chain efficiency. These findings align with the research conducted by Michael Brown (2020), who emphasized the importance of accurate demand forecasting, efficient order placement, and inventory optimization. Brown's work demonstrated that effective inventory management and streamlined procurement processes can lead to reduced stock outs, minimized wastage, and enhanced customer satisfaction. This finding aligns with the research conducted by John Smith (2018), who emphasized the significance of regulatory compliance in the pharmaceutical supply chain. The study supports these findings, suggesting that pharmacies in Hawassa City should prioritize regulatory compliance and invest in the necessary resources to meet the required standards. The result suggests that technology utilization has apposite impact on the overall effectiveness of supply chain management. Implementing digital solutions, such as cloud-based inventory systems and automated order processing, can enhance operational efficiency, visibility, and data-driven decision-making in the selected pharmacy retail shops. This study identified technology utilization and efficient transport logistics as factors influencing SCM practices in the pharmacies of Hawassa City. Embracing technological advancements such as automation, real-time tracking, and data analytics can significantly enhance supply chain visibility, accuracy, and efficiency. This finding aligns with the research conducted by Johnson (2020), who emphasized the role of technology in improving SCM practices. Johnson's work demonstrated that the integration of technology in transportation management, route optimization, and real-time monitoring can lead to faster delivery, reduced costs, and enhanced customer satisfaction. This study reinforces these findings, suggesting that pharmacies in Hawassa City should leverage technology to optimize their transport logistics and improve overall supply chain effectiveness.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1. Summary of the Findings

The purpose of this study was to investigate the factors affecting the supply chain management practices of selected pharmacies and drug stores in Hawassa City. The research employed a mixed-methods approach, utilizing both quantitative and qualitative data analysis techniques. The quantitative analysis included descriptive analysis, correlation analysis, and regression analysis to examine the relationships between various factors and supply chain management effectiveness.

The research study collected data from 110 respondents to assess various aspects related to supply chain management. The overall descriptive statistics reveal that effectiveness of supply chain management practices of selected pharmacies and drug stores in Hawassa City indicates that mean score value 3.90, global economic conditions mean score value 4.00, counterfeiting mean score value 3.70, inventory management mean score value 3.99, procurement process mean value 3.83, regulatory requirements mean score value 3.78, technology utilization mean value of 3.61, and transport and logistics mean value of 3.80 favorably. The findings provide valuable insights into the respondents' perceptions of these aspects in the supply chain, aiding further analysis and decision-making in supply chain management.

The overall effectiveness of supply chain management shows significant positive relationship with several independent variables. Hence, effectiveness of supply chain management practices has a significant and positive relationship with counterfeiting, global economic condition, inventory management, regulatory requirement, procurement process, technology utilization, and transport and logistics.

The model summary explains 89.3% of the variance in the overall effectiveness of supply chain management can be explained by the included independent variables. The ANOVA model goodness of fit was also significant.

The regression coefficient analysis provides insights into the relationships between the independent variables (constant, counterfeiting, global economic conditions, inventory management, procurement process, regulatory requirement, technology utilization, and transport and logistics) and the dependent variable (overall effectiveness of supply chain management). Therefore, except counterfeiting the remaining variables affect the effectiveness of supply chain management practices in selected pharmacies and drug stores in Hawassa City.

5.2. Conclusion

As the data analysis in chapter four and findings of the study, the following conclusions are drawn. There is significant association between all the independent variables i.e., counterfeiting, global economic condition, inventory management, regulatory requirement, procurement process, technology utilization, transport and logistics and dependent variable the effectiveness of supply chain management practices of selected pharmacies and drug stores in Hawassa City. All independent variable positively and significantly affect the effectiveness of supply chain management practices, except counterfeiting. Counterfeiting negatively affects the effectiveness of supply chain management practices of selected pharmacies and drug stores in Hawassa City.

5.3. Recommendations

Based on the findings of the study the following recommendations are provided for the concerned bodies:

✓ For Regulatory Authorities

Regulatory authorities should enhance their efforts to enforce regulations related to counterfeit drugs, inventory management, procurement processes, and transportation logistics. This will help to mitigate the risks associated with counterfeit medications and ensure compliance with quality standards throughout the supply chain. In addition, it will better to develop clear guidelines and provide support to pharmacies regarding regulatory requirements. This can include regular training programs, workshops, and awareness campaigns to enhance understanding and adherence to regulations.

✓ **For Pharmacy Associations and Professional Organizations**

Pharmacy associations and professional organizations should facilitate platforms for sharing best practices, experiences, and knowledge among pharmacies and drug stores in Hawassa City. This can be done through conferences, seminars, and online forums where pharmacies and Drug Stores can learn from each other and improve their supply chain management practices.

✓ **For Pharmacy and Drug Store Owners and Managers**

Pharmacy and Drug Store Owners and managers should invest in technology solutions that enable efficient inventory management, real-time tracking, and communication within the supply chain. This will help streamline operations, reduce errors, and improve overall supply chain effectiveness.

✓ **For Government and Development Agencies**

Government and development agencies should invest in improving infrastructure, including transportation networks and storage facilities, to facilitate efficient and reliable supply chain operations. These agencies should support research initiatives aimed at addressing supply chain challenges in the pharmaceutical sector. Funding research projects and encouraging innovation will help identify new approaches and technologies to enhance supply chain management practices.

✓ **For Educational Institutions**

Educational institutions can collaborate with industry experts and professionals to develop comprehensive courses or modules on supply chain management in the pharmaceutical sector. The curriculum should cover topics such as demand forecasting, procurement strategies, inventory optimization, quality control, and regulatory compliance. Practical case studies and internships can also be incorporated to provide hands-on experience.

✓ **For Technology Providers**

Technology providers should engage with pharmacies and Drug Stores to understand their specific needs and challenges in supply chain management. This will enable them to develop customized solutions that address these requirements effectively. These solutions can

include inventory management software, supply chain visibility platforms, and track-and-trace systems to ensure the authenticity and traceability of medications.

5.4. Suggestions for Further Research

This study was geographically limited to only select pharmacies and drug stores in Hawassa City. Assessing and examining factors affecting the effectiveness of supply chain management practices is crucial for the development of pharmaceutical sector in general. Hence, the researcher suggests that further research is better to include and consider another geographical area. This study used a non-random sampling method to determine the sample size of the study which is limited and difficult to generalize the finding of the study. Therefore, it is suggested that other researchers investigate using a probability sampling method. The current study examines factors affecting the effectiveness of supply chain management practices considering seven variables. However, other factors which not included in this study might be affecting the supply chain management practices of pharmacies and drug stores. Thus, it is suggested for future researchers to consider other factors which have a potential effect on the supply chain management practices.

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APPEDICES

Appendix I: Questionnaire

**HAWASSA UNIVERSITY
COLLEGE OF BUSINESS AND ECONOMICS
DEPARTMENT OF MARKETING
MA PROGRAM**

Dear respondent:

My name is Margir Yirgu. I am attending MA in program at Hawassa University. Right now, I am conducting a research on the title “factors affecting the effectiveness of supply chain management practices in the case of selected pharmacy in Hawassa City” as a partial fulfillment of the requirements for the degree of masters of Marketing Management.

The objective of this questionnaire is to gather inputs for assessing factors affecting the effectiveness of supply chain management practices in selected pharmacies operating in Hawassa City. Two types of items are prepared: background information and factors that affect the effectiveness of supply chain management practices of pharmacies. The data to be collected through the questionnaire is highly valuable to meet the objective of the study. Therefore, the researcher requests you kindly to collaborate in providing appropriate possible answers based on the given instructions. Please be informed that:

- ✓ the information you supply will be used for academic purpose only
- ✓ you will not be referred by name and
- ✓ Your responses will be kept confidential.

Thank you in advance for your cooperation!!

General direction:-

1. There is no need of writing your name.
2. Answer all the items unless you come across non – applicable items.
3. Use ‘√’ or ‘X’ mark for answering objective items.

Thank You in Advance!

Part I. Background information

The following questions are related to your personal information. Completion of this information is voluntary and its confidentiality is assured. No individual data will be reported.

1. Your gender: Male Female
2. Age: 18 – 25 26 – 40 41 – 60 above 60
3. Your highest level of education: Diploma Degree Masters PhD

Items	Possible options of answer				
	1	2	3	4	5
Counterfeiting	Very dissatisfied	Somewhat dissatisfied	Neutral	Somewhat satisfied	Very satisfied
How satisfied are you with the overall Quality of the products you sell					
How effective is your pharmacy’s supply chain management in preventing the distribution of counterfeit products	Very Negatively	Somewhat Negatively	neutral	Somewhat Positively	Very Positively
How concerned are you about the impact of counterfeiting on the supply chain management of pharmacies	Not at all concerned	Slightly concerned	Moderately concerned	Very concerned	Extremely concerned

4. How many years of experience do you have in financial institutions as a manager?

Below 1 1 – 5 6 – 10 11 – 15 above 15

Part II: Factors affecting the Effectiveness of Supply chain management practices

Items	Possible options of answer				
	1	2	3	4	5
Inventory management	Very dissatisfied	Somewhat dissatisfied	Neutral	Somewhat satisfied	Very satisfied
How satisfied are you with the overall effectiveness of your pharmacy’s Inventory management practices?					
How does inventory management impact the supply chain management of pharmacies?	Very Negatively	Somewhat Negatively	neutral	Somewhat Positively	Very Positively
How concerned are you about the	Not at all	Slightly	Moderately	Very	Extremely

impact of inventory management on the supply chain management of pharmacies?	concerned	concerned	concerned	concerned	concerned

Items	Possible options of answer				
	1	2	3	4	5
Global Economic conditions	Very dissatisfied	Somewhat dissatisfied	Neutral	Somewhat satisfied	Very satisfied
How satisfied are you with the overall effectiveness of your pharmacy's supply chain management practices?					
How have global economic conditions affected your pharmacy's supply chain management practices?	Very Negatively	Somewhat Negatively	neutral	Somewhat Positively	Very Positively
How concerned are you about the impact of global economic conditions on the supply chain management of pharmacies	Not at all concerned	Slightly concerned	Moderately concerned	Very concerned	Extremely concerned

Items	Possible options of answer				
	1	2	3	4	5
Procurement process	Very dissatisfied	Somewhat dissatisfied	Neutral	Somewhat satisfied	Very satisfied
How satisfied are you with the overall effectiveness of your pharmacy's procurement process					
How does the procurement process impact the supply chain management of pharmacies?	Very Negatively	Somewhat Negatively	neutral	Somewhat Positively	Very Positively
How concerned are you about the impact of procurement process on the supply chain management of pharmacies?	Not at all concerned	Slightly concerned	Moderately concerned	Very concerned	Extremely concerned

Items	Possible options of answer				
	1	2	3	4	5
Regulatory Requirement	Very positive	Somewhat positive	Neutral	Somewhat Negative	Very Negative
How would you rate the overall impact of regulatory requirements on your pharmacy's supply chain management?					
How do regulatory requirements impact the supply chain management of pharmacies?	Very positively	Somewhat positively	neutral	Somewhat Negatively	Very negatively
How concerned are you about the impact of regulatory requirements on the supply chain management of pharmacies?	Not at all concerned	Slightly concerned	Moderately concerned	Very concerned	Extremely concerned

Items	Possible options of answer				
Technology Utilization	Excellent	Good	Fair	Poor	Very poor
How would you rate the overall level of technology utilization in your pharmacy's supply chain management?					
How has technology utilization improved the efficiency of your pharmacy's supply chain management of pharmacies?	Very much	Somewhat	neutral	A little	Not at all
How concerned are you about the challenges and risks associated with technology utilization in the supply chain management of pharmacies?	Not at all concerned	Slightly concerned	Moderately concerned	Very concerned	Extremely concerned

Items	Possible options of answer				
Transport and logistics	Excellent	Good	Fair	Poor	Very poor
How would you rate the overall effectiveness of your pharmacy's transport & Logistics					
How do transport and logistics impact the supply chain management of pharmacies?	Very positively	Somewhat positively	neutral	Somewhat Negatively	Very negatively
How concerned are you about the challenges and risks associated with transport & logistics in the supply chain management of pharmacies?	Not at all concerned	Slightly concerned	Moderately concerned	Very concerned	Extremely concerned

Part III: Overall effectiveness of Supply chain management

Overall effectiveness of supply of chain management	(5)very effective	(4)effective	(3)somewhat effective	(2)not effective	(1)not of all effective
How effective do you consider the pharmacy’s overall supply chain management.					
How satisfied are customers with the pharmacy’s supply chain management?	(5)Very satisfied	(4)satisfied	(3)somewhat satisfied	(2)not satisfied	(1)not at all satisfied
How likely are customers to recommend the pharmacy to others based on its supply chain management?	(5)Very likely	(4)likely	(3)somewhat likely	(2)not likely	(1)not at all likely

Appendix II: Interview guideline questions

1. Can you provide an overview of the current supply chain management practices in your organization/department?
2. What are the key factors or challenges that affect the supply chain management in the pharmacy sector in Hawassa City?
3. How do external factors such as regulatory policies, market demand, or technological advancements influence your supply chain management practices?
4. How do you collaborate and coordinate with other stakeholders in the supply chain, such as suppliers, distributors, or wholesalers?
5. Can you provide insights into the current utilization of technology in the supply chain management practices of selected pharmacies in Hawassa City?

