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The effect of supply chain management practice in relation to supply chain performance Ethiopia's fertilizer

by

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DECLARATION

I do hereby declare that the work which is being presented in this thesis entitled “The effect of supply chain management practice in relation to supply chain performance Ethiopia’s fertilizer” with the guidance and support of the research supervisor is my own original work. It has not been submitted partially or in full by any other person for an award of a degree in any other university or higher education institution and all sources of material used for the thesis have been duly acknowledged.

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Place: Addis Ababa

Date of submission: June,2023

Signature_____ Date_____

CERTIFICATION

This is to certify that Christian Teshome Mekuria carried out his/her study on the topic entitled "The effect of supply chain management practice in relation to supply chain performance Ethiopia's fertilizer". I have supervised and directed the student in undertaking the research reported herein and I confirm that the student has affected all corrections suggested and suitable for submission for the award of the degree of Masters of Art in Logistics and Supply Chain Management.

Supervisor	**Date**

APPROVAL

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Name of Advisor	Signature	Date
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ABSTRACT

The main objective of this study was to examine how supply chain performance in Ethiopia's fertilizer business was affected by supply chain management practices. The 5-point Likert-Scale closed-ended questionnaire was used to gather data from a sample population, and the sample size was obtained using Yemane's sample size calculation. 137 of the 165 questionnaires provided were properly completed and collected for the study. The primary data was gathered from 137 employees of the four key organizations that play significant roles in Ethiopia's supply chain fertilizer (the Ministry of Agriculture, Ethiopian Agricultural Business Corporation, Ethiopian Shipping, and Logistics Services Enterprise, and Cooperative Unions). The framework was examined using descriptive and explanatory research methods, and the study employed quantitative and qualitative methodology to attain its aims. Descriptive statistics and inferential statistics were then used to analyze the data. Findings: The results of the descriptive statistics suggest that the four organizations generally have good levels of implementation both in supply chain practice and supply chain performance and the regression analysis with an adjusted R of 0.969 indicates a strong and favorable link between supply chain management practices and the performance of Ethiopia's supply chain for fertilizer. The study's primary conclusion was that supply chain management practices variables, supply chain integration, information exchange, customer relationships, strategic supplier relationships, and supply chain coordination have a positive and significant relationship with the supply chain performance of the fertilizer industry in Ethiopia. Finally, the study advised that the companies involved in the supply chain must communicate with one another more frequently, needs to have access to sufficient supplies of fertilizer, these organizations should coordinate with one another in order to achieve a common objective and should work closely with neighboring nations that have ports

Keywords: Supply chain management practices, supply chain performance, Fertilizer

CHAPTER ONE

INTRODUCTION

1.1. Background of the study

Organic fertilizers are made from plants and animals while inorganic fertilizers are made from chemicals. Fertilizer costs both nationally and internationally hit new highs. Although many blame the present conflict between Russia and Ukraine on rising fertilizer costs, these price hikes started to happen around the middle of 2021. In 2021, the output of ammonia, a crucial component of nitrogen fertilizers, dropped as a result of rising prices for gasoline. Fertilizer prices rose as a result of supply delays and disruptions and China has capped fertilizer exports to protect the domestic market and food supply. We have witnessed the effects of COVID-19 through delays and disruptions throughout the pandemic. Similarly, the repercussions of the world's dwindling fertilizer production are now being felt. Chemical fertilizers rarely just have an impact on those who are highly exposed to them; unlike conventional products, both minor and substantial effects can occur. Due to farmers' financial struggles to pay for raw materials and further supply chain disruption, high fertilizer costs may affect global agricultural and food production. Reduced agricultural productivity will increase crop output and may even cause food insecurity (MAERSK, 2022).

The largest fertilizer producer in Africa is Morocco, followed by Algeria and Egypt. The problem is that agriculture in many African countries is still dependent on fertilizer producers due to the lack of raw materials for fertilizer production, insufficient domestic demand, lack of access, and high construction costs of production facilities. According to the African Fertilizer and Agribusiness Partnership (AFAP), about 40 percent of African soil is at risk of nitrogen depletion, in part due to inadequate fertilizer use. Most farmers have increased their usage of fertilizers, so the average price in sub-Saharan Africa has risen from 16 kg/ha to 22 kg/ha by the end of 2022. Even though, this would remain below the recommended 100 kg/ha. The northern regions of the African continent are where most of the fertilizers are produced. Farmers in this country are using more chemical fertilizers than farmers in other countries due to industrialization (The Exchange, 2022).

Low-yielding crops and low fertilizer use are the mainstays of most African agriculture. Compared to other countries, Africa had seen the largest demand for nitrogen fertilizer between 2020 and 2022. Russia's war in Ukraine and Western sanctions have wreaked havoc on food and fertilizer supplies in many African countries. Since Russia supplied 20 to 50 percent of the fertilizer needs of Ghana, Ivory Coast, and Mauritania before the conflict began, the countries seem to have seen the rapid and heavy impact of the Western sanctions. Some African countries have the raw materials to produce additional fertilizers to meet local and regional needs. Natural gas deposits in Algeria, Mozambique, and Nigeria are used as nitrogen-based fertilizers, while significant phosphate deposits have been found in Morocco, South Africa, Tanzania, and other countries. However, dedicated working and production facilities for converting raw materials into finished products are currently available in only a few countries. And also, fertilizer expansion can generate significant export gains (Saloni Shah, 2022).

According to FAO (2020), Ethiopia uses 36.8 kg of fertilizer per hectare and the crop yield is 116.8. The World Bank says Ethiopia's agriculture contributes 37.57 percent of the country's GDP and it generates US$ 41.81 billion in agriculture value added (2021), and covered an additional 384,761 km2 of land by 2020. All these statistics represent the achievements of previous years. Fertilizer use in Ethiopia has increased over the years since it was declared part of the Freedom from Hunger effort in the late 1960s, from 3,500 tons2 in the early 1970s2 to 34,000 tons in 1985. But by the early 1990s, it had grown to 140,000 tons. It reached over 650,000 tons in 2012 (IFPRI, 2013). Ethiopia has imported 1.8 million tons of fertilizer for 27.2 billion birrs primarily from Morocco and also from Egypt, United Arab Emirates, and Saudi Arabia (2021), and imports 1.9 million tons of fertilizer for the 2022 crop season. The Ethiopian government has implemented several initiatives to increase soil fertility, and one of these strategies, which lasted for 20 years, had as one of its main goals increasing small-scale farmers; access to and availability of chemical fertilizers as well as other things like better seeds and agricultural extension services. Most of these have focused on the use and distribution of fertilizers in conventional agriculture (Byerlee et al., 2007; Adekunle et al., 2017).

Ethiopia is a landlocked country and faces more problems than any other country in the world; They are economically disadvantaged due to their remote location, lack of direct access to the ocean, and transportation and shipping costs. As a result, it prevented it from importing products

from the ocean and reduced the number of fertilizers imports by 68.6%, which has a negative influence on the sector's output given how heavily agriculture is relevant to Ethiopia's economy (Dessie Tarko, Habtamu Tesfaye, Nicholas Sima, 2019). Ethiopia is attempting to compensate for its geographic isolation by linking nearby seaports with its interior markets. Typically, the dry ports serve as a feeder to the adjacent markets. Therefore, building a solid logistics and transportation network linking inland ports with neighboring markets and inland ports with seaports is essential for economic growth. Additionally, the execution of policies is also very important since Ethiopia adopted a free-market economy many years ago. In 1967, fertilizer use was made available to smallholder farmers in Ethiopia. Agricultural Input Supply Corporation, a government-owned organization that later changed its name to Agricultural Inputs Supply Enterprise, initially had ownership of the corporation. Under the direction of the Ministry of Agriculture, the Agricultural Inputs Supply Enterprise (AISE) was formally founded in 1985 G.C. to provide agricultural inputs to farmers to raise the quantity and enhance the quality of agricultural products. It was the only importer, distributor, and marketer of agricultural inputs in the country up until 1992 G.C. By combining five state-owned companies, the Council of Ministers established the Ethiopian Agricultural Businesses Corporation (EABC) in December 2015 G.C. as a federal government public enterprise to supply fertilizer. According to data gathered from the Ministry of Agriculture 2022, Ethiopia's Agriculture Works Corporation is now involved in the distribution of imported fertilizers to farmers' unions and the private sector.

1.2 Statement of the problem

Fertilizer price doubling threatened Ethiopia's foreign currency reserved because of high inflation of gas prices due to the war between Russia and Ukraine and Covid 19, and the fact that America has reduced phosphate production, and Russia and China's exports are limited to the international market. There is no information that the war directly affected Ethiopia, but since Ethiopia does not explicitly import fertilizer from Russia, this may indirectly impact Ethiopia's ability to acquire the fertilizer it needs on time because countries that previously purchased from Russia will automatically alter their importers.

Fertilizer accumulates in ports due to inadequacies in the fertilizer supply chain. Once the fertilizer arrives in Djibouti, solely the Ethiopian Shipping Lines and Logistics Enterprise is permitted to transport it. Stocked at the storage facilities of the state-owned Ethiopian Agricultural Businesses

Corporation, the sole organization authorized to bring in and provide fertilizer. According to Daniel Sineshawe (2020), at a 10% level of significance, the performance of the fertilizer supply chain was proven to be impacted negatively. Fertilizer supply chain performance reduced by 0.172 units for every unit of storage capacity shortfall. This implies that having storage facilities available to farmers would benefit fertilizer providers by assuring quick and regular fertilizer delivery, but farmers are burdened with high transportation costs and delayed fertilizer deliveries due to a lack of storage facilities.

The total cost of fertilizer logistics includes the purchase price, shipping (by land, rail, and sea), storage, assessment, clearance and transportation expenses, wrapping and unwrapping expenses, regulatory government charges, deterioration, and other administrative costs, all which will have a financial impact on the fertilizer prices that farmers ultimately pay. According to Reta Hailu (2016), farmers have been paying excessive prices that exceed 60% of the cost of fertilizers, which has a significant negative impact on Ethiopia's poor farmers' ability to purchase enough fertilizer and increase productivity.

According to Daniel Sineshaw and Wondimagegne Chekol (2018), the last mile is the distance from the town to the fertilizer market. The chance of acquiring and utilizing fertilizer diminishes as market distance increases. Hence, a negative relationship is anticipated. The expense of transporting inputs, particularly fertilizers, to rural areas, is greatly increased by the poor condition of those locations. Farmers' costs for fertilizer are impacted by the high cost of distribution to farther-flung places. A large percentage of respondents (82.5%) agree that the geographical distance between the town and the market is an important obstacle to fertilizer delivery. This implies that those who reside away from the market might not have similar access to agricultural commodities as farmers in the vicinity.

To better understand the present situation of the fertilizer supply chain, eliminate delays, and encourage timely fertilizer delivery to farmers a thorough understanding of the supply chain makes it easier to pinpoint the key constraints causing the delivery of fertilizer to farmers to be delayed. By investigating the effect of supply chain management practice on the performance of Ethiopia’s fertilizer supply chain, this study seeks to close this knowledge gap.

1.3 Objective of the study

The main objective of these is to understand the supply chain of fertilizer in Ethiopia with respect to supply chain performance and supply chain management practice to do that the study will discuss major assessments like

- Evaluate the supply chain performance of fertilizer with respect to supply chain management practices in Ethiopia
- Assess the supply chain management practice of fertilizer in Ethiopian
- To measure the supply chain performance of fertilizer in Ethiopia

1.4 Research Question

- What are the supply chain performances of fertilizer in Ethiopia?
- What are the supply chain management practices of fertilizer in Ethiopia?
- Who are the actors that are involved in the supply chain of fertilizer in Ethiopia?
- How is the supply chain management practice affect the supply chain performance of fertilizer in Ethiopia?

1.5 Significance of the Study

This study is conducted in order to give awareness of what is expected from the purchase of fertilizer to delivering to the end customer and also to minimize and show the gap in the supply chain and suggest what must be completed in order to fulfill the need of many and how to efficiently deliver with the cheapest price or alternative way of importing a fertilizer. Despite its significance of supply chain performance on supply chain management practices, there isn't much research linking supply chain management techniques with efficient supply chain performance. This study aims in order to fill a gap in knowledge on the impact of fertilizer's supply chain performance on Ethiopia's supply chain management practices. This investigation will be conducted thoroughly the associations between SCM practices and the efficiency of the Ethiopian fertilizer supply chain.

1.6 Scope of the Study

The emphasis of this research will be the Ministry of Agriculture (MOA), which is responsible for arranging the whole supply chain, Ethiopian Agricultural Businesses Corporation (EABC), which imports fertilizer, cooperative unions, which are in charge of distributing and storing the fertilizer to farmer unions, the private sector, and other businesses, as well as Ethiopian Shipping Lines and Logistics Enterprise, which is in charge of transporting the fertilizer. Since there is no fertilizer production in Ethiopia to meet demand, the study's primary focus will be on sourcing, transportation, warehousing, and delivery to the final consumer. The period from October 2022 to June 2023G.C. was set out for the preparation and delivery of the research paper.

1.7. Limitations of the Study

A larger variety of stakeholders are involved in the fertilizer supply chain, from suppliers up to end users (farmers). To discuss each of them would go beyond the purview of this study. This is due to the fact that in order to understand the full scope of the issue and find a solution, such studies necessitate significant time and financial investment. In this study, however, only the importer, the transportation company, and the logistics service provider were included due to time and financial constraints.

1.8. Definition of terms

Supply chain management

Supply chain management is the coordination of all company procedures between consumers to suppliers that deliver knowledge, commodities, and services that are valuable to clients. (Grant, D., Lambert, D., Stock, J., and Ellram (2006)).

Supply chain management practices

According to Koh et al. (2007), Supply chain management techniques are a set of activities taken by businesses to promote effective supply chain management.

Supply chain performance

The performance of the supply chain needs to be reviewed for the purpose of developing an effective and productive supply network. Metrics for performance ought to offer a summary of the the company's supply chain's integrity and competition. (Gunasekaran, 2001).

1.9. Organization of the Study

The paper will be divided into five chapters. The introduction, problem statement, purpose of the research question, and study scope will all be covered in the first chapter. Existing literature will be examined in chapter two. It incorporated significant theoretical and empirical research from other authors that were relevant to Ethiopian fertilizer, supply chain management, practice, and performance. The third chapter will discuss data-gathering techniques and procedures. The fourth chapter will discuss and interprets the findings, and the fifth chapter will provide a summary, a conclusion, and recommendations on the research topic.

CHAPTER TWO

REVIEW OF THE RELATED LITERATURE

2.1. Theoretical literature review

2.1.1. Supply chain management (SCM)

Humans depend on supply chains to get fundamental essentials like food, water, medicine, and healthcare, among many others. Supply chains are also the main driver of economic growth, which raises living standards and creates jobs. Here are some terminologies to help you understand supply chain management and supply chain.

The individuals, companies, organizations, assets, tasks, and technical advancements that constitute the production and delivery of a thing are all included in a supply chain. The movement of fundamental items from the vendor to the manufacturer, then to the customer, forms the foundation of the supply chain. The basic steps of a supply chain are as follows: placing orders and buying raw materials, converting those items into basic components, utilizing those parts to make products, filling orders or making sales, delivering products, providing customer service, and handling returns (Ben Lutkevich, 2021).

Controlling the flow of knowledge, merchandise, and services among an organization of clients, businesses, and supply chain partners is the main goal of the field of supply chain management (SCM). In the late 1980s, the phrase "supply chain management" first surfaced, and it became well-known in the 1990s. Operations management and logistics were the previous terms used by corporations (Michael H. Hugos, 2018). A supply chain's activities must be regulated and synchronized. SCM may consequently appear naively simple. Actually, it's a clever business concept with wide-ranging ramifications for the decisions it demands. Before exploring into the complexities of SCM, we must first grasp what the phrase "supply chain" implies. The relationship of every participant engaged in the manufacture and distribution of a completed good to a customer is known as a supply chain. This includes acquiring parts and raw materials, producing and assembling the finished products, labeling, packaging, and storing the finished goods in

warehouses, entering and tracking orders, and distributing and delivering the finished product to the consumer (Nada R. Sanders, 2020).

The management and collaboration of all the individuals, groups, and technological elements responsible for value creation for a firm constitute supply chain management. All business activities must be coordinated with outside events for effective supply chain management. In other words, it requires that you see your business as a single link in a long, end-to-end chain that provides a customer with something of value. Value is a term that is frequently used while talking about supply chain management. Money is essentially the same thing as value. Anything that can be purchased by a customer has value. A company's value equation is impacted by price negotiations, production planning, and logistics management. However, because of their interconnectedness, it is not a good idea to handle them separately or in divisions. As firms grow, supply chains stretch, and business processes speed up, it is more important than ever to align the diverse supply chain operations (Daniel Stanton, 2020).

2.1.2. Supply chain performance

According to Asamoah et al. (2019), the efficacy and efficiency of the SC system are often assessed using a set of criteria known as the supply chain performance metrics. Numerous academics have highlighted various metrics in their papers that might be used to gauge the supply chain system's performance level. These characteristics include measures that are both qualitative and quantitative. Customer satisfaction and product quality are considered qualitative metrics, while order-to-delivery lead times, supply chain reaction times, flexibility, resource utilization, and delivery performance are considered quantitative metrics.

Currency fluctuations, worldwide demand, and oil's prices have all seen significant variations during the start of the twenty-first century, according to Sunil Chopra and Peter Meindl (2013), all of which have an effect on supply chain performance. To understand why a corporation might improve supply chain reactivity and effectiveness, we must look at its supply chain's operational and multi-functional drivers, such as infrastructure, supplies, transport, knowledge, purchasing, and price. The interplay of these factors has an effect on the supply chain's responsiveness and efficiency. Cost influences consumer purchasing habits, which influences how the supply chain operates. It's critical to realize that these variables work in concert rather than separately to

influence supply chain performance overall. A well-designed and operated supply chain recognizes this interaction and makes the appropriate choices to accomplish the desired degree of responsiveness. In an ideal world, all supply chain phases would collaborate to develop an integrated strategy that enhances supply chain performance. If each stage creates its own collectively strategy, it is exceedingly improbable that each of the plans will mesh in a coordinated fashion. The absence of coordination results in supply chain constraints or excesses. Therefore, comprehensive plans that include the whole supply chain are required. There are a number of performance challenges in the supply chain because the client and supplier are independent businesses that are each looking to maximize their own profits. The performance of the supply chain can be improved by consolidating orders, streamlining the procurement procedures, collaborating with suppliers on designs, supporting integrated forecasting and planning with vendors, developing supply chain agreements that maximize profit while limiting inaccurate information, and lowering purchasing prices through greater supplier competitiveness. Then, more advanced IT systems incorporate an analytics layer that uses transaction data to proactively improve the overall operation of the supply chain.

According to Martin Christopher (2005), the SCOR (Supply Chain Operations Reference) model is built around five main processes: Plan-Source-Make-Deliver-Return. This model covers the core supply chain operations from recognizing customer preference for item delivery and obtaining payment. The goal of SCOR is to provide a consistent technique for evaluating supply chain performance and to utilize common measures to contrast different businesses. One advantage of using a rigid method for supply chain and logistics comparisons is the fact that it is simple to identify the KPIs that must be tracked regularly. The idea of key performance indicators (KPIs) is simple. It implies that while a multitude of performance indicators may be employed within an organization, just a small number of critical criteria ultimately determine whether a company succeeds or fails in the marketplace. Recently, the concept of the "Balanced Scorecard" has attracted a lot of interest. The balanced scorecard is based on the idea that using a variety of KPIs—many of which are undoubtedly non-financial metrics—will provide management with a more effective means of attaining strategic goals than using more traditional, financially oriented statistics. These KPIs directly result from the strategic objectives. The balanced scorecard is designed to provide ongoing advice on important areas whereby activity may be required to guarantee that these goals are met. According to this paradigm, success consists of four primary

outcomes: Better, Faster, Cheaper, and Closer. Practically everyone wants to achieve this set of four interconnected goals. They are essential because they combine internal measurements of resource and equipment utilization with performance indicators based on total quality that is driven by customers.

Even so, there are several indicators and performance measurements for the supply chain that can be evaluated. Reliability, flexibility, responsiveness, cost, and quality are those that are most frequently used by practitioners and mentioned in research; they will be discussed in greater detail in this research.

Table 1: Dimension of Supply Chain Performance Measurement

Dimension	Definition	Items
Reliability	Delivering the appropriate product, at the right duration, to the right location, in excellent shape, in a good package, in a decent volume, with adequate paperwork, and to the right customer is the definition of supply chain performance.	• One hundred percent delivery of order • Delivery performance to customer on time • Accuracy in documentation • Product delivery with perfect condition
Responsiveness	Swift product delivery via the supply chain to customers	• Sourcing cycle time • Manufacturing cycle time • Delivery cycle time
Cost	Costs associated with supply chain management	• Direct and indirect cost of supply chain • Distribution and selling expenses of products
Quality	either customer satisfaction or usability	• Customer satisfaction • Customer response time • Lead time • On-time delivery • Fill rates • Stock out probability
flexibility	Is the business able to satisfy a wider range of consumer expectations without incurring undue expense, effort, inconvenience, or loss expanding the selection of items accessible, and enhancing responsiveness and performance	• Volume flexibility • Delivery flexibility • Number of Back orders

Source: adapted from Hamidianpour, et al (2016)

2.1.3. Supply chain management practice (SCMP)

According to Li et al. (2006), supply chain management practice includes both upstream and downstream components of the supply chain. SCM practices, as defined by Koh et al. (2007), are a group of steps taken by enterprises to support effective supply chain management. SCMPs are a group of measures that an organization has performed to enhance its SCM. Any supply chain-related activity that improves the overall success of the firm can be considered an SCMP. By putting the best supply chain management practices' methods, tactics, and philosophies into practice in today's environment of intense competition, one can improve their SCMP. An effective supply chain management process consists of a series of procedures that connect customers to the raw materials, components, and finished goods they need to operate their businesses. This could encompass everything from planning the production line to managing the inventory, as well as transportation and warehousing. The following five fundamental supply chain management procedures should be carefully taken into account: creating relationships with important suppliers, employing technology to the organization's advantage, allowing contracts to serve as a component of the supply chain function, and pursuing green initiatives are all examples of ways to improve your supply chain management (AIMS UK, 2022).

According to a study by Banerjee and Mishra (2017), all components of the supply chain are intricately intertwined, and all SCM techniques have a direct impact on how well businesses perform. According to Michael Hugos (2014), supply chain management practice follows a basic pattern, and each organization must decide for itself and in concert with other companies how to act in the following five areas: production, inventory, location, transportation, and information.

In multiple research studies of supply chain management practice, multiple variables and dimensions have been investigated, explored or utilized to measure supply chain practice. This is a summary of some of them for further investigation.

Table 2: Dimension of supply chain management practices

No.	Author	Dimension
1	Tan (2002)	Supply chain integration Information sharing Supply chain characteristic Customer service management Geographical proximity JIT capability
2	Li et al. (2005)	Strategic supplier partnership Customer relationship Information sharing
3	Li et al. (2006)	information quality Internal lean practices Postponement
4	Zhou and Benton (2007)	Supply chain plan JIT production Delivery practices
5	Koh et al. (2007)	Strategic collaboration and lean practices Outsourcing and multi-suppliers
6	Bayraktar et al. (2009)	Strategic collaboration and lean practices Suppliers' selection practices Procurement practices
7	Chow et al. (2008)	Customer and supplier management Supply chain features Communication and speed Information sharing
8	Robb et al. (2008)	Customer relationships Supplier relationships E-commerce Enterprise software

Source: adapted from (A. G. Alves Filho, Adriana Backx Noronha Viana and Charbel José Chiappetta Jabbour, 2011)

2.1.4. Efficient supply chain

The supply chain needs to become more effective due to the ongoing disruption that has existed since 2020 first the pandemic, then the war between Russia and Ukraine. All countries are impacted by this pressure, either directly or indirectly. The rising cost of fuel is a problem for logistics in general. Demand is increasing due to population expansion and rising purchasing power; thus, businesses should focus on simplifying their supply chains. Products that can be generally categorized as commodities and are frequently sold in large amounts (such as fertilizer, groceries, and newspapers) are brought to market through an effective supply chain, or ESC. Because the product flows are predictable and operational improvement efforts are more likely to concentrate on operations than product innovation, these businesses may invest in large, expensive facilities (Fisher, 1997).

Using resources, expertise, and technology in a way that lowers logistical costs and boosts revenues is what Kristina Lopienski refers to as supply chain efficiency in 2022. The interior workings of the supply chain are also highlighted. Additionally, it helps to shorten the wait time, which is necessary to maintain financial effectiveness and efficiency. For a supply chain to be efficient, speed and a sizable, regular order are required. For a business to be efficient, it needs to have increased predictability, less working capital, risk mitigation, cost optimization, and data analysis. A good supply chain management plan must include these three key components: agility, alignment, and adaptability.

According to JNU, Jaipur (2013), it is necessary to maintain low inventories of raw materials, ongoing projects, and finished commodities. Additionally, supply chain management must be effective and efficient throughout the entire system. Using a systems approach to supply chain management is prioritized over merely reducing transportation costs or stock levels. These supply chain networks are more effective than the simple old supply chain since they can now be automated in real time using new technologies and standards. Among other modes of transportation, a supply chain network may make use of a range of vehicles, railroads, freight flights or shipping containers. Request management programs, storage management systems, transport management systems, tactical shipping modeling, inventory control systems, replenishing systems, visibility into the supply chain, the improvement tools, and more structures can be utilized to oversee and enhance an efficient supply chain network.

Given that customers are primarily driven by price, an efficient supply chain demands supplies at the lowest costs, maximizes performance at the lowest product costs, and reduces profits. It also reduces inventory to cut expenses and lead times without increasing costs, and it chooses suppliers based on price and quality (Sunil Chopra and Peter Meindl, 2007).

2.2. Empirical literature review

2.2.1 Supply chain management practice parameters

2.2.1.1. Supply chain integration (SCI)

According to Ian Sadler (2007), supply chain integration necessitates "bounded," highly competitively designed and run significant steps in the placement, transformation, and transit of raw materials and completed goods for a chain of manufacturing and service businesses. The purpose of supply chain integration is to create a balance between providing excellent customer service, having little investment in inventory, and having cheap unit costs. By coordinating the flow of material from suppliers with the demands of the client, it achieves this. According to Cigdem Ataseven and Anand Nair (2017), a comprehensive examination of the relationships between supply chain integration and important supply chain performance measures was carried out using a meta-analytical technique. The study contributes to the body of knowledge since its findings experimentally show that a company's financial performance is greatly impacted by internal integration, supplier integration, and customer integration. Additionally, it examines how a company's essential qualities of cost, quality, delivery, and flexibility are affected by internal, supplier, and customer integration as well as how those factors affect the operational performance of a business. This study clarifies the relationships between several performance features and the integration of supply chain activities. Integration between internal and external systems is crucial for businesses. Internal integration makes sure that an organization's functions work together as a cohesive whole, whereas external integration emphasizes the significance of putting practices into practice in collaboration with suppliers and customers to forge relationships that support the achievement of a seamless flow of goods, materials, and information in the supply chain.

Hypothesis 1: Supply chain integration practice positively and significantly affects the fertilizer supply chain performance in Ethiopia.

2.2.1.2. Information Exchange (IE)

According to R. Sendhil Kumar and S. Pugazhendhil (2012), exchanging information is a fundamental part of cooperation in supply chain management. It may be classified based on operational characteristics such as inventories, sales, market predictions, orders in progress, and manufacturing schedule. With the flow of information, the downstream and upstream parties in the supply chain are always in contact with one another with information on stocks and production schedules. In light of the fact that it connects various supply chain players and helps them to coordinate their efforts, information exchanging is the primary element influencing the performance of supply chains, according to a study by Joby George and V. Madhusudanan Pillai (2019). The exchange of information is critical to the everyday operation of each level of the supply chain. According to the study's findings, information sharing has the greatest influence on supply chain performance. Managers' ability to make better decisions is aided by the constant flow of information, which improves supply chain efficiency.

Hypothesis 2: Information exchange practice positively and significantly affects the fertilizer supply chain performance in Ethiopia.

2.2.1.3. Customer relationship (CR)

Hokey Min (2015) made the point that in order for a business to keep a customer's business, they must have confidence in their capacity to offer top-notch customer service and believe that they would keep their promises. When a customer's needs and preferences are met, they are more likely to be satisfied, thus the company should get to know its customers by keeping in touch with them over time. The first stage in creating a relationship with customers is customer acquisition. Customer acquisition is to bring in new clients, acquire their trust in the company's goods and services, and persuade them to use the company's services once more. Customer acquisition shows the company's effort to forge new relationships with customers, whereas customer retention demonstrates the company's efforts to deepen existing ones. According to Faisal Nayef Al-Madi (2017), a self-administered questionnaire and a quantitative technique with a survey as the research strategy were used to arrive at the study's primary conclusions. For this kind of research, a single cross-sectional design was employed, and respondents' data was only ever collected once. To examine the data, SPSS, statistical software for social sciences, was employed. The results showed

that customer relationships had a favorable effect on supply chain performance. This suggests that any improvement in customer relationships will increase the supply chain's effectiveness.

Hypothesis 3: Customer Relationship management practice positively and significantly affects the fertilizer supply chain performance in Ethiopia.

2.2.1.4. Strategic supplier relationship (SSR)

A strategic supplier relationship necessitates a broader perspective on important vendors thus one can perceive them in a manner of potential partners rather than merely vendors from whom you buy items. This necessitates broadening the scope of interactions with people beyond straightforward order and fulfillment procedures and making use of their talents and skills to promote innovation, expand into new markets, raise the bar on quality, give market trend information, and more. Additionally, it requires that supplier relationships be managed as if they were assets (Hojberg, 2013). Since cooperation with other companies or organizations, including vendors, who have a good and significant impact on innovation, Radas S. (2009) contends that effective supply chain management should be aided by these strategic supplier connections.

Hypothesis 4: Strategic supplier relationship practice positively and significantly affects the fertilizer supply chain performance in Ethiopia.

2.2.1.5. Supply chain coordination (SCC)

Arshinder, A. Kanda, S. G. Deshmukh (2007) stated that supply chain performance can be improved by employing supply chain coordination (SCC). Coordination is made possible when interdependent parties work together to optimize customer value throughout the entire SC by combining their expertise and resources. Agreements, sharing of knowledge, technological advancements, and collaborative efforts are all examples of collaborative initiatives are just a few of the ways the SC members can coordinate. If the partners are to communicate frequently and effectively, they must have reliable information systems and the capacity to share information. To cooperate with one another, the SC members must be able to use coordination mechanisms successfully.

Hypothesis 5: Supply chain coordination practice positively and significantly affects the fertilizer supply chain performance in Ethiopia.

2.2.2. Supply chain performance measure

2.2.2.1. Cost

Murray Martin, (2018) declared cost is a crucial productivity indicator since it shows how productive different firm departments are. Businesses must they can seek ways to reduce costs and increase revenue in order to identify areas of the business where adjustments can be made. To calculate the cost of moving items within the warehouse, businesses usually look at inventory carrying costs. Businesses are continuously looking for ways to enhance cash flow and boost profitability. According to Toru Higuchi (2022), Sales of products or services to the final customers minus the expenses of the whole supply chain are the two metrics used to measure supply chain profitability. A crucial issue is how supply chain actors share profits, costs, and risks. A crucial problem is how supply chain participants share revenues, expenses, and liabilities, even if cooperation and information sharing are required to boost sales. The income and expense sides of a supply chain must both be considered in determining its profitability. However, in actuality, it could be difficult to assess the side that makes money. It is vital to take into account external elements in the evaluation because they can swiftly affect sales, which provide a significant portion of income, such as competition trends and market circumstances.

2.2.2.2. Responsiveness

In order to react quickly, open up new routes, and scale up and down in response to changes in product and consumer demand rates, a company must have a significant amount of excess capacity, claims Laurence Gartside (2020). This is because responsiveness is defined as the capacity to act quickly. A "responsive" supply chain's purpose is to bring a new goods to a new customer base as quickly as it is practical, which will unavoidably result in high costs. They must be able to boost output if they are to meet the rapidly growing demand, which is not expected to last.

Inda Sukati (2011) conducted a study to clarify the interrelationships between supply chain responsiveness and supply chain management practices. The data was collected using a questionnaire distributed to 200 managers selected at random. This investigation demonstrated that

companies require to be more responsive to be able to swiftly satisfy client requirements. It did this by creating and evaluating a research framework of supply chain management practices and supply chain responsiveness concepts. It also did this through examination on how many companies making consumer goods use legal and reliable instruments. However, the firm needs to be fully responsive, reactivity across all dimensions, including the upstream, internal, and supply side is required.

2.2.2.3. Flexibility

Supply network flexibility has the potential to be an important supply chain performance indicator and a way for the company to boost productivity. All aspects of flexibility, both internal or external, that have a direct impact on a company's clients and are collaborated on by multiple supply chain roles to the company (marketing, manufacturing), or external (suppliers, channel members), are included in the definition of supply chain flexibility. Supply chain flexibility is built on two fundamental elements. The first is logistics flexibility, which is concerned with the several logistical methods that can be applied to either introduce good to the marketplace or purchase a part from a supplier. The amount of product varieties that can be produced in each manufacturing location by the supplier or assembler is referred to as process flexibility (Angel Martnez, Manuela Pérez 2005).

2.2.2.4. Reliability

The Reliability trait deals with the capacity to carry out tasks as intended. The emphasis of reliability is on the outcome's predictability of a process. Examples of usual the appropriate quantity are measurements for the dependability trait and on-time, and the right quality. Reliability is one of the qualities that are customer-focused. Supply chain success is determined by the appropriate product being delivered at the right time, at the right location, in acceptable shape and packaging, in a suitable quantity and size, with the required paperwork, and to the right customer. (Graham Smith, 2014).

2.2.2.5. Quality

The quality system requirements are typically the same for all product categories, claim Thomas Pyzdek and Paul Keller (2013). According to ISO 9000, there are four different types of product

quality: quality that results from the product's definition to meet market needs; quality that results from the design; quality that results from compliance with the design; and quality that results from product support. Product quality audits have traditionally focused primarily on evaluating design conformance. However, contemporary quality audit standards are designed to recognize all four facets of quality. Poor product quality, which is typically caused by insufficient process quality, can bring down an organization more quickly than virtually anything else. But after enormous efforts and significant financial investments, many businesses were shocked to see that their anticipated payback did not materialize. The adage "if you build a better mousetrap, the world will beat a path to your door" worked exceptionally well for companies whose main barrier to entry was poor product quality. For some businesses, though, the strategy seemed to be rather uninspiring.

2.3. Supply chain of fertilizer in Ethiopia

To boost agricultural production at all levels and forecast fertilizer need for import planning, the Ministry of Agriculture is responsible for creating agricultural policies and plans based on national objectives. At the Kebele level, the primary cooperative and the development agent collect data on farmer needs. The Woreda office then compiles the data and sends it to the Zonal office, where it is given to the Bureau of Agriculture and Rural Development (BoARD), which then sends the data to the Ministry of Agriculture for evaluation and forecasting of fertilizer demand for the coming planting season.

Every year, the state-owned Ethiopian Agricultural Business Corporation (EABC) imports fertilizer, allowing cooperatives to oversee fertilizer distribution. Ethiopian Shipping Lines and Logistics Enterprise is in charge of transporting fertilizer from suppliers' ports to cooperative warehouses in Ethiopia. Cooperative unions play an important role in the delivery of fertilizer to farmers. They accomplish this by receiving fertilizer in their warehouses. Agricultural cooperatives in Amhara, Oromia, Tigray, and SNNPR all have warehouses that act as agricultural supply distribution hubs.

Cooperatives, local governments, and micro-lending organizations receive credit through the Commercial Bank of Ethiopia; these organizations also preserve records and collect interest and principal payments. According to the reporter (2022) after reviewing the ten-month performance

report, the Ministry of Agriculture stated that the government is taking into consideration farmer loans and subsidies to help with supply issues and price increases in the fertilizer market. According to the assessment, there won't be enough fertilizer this year to meet demand. In addition to supply issues, the conflict between Russia and Ukraine has caused a dramatic rise in fertilizer costs worldwide. While the nation is experiencing a shortage of foreign currency, the budget needed to purchase fertilizers has increased. Five farmers would split a bag of fertilizer that they had previously purchased for 2,300 Birr. Today's farmers believe that because fertilizer prices have suddenly increased, they were unable to purchase it this time. Despite a decrease of over five million quintals from last year in the amount of imported fertilizer, prices nearly doubled to 4,800 birr per quintal this year.

2.4. Conceptual framework

The conceptual framework explains the connections that should exist between your variables. It describes how the relevant aims of your research process work together to produce logical findings. A literature review of prior studies on your topic is frequently used to develop conceptual frameworks, which can be presented either textually or visually (Bas Swaen and Tegan George, 2022).

The conceptual framework stresses the effects of supply chain management practices on the fertilizer supply chain performance in Ethiopia, based on the research objectives, literature studies, and the assumption that supply chain management practices and supply chain performance are connected.

Independent variable **Dependent variable**

Supply chain management practice **supply chain performance**

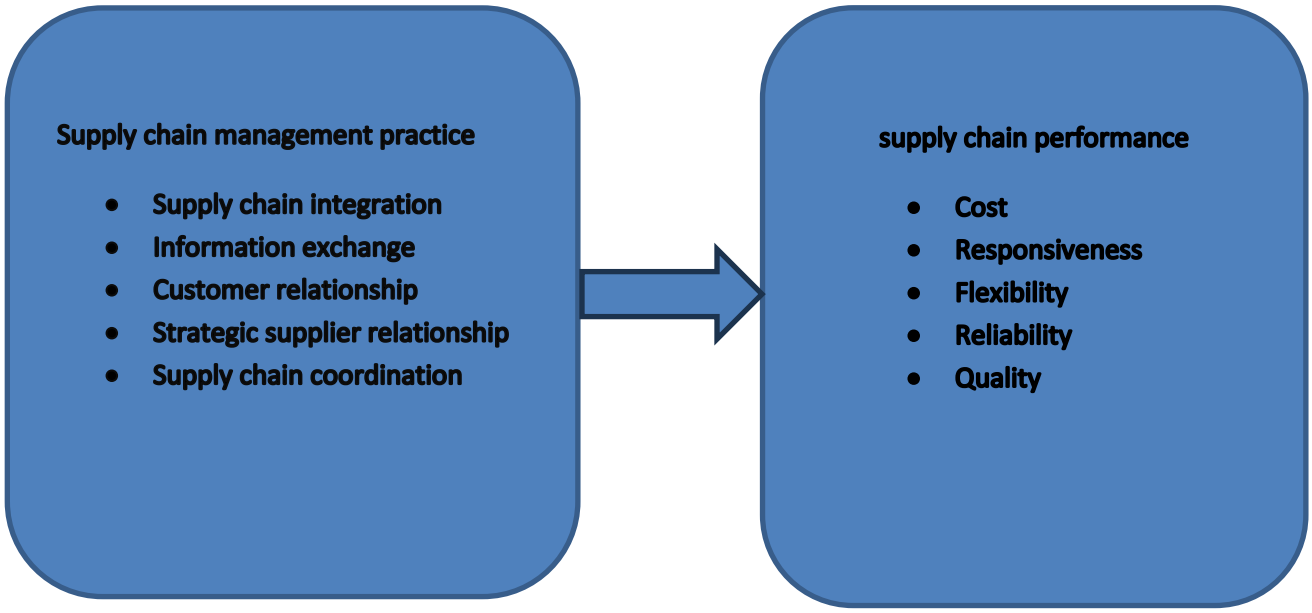

Figure 1 conceptual framework

Source: Researcher's own framework

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Description of the study area

Ethiopia is a landlocked nation that faces numerous supply chain obstacles despite having a low fertilizer usage rate. These obstacles arise from the world's high fertilizer market prices as well as the difficulty of obtaining fertilizer at the anticipated time. All of these concerns may be mitigated by an effective supply chain, hence in this study, we seek to examine the fertilizer supply chain's performance in relation to supply chain management practice, with a focus on Ethiopia. The research also focuses on the Ministry of Agriculture (MOA) for their work on supply chain planning, Ethiopian Agricultural Businesses Corporation (EABC) for importing fertilizer and cooperative unions for distributing fertilizer to farmers' unions, the private sector, and other businesses, and Ethiopian Shipping Lines and Logistics Enterprise for their responsibility with fertilizer transportation.

3.2. Research Approach

According to John W. Creswell (2014), research approaches are strategies and procedures for conducting studies which could vary from broad concepts to specific methodologies for gathering, analyzing, and interpreting information. This technique has several possibilities, and they do not necessarily need to be selected in the order that you think sensible or that is mentioned here. The most important decision is how to learn a subject. Qualitative, quantitative, and mix approaches are the three most important research methodologies. Each of the three techniques are certainly not as diverse as they look at first glance. It's important to remember that qualitative and quantitative methodologies are not polar opposites, tightly classified, or segregated. Because it integrates both qualitative and quantitative methodologies, mixed methods research falls in the center of the spectrum. The study employs both qualitative and quantitative methodologies.

3.3. Research design

Research design is the process of establishing a framework or plan for your research undertaking. Keeping your project's objectives in mind will help you make informed decisions concerning

research design. When we want to describe people, groups, activities, events, or circumstances, descriptive research is useful. Explanatory research is appropriate when we want to clarify linkages, causes and effects, or why something is the way it is (Patricia Leavy, 2017).

Descriptive analysis approaches, such as percentage and frequency calculation, were used to describe the information obtained in this research and also to explain the relationship between the dependent variable and independent variable the study also use explanatory research. The sample data were gathered, and descriptive statistics and inferential statistics were used to analyze them by the using the SPSS computer software, the questionnaire was coded and analyzed at this step. Frequency, percentage, and cross tabulation were used to present a broad overview of the data, a summary of the study, and to make it easier to comprehend the results.

3.4. Population and sample

Population is the phrase used in research for such a group. A finite population is a population in which there are a finite number of units and they can all be exactly counted. It is known as an endless population when there are an infinite number of units and it is impossible to count them. A "sample" is a subset of the entire population that correctly represents it. It indicates that the units chosen as a population sample must include all important attributes of distinct population unit types. Due to a number of variables, the majority of investigations gather data from sample sizes instead of the whole population, and the findings are subsequently extrapolated to the whole population. Only by making an attempt to select the sample and maintaining the attributes of a perfect sample at the forefront would this be feasible to accomplish properly (Satishprakash Shukla, 2020).

For the study the population focuses on the employees of the Ministry of Agriculture, Ethiopian Agricultural Businesses Corporation, Cooperative Union, and Ethiopian Shipping Lines and Logistics Enterprise. These companies and departments were chosen because they are in charge of the fertilizer supply chain operations in Ethiopia, such as predicting, acquiring, transporting, and distributing fertilizer. The following table provides a summary of the total population within the corresponding departments.

Table 3: Target Population of the Study

Organizations	Targeted Population
MOA	46
EABC	37
ESLSE	90
Co-operative unions	12
Total	185
Sources: MOA, EABC, ESLSE, Co-operative unions, 2021	

The more people who were sampled in a study, the more accurate the results were. The sample size for the study was determined using Yamane's (1967) method, which was based on a 95% intended confidence level and a 5% desired precision level.

$n = N/(1 + (N * e2))$

$n = 185/(1 + (185 * 0.05 * 0.05))$

$n = 165$

Where:

N=Population size

e=Tolerance at the desired level of confidence, take 0.05 at 95% confidence level.

n=sample size

3.5. Data sources and types

The two main categories of data are primary and secondary data. Primary data is data obtained directly from first-hand observation or collection, whereas secondary data is public data, previously gathered data or information from third sources. The gathering of both primary and secondary data served as the foundation for the study's execution. A well-structured questionnaire

was used to collect primary data, and it contains pertinent inquiries about supply chain management practices and supply chain performance in the organization in question. The questionnaire was utilized to enable respondents to react in a uniform and guided manner, an impartial strategy, and an objectively focused questionnaire served as the preferred data collection method for this study. Secondary data for the study was gathered from publications, research papers, articles, and news sources.

3.6. Data collection procedures

A closed-ended questionnaire will be used for the study since it is quicker and easier to complete, allows for more accurate data collection through answer choices, and increases customer response rates, which helps to weed out irrelevant responses. A 5-point Likert-Scale technique was employed in the questionnaire design. With some modifications for the study, the majority of the questionnaires were derived from earlier studies. Secondary data was gathered from books, journals, case studies, articles, news, and the internet.

3.7. Data analysis

After gathering the data, descriptive statistical and inferential statistical approaches were employed to analyze it. A large amount of raw data must be transformed into tables, charts, and percentages through the descriptive analysis process and also Inferential statistical analysis, correlation, and multiple regression techniques will be performed using the SPSS software version 27. In this study, descriptive analysis will be used to determine whether to understand the dependent variable and independent variable separately and to know if they are performed throughout the supply chain. Inferential analysis will be used to know if the dependent variable and independent variable have a relationship.

3.8. Validity and Reliability of the Study

The triangulation strategy was used to increase the data's reliability and validity. The major goal of the study is to compare the differences between the questionnaire results. To guarantee the accuracy and authenticity of the study's findings, the researcher frequently considered both the validity and reliability of the information being analyzed.

Reliability analysis

The Cronbach's alpha test coefficient was utilized to evaluate the surveys' reliability using SPSS software. Reliability metrics give more assurance that the individual variables are consistently assessed. The term "Cronbach's" is used to describe an estimate of the reliability of a analysis test. Cronbach's alpha measures consistency within, or how strongly related a set of objects is to each other. It measures the reliability of the scale. The minimum allowed Cronbach's value is 0.7, with a maximum expected value of 0.9; anything above that is deemed unnecessary or harmful to one's image. The SPSS analysis findings suggest that the overall reliability score for this research is 0.894, which is illustrated in the table below.

Table 4: Reliability test

	Variable name	Cronbach's alpha	No. of items
1	Supply chain integration	0.773	5
2	Information exchange	0.814	7
3	Customer relationship	0.795	7
4	Strategic supplier relationship	0.752	6
5	Supply chain coordination	0.710	4
6	Supply chain performance	0.801	17
7	Overall	0.894	46

Validity test

The amount in which an investigation properly represents or analyzes the precise notion or structure that the researcher is aiming to examine is referred to as validity. The survey's content validity demonstrates how representative the survey items and the responses to these questions are of all conceivable queries about supply chain management practice and supply chain performance. The questionnaire, which was modified from past research whose validity had been confirmed, was also examined by the organizations human resource employees. This makes it simpler to assess if the survey questions are well-designed, relevant to the topic being assessed, and viable means to gather the required data. The criticism from the thesis adviser was also taken into account to improve the tools' content validity.

3.9. Ethical consideration

It will be crucial to fully disclose the purpose of the study as well as the role and responsibilities of the researcher to encourage honesty in the responders. The information submitted by the respondents will be kept private and exclusively utilized for academic purposes; it will be made clear to the respondents.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS, AND DISCUSSION

The material obtained was examined and presented in this chapter in accordance with the study's goals. The information was deemed critical for determining the effect of supply chain management practice on the performance of Ethiopia's fertilizer supply chain. Descriptive, correlational, and regression analysis were used to assess and interpret the study's findings. The questionnaires were arranged into five labels ranging from one to five, with 1 indicating strongly disagree, 2 indicating disagree, 3 indicating neutral, 4 indicating agree, and 5 indicating strongly agree, and on supply chain performance 1 indicating very poor, 2 indicating poor, 3 indicating average, 4 indicating good, and finally 5 indicating excellent. On a scale-typed questionnaire, correlation and regression analysis were utilized to investigate the relationship between supply chain management practice and supply chain performance. Employees were given a total of 165 questionnaires, with 137 (83.03%) of them being collected and analyzed. The data received from respondents was presented and analyzed using the statistical tool SPSS version 27. The researchers used correlation analysis, especially Pearson Correlation, as Pearson Correlation is better suitable for collecting data on Likert scales, to assess the magnitude of the relationship between the variables under examination. In order to evaluate how the independent variable (supply chain management practices) affected the performance of the fertilizer supply chain, regression analysis was also performed.

4.1 Respondents' demographic information

The demographic information of the respondents, including their educational background, job status, and company of employment, as well as their experience, is presented in the table below. The results of this survey were processed using SPSS 27 software.

Table 5: Respondents' Demographic summary

Demographic Profile	**Item**	**Frequency**	**Percent**	**Cumulative percent**
Educational qualification	Certificate diploma	7	5.1	5.1
	Bachelor's degree	86	62.8	67.9

	Post graduate degree	44	32.1	**100**
Employee level	Staff	26	19.0	19.0
	Supervisor	31	22.6	41.6
	Manager	15	10.9	52.6
	Officer	65	47.4	**100**
Experience	Under two years	11	8.0	8.0
	2-5 years	35	25.5	33.6
	6-10 years	46	33.6	67.2
	Above 10 years	45	32.8	**100**
Organization	MOA (Ministry of Agriculture)	25	18.2	18.2
	EABC (Ethiopian Agriculture Businesses corporation)	20	14.6	32.8
	ESLSE (Ethiopian Shipping Lines and Logistics Enterprise)	64	46.7	79.6
	Cooperative unions	28	20.4	**100**
Total Number of respondents = 137				

Source: Own computation using SPSS version 27 software.

4.1.1 Respondents' Educational Backgrounds

A significant portion of respondents (137 in total) have higher education levels, with bachelor's degrees accounting for 62.8% and postgraduate degrees accounting for 32.1% of the respondents, respectively. This demonstrates their ability to internalize and respond courageously to supply chain performance and supply chain management practices. They also have greater information and current management skills, which makes them more conscious of the corporate environment around them.

4.1.2 Respondents' Work Experience

There are 35 (25.5%) respondents with 2 to 5 years of work experience, 11 (8%) with fewer than 2 years, 46 (33.6%) with 6 to 10, and the remaining 45 (32.8%) with more than 10 years. This implies that 126 people, or 92%, had more than two years of work experience. This suggests that nearly every one of the respondents have the relevant information and expertise about their companies to reply to questions about supply chain management practices and supply chain performance.

4.1.3 Respondents' Employee Level

The data shows that 31 respondents (22.6%) are supervisors and 26 respondents (19%) are stuff members. There are 65 officers (47.4%) and 15 managers (10.9%) among the answers. This implies that respondents may supply information from a number of perspectives.

4.1.4 Respondents' Organization

According to the table, 25 respondents (18.2%) are from MOA, 20 (14.6%) are from EABC, 64 (46.7%) are from ESLSE, and the remaining 28 (20.4%) are from cooperative unions. Because of their substantial engagement in the Ethiopian fertilizer supply chain management practice, the information acquired from them is accurate and relevant for the study.

4.2. Descriptive Analysis of independent and dependent variables

4.2.1 Descriptive analysis of independent variables (SCMP)

M Thongsri (2005) claims that standard deviations and average scores were calculated using descriptive statistics. The means were interpreted in the following manner to aid with data analysis.

From 1 to 1.80 represents (strongly disagree).

From 1.81 until 2.60 represents (do not agree).

From 2.61 until 3.40 represents (neutral).

From 3:41 until 4:20 represents (agree).

From 4:21 until 5:00 represents (strongly agree).

The standard deviation was used as a data assessment approach in this investigation. When compared to the mean, a large standard deviation shows that the data points are far from the mean, whereas a small standard deviation suggests that the data are close to the mean.

4.2.2 Descriptive analysis on Supply chain integration (SCI)

Table 6: Descriptive statistics on Supply chain integration (SCI)

Supply chain integration	**Mean**	**Std. Deviation**
Organizations in our supply chain communicate more often with one another	4.55	.674
Our company takes part in the marketing initiatives of its clients	4.18	.656
Our supply chain's businesses develop a coordinated interaction and knowledge system	4.22	.650
Beyond its consumers and suppliers, our company widens its supply chain	4.38	.867
Our business takes part in the selection of its suppliers	4.43	.705
Grand Total	**4.352**	**0.7104**

Sources; SPSS survey 2023

The five items under supply chain integration (SCI) have a total mean score of 4.352 in the table above, which indicates that respondents generally believed that supply chain integration is a strongly practiced concept in their firm. This viewpoint is supported by the chapter two literature. According to Cigdem Ataseven and Anand Nair (2017), for the purpose to enhance decision-making and enable every of the chain's parts to work together more successfully, supply chain integration requires carrying out an effort to strengthen the links among each sector of the supply chain.

4.2.3 Descriptive analysis on Level of information exchange (IE)

Table 7: Descriptive statistics on information exchange (IE)

Information Exchange	**Mean**	**Std. Deviation**
Do you share information with your trading partners that aids in the creation of business plans	4.33	.665
Does your business communicate shifting demands to its trading partners in advance	4.45	.618
Do your organization's trade partners share their expertise of your organization's fundamental business processes	4.07	.819
Do your business's trading partners provide you access to their confidential information	4.42	.715
Do your business partners notify you completely about matters that could harm the company	4.44	.685
Is communication between your company and its trading partners periodic	4.45	.747
Do your business and its trade partners communicate with one another about any events or adjustments that may have an impact on the other partners	4.20	.608
Grand Total	**4.34**	**0.694**

Sources; SPSS survey 2023

The seven questions included in the information exchange (IE) category had a total mean score of 4.34 in the table above, suggesting that respondents strongly agreed that information exchange is well practiced in their company. The findings are consistent with the literature review mentioned in the study's second chapter. According to Joby George and V. Madhusudanan Pillai (2019), information sharing is the major element affecting supply chain success since it connects diverse supply chain players and allows them to coordinate their activities. The exchange of information is critical to the everyday operation of each level of the supply chain.

4.2.4 Descriptive analysis on Customer relationship (CR)

Table 8: Descriptive analysis on Customer relationship (CR)

Customer Relationship	**Mean**	**Std. Deviation**
Does your company regularly communicate with consumers to establish expectations for dependability, responsiveness, and other factors	4.43	.616
Does your business regularly forecast what customers will want in the future	4.41	.613
Does your business regularly assess and quantify client satisfaction	4.42	.801
Does your company regularly assess how important a relationship with a consumer is	4.24	.625
Does your business make it easier for clients to contact you for assistance	4.38	.677
Does your business often follow up with consumers to get their opinions on the quality of the services	4.38	.796
Does your business routinely review client complaints, both official and informal	4.45	.618
Grand Total	**4.387**	**0.678**

Sources; SPSS survey 2023

According to the table above, the aggregate mean score of the seven items that comprised the customer connection (CR) category was 4.387, suggesting that respondents typically strongly agreed that customer relationship is well-versed in their firm. The findings are consistent with the literature review presented in the study's second chapter. According to Faisal Nayef Al-Madi (2017), the study's major findings revealed that customer interactions favorably improve supply chain effectiveness. This implies that customer relationship management is an important aspect of

supply chain management and that any improvement in customer relationships will boost supply chain performance.

4.2.5 Descriptive analysis on Strategic supplier relationship (SSR)

Table 9: Descriptive statistics on Strategic supplier relationship (SSR)

Strategic supplier relationship	**Mean**	**Std. Deviation**
Do you have a small number of trusted suppliers	4.36	.685
Do you prioritize quality when choosing your suppliers at your company	4.38	.796
Does your business try to build lasting relationships with its suppliers	4.40	.478
Do your company's planning and goal-setting processes involve any significant suppliers	4.37	.675
Does your business frequently resolve issues with its suppliers	4.10	.633
Does your company actively include its main suppliers in the procedures for developing new products	4.43	.616
Grand Total	**4.34**	**0.647**

Sources; SPSS survey 2023

According to the table mentioned previously, all six questions on strategic supplier relationships (SSR) earned average scores over 4.34, indicating that respondents strongly agreed that strategic supplier relationships are frequently employed in their supply chain network. The finding is corroborated by the literature evaluation presented in the second chapter of the research. According to Radas S. (2009), strategic supplier relationships should facilitate effective supply chain management because partnership with other companies or entities, particularly suppliers, significantly and favorably affects the development and efficiency of supply chain management as a whole.

4.2.6 Descriptive analysis on Supply chain coordination (SCC)

Table 10: Descriptive statistics of on Supply chain coordination (SCC)

Supply chain coordination	**Mean**	**Std. Deviation**
Do the supply chain's participants take an active role in establishing standardized supply chain procedures and processes	4.42	.694
Do the participants in the supply chain mutually and explicitly identify their roles and responsibilities	4.10	.633
Do you all understand which supply chain participants are in charge of which supply chain activity	4.24	.625
Do all the supply chain members works toward a common goal	4.39	.645
Grand Total	**4.2875**	**0.649**

Sources; SPSS survey 2023

According to the aforementioned table, all four questions about supply chain coordination (SCC) had average scores above 4.2875, indicating that the respondents strongly agreed that supply chain coordination is frequently employed in the supply chain network. The literature review included in the second chapter of the study backs up this finding. According to Arshinder, A. Kanda, and S. G. Deshmukh (2007), supply chain coordination (SCC) can improve supply chain performance. Coordination is made possible when interdependent parties work together to optimize customer value across the entire supply chain by sharing resources and expertise.

4.2.7 Descriptive analysis on fertilizer supply chain performance in Ethiopia

Table 11: Supply chain performance summary

	Items	**Mean**	**Std. Dev.**
Cost	**Direct and indirect cost of the SC**	**4.38**	**.677**
	Distribution and selling Expense of Products	**4.43**	**.616**

	Grand mean	**4.405**	**0.6465**
Responsiveness	**Shortest sourcing cycle time**	**4.42**	**.650**
	Shortest delivery cycle time	**4.08**	**.619**
	Low Shipping errors	**4.10**	**.633**
	Grand mean	**4.2**	**0.634**
Flexibility	**Volume flexibility**	**4.24**	**.625**
	delivery flexibility	**4.39**	**.690**
	Time flexibility	**4.41**	**.613**
	Grand mean	**4.347**	**0.643**
Reliability	**100% delivery of order (quantity)**	**4.39**	**.797**
	Delivery performance to customer on time	**4.08**	**.619**
	Accuracy in documentation	**4.33**	**.369**
	Product delivery with perfect condition	**4.40**	**.478**
	Grand mean	**4.3**	**0.566**
Quality	**Customer satisfaction**	**4.31**	**.454**
	Customer response time	**4.37**	**.387**
	Lead time	**4.35**	**.444**
	Fill rate	**4.32**	**.325**
	Stock our probability	**4.39**	**.817**
	Grand mean	**4.348**	**0.4854**
Grand mean of supply chain Performance		**4.32**	**0.595**

Source: own computation on SPSS version 27

Cost performance of the fertilizer supply chain

According to the table, the mean and standard deviation of Direct and indirect supply chain cost (M=4.38, SD=0.677) and Distribution and selling Expense of products (M=4.43, SD= 0.616) indicate that the supply chain's cost performance is excellent. Martin Murray (2018) stated that

cost is a critical supply chain performance indicator because it demonstrates the productivity of various company departments.

Responsiveness of the fertilizer supply chain

The table shows that the mean value of shortest sourcing cycle time (M=4.42, SD=0.650), shortest delivery cycle time (M=4.08, SD=0. 619) and low shipping errors (M=4.10, SD=0. 633) with a total mean of 4.2 indicates that the organization's responsiveness is very good. The literature also agrees that responsiveness is the ability to act quickly, and it requires a lot of surplus capacity to be able to react, open up new routes, and scale up and down quickly in response to shifts in product and consumer demand rates, as well as their overall efficiency (Laurence Gartside, 2020).

Flexibility of the fertilizer supply chain

The table shows that the mean value and standard deviation of volume flexibility (M=4.24, SD=0.625), delivery flexibility (M=4.49, SD=0.690), and time flexibility (M=4.41, SD=0.613), with a total mean of 4.347, indicate that the organization's flexibility is outstanding. The research also supports the notion that supply network flexibility might eventually serve as an essential barometer of supply chain performance and a means for a company to increase efficiency (Angel Martnez, Manuela Pérez (2005).

Reliability of the fertilizer supply chain

According to the table, the mean and standard deviation for 100% order delivery (quantity) (M=4.24, SD=0.625), for delivery performance to customer on time (M=4.49, SD=0.690), for documentation accuracy (M=4.41, SD=0.613), and for product delivery in perfect condition (M=4.347, SD=0.643) with a total mean of 4.39, indicate that the organization's reliability performance is excellent. A measure of supply chain success is the delivery of the appropriate good at the appropriate time, at the appropriate location, in acceptable condition and packaging, in an adequate number and size, with appropriate documentation, and to the appropriate customer (Graham Smith, 2014).

Quality performance of the fertilizer supply chain

According to the table, the mean and standard deviation of customer satisfaction (M=4.31, SD=0.454), customer response time (M=4.37, SD=0.387), lead time (M=4.35, SD=0.444), fill rate (M=4.32, SD=0.325) and stockout probability (M=4.39, SD=0.817) with total mean of 4.348, implies that the organization quality performance is excellent.

4.3 The relationship between supply chain management practices and the performance of the fertilizer supply chain

Correlation and regression analysis are covered in this section. The section was designed to meet the goal of establishing the link between the variables.

4.3.1 Correlation Analysis of SCMP and Fertilizer Supply Chain Performance

Correlation analysis was applied to accomplish the investigation's particular goals, involving analyzing the influence of supply chain integration, information sharing, customer relationships, strategic supplier relationships, and supply chain coordination on fertilizer supply chain performance in Ethiopia. According to Bonett and Wright (2000), the Pearson correlation assesses the strength with which two variables are related proportionally. Its values range from -1 to 1, with -1 representing absolute negative linear correlation, 0 representing no relationship, and + 1 representing total positive correlation. If the absolute value of "r = 0.00-0.19 - very weak, r = 0.20-0.39 - weak, r = 0.40-0.59 - moderate, r = 0.60-0.79 - strong, and r = 0.80-1.0 - very strong" (Evans, 1996) is recommended. Pearson correlation coefficients were calculated with the goal of learning more about the connections between the dependent and independent variables, as shown in the table.

Table 12: Correlation analysis of dependent and independent variables

Correlations

		Performance	Integration	Information	Customer	Coordination	Strategic
Performance	Pearson Correlation	1	.584**	.695**	.809**	.847**	.833**
	Sig. (2-tailed)		<.001	<.001	<.001	<.001	<.001
	N	137	137	137	137	137	137
Integration	Pearson Correlation	.584**	1	.593**	.384**	.395**	.562**
	Sig. (2-tailed)	<.001		<.001	<.001	<.001	<.001
	N	137	137	137	137	137	137
Information	Pearson Correlation	.695**	.593**	1	.587**	.453**	.673**
	Sig. (2-tailed)	<.001	<.001		<.001	<.001	<.001
	N	137	137	137	137	137	137
Customer	Pearson Correlation	.809**	.384**	.587**	1	.548**	.754**
	Sig. (2-tailed)	<.001	<.001	<.001		<.001	<.001
	N	137	137	137	137	137	137
Coordination	Pearson Correlation	.847**	.395**	.453**	.548**	1	.623**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001		<.001
	N	137	137	137	137	137	137
Strategic	Pearson Correlation	.833**	.562**	.673**	.754**	.623**	1
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	
	N	137	137	137	137	137	137

**. Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS output survey, 2023

According to the data presented in the table, supply chain integration displays a somewhat favorable link (r=0.584) with Ethiopia's fertilizer supply chain performance. The degree of connection among these two categories is moderate, based on Evans (1996).

The data presented in the table shows that information exchange (r =0.695) exhibits a positive and robust link with fertilizer supply chain performance in Ethiopia. Based on Evans (1996), the amount of association between the two variables is strong.

Customer relationship r = 0.809 exhibits a favorable and extremely strong link with fertilizer supply chain performance in Ethiopia, as indicated in the above table. As indicated by Evans (1996), the amount of correlation among the two variables is strong.

The performance of Ethiopia's fertilizer supply chain is positively and significantly correlated with the strategic supplier relationship (r = 0.833), as can be seen from the table. The level of correlation reported by Evans (1996) indicates that there is a strong link between the two variables.

The performance of Ethiopia's fertilizer supply chain is positively and significantly correlated with supply chain coordination (r = 0.847), as can be seen from the table. The level of correlation reported by Evans (1996) indicates that there is a strong link between the two variables.

4.3.2 Regression Analysis of SCMP and supply chain performance

Using regression analysis, you could identify the factors which have an influence on an intriguing topic with pinpoint precision. When doing a regression, you may safely determine which aspects are most significant, which can be discarded, and the way these variables connect. Grasping the following terminology is essential for fully understanding regression analysis. The primary aspect that you are seeking to grasp or estimate is known as the dependent variable. Independent factors assume that each of them has an effect on the dependent variable.

When performing multiple regression analysis, the scholar examined the premise that the information must be fulfilled in order for the research project to be legitimate and genuine. These involve tests for normality of distribution, multicollinearity, linearity, and homoscedasticity. Each test is described in depth below.

4.3.3 Normality Distribution Test

A normality test is often used to determine the normality of a data collection, as well as to figure out the chance that the unknown variable underneath the set of data has a normal distribution. A normality test is used to determine if sample data were taken from a population with a normal distribution (within a particular tolerance). A normally distributed sample population is required for many statistical tests, such as one-way and two-way ANOVA, the t-test, and others. A non-formal way of establishing whether or not a distribution is normal is to compare a sample data histogram to a normal probability curve. The bell-shaped, normal-like distribution of the empirical data should be present in the histogram. A graphical method for determining normality is the normal probability plot of standardized data vs. the normal distribution. The degree to which a normal distribution can accurately forecast the sample data in this case is shown by the correlation between the sample data and normal percentiles (a measure of fit). These plots have the benefit of being simple to read and easy to identify outliers (Wikipedia). The normality test results are shown in appendix.

4.3.4 Multicollinearity Test

Multicollinearity is defined as a high intercorrelation between two or more independent variables in a multiple regression model. Multicollinearity can result in distorted or false findings when a researcher or analyst attempts to determine how effectively each independent variable can be used to predict or interpret the dependent variable in a statistical model. In general, multicollinearity can result in bigger confidence intervals, which can lead to less trustworthy probability when estimating the influence of independent variables in a model. Fully collinearity occurs when two variables have a correlation coefficient of +/- 1.0. (Adam Haye,2023). According to Hair, J. F. Jr., Anderson, R. E., Tatham, R. L., and Black, W. C. (1995), tolerance should be larger than 0.1 and VIF should be less than 10. The findings of this study corroborated and validated this one. The appendix contains the multicollinearity test findings.

4.3.5 Linearity Test

To test the linearity assumption, scatterplots were used to demonstrate the relationship between each independent variable and the dependent variable. The interaction between each independent variable and the dependent variable was determined to be linear when the SPSS scatterplot was examined visually, as shown in the appendix.

4.3.6 Homoscedasticity Test

Homoscedasticity describes whether the residuals are randomly distributed or if they tend to cluster at some values while dispersing widely at other values. This same idea may be referred to as equality of variances or homogeneity of variances in the context of t-tests and ANOVAs. If your data resembles a shotgun discharge of randomly dispersed data, it is homoscedastic. Heteroscedasticity, which is the reverse of homoscedasticity, might cause your data to take the shape of a cone or fan. When you display the projected values and residuals on a scatterplot, as we shall do at the conclusion of this blog post, you may verify this assumption.

Multiple regression analysis was performed to determine how well the regression model fit the data (model summary), whether the independent variables statistically significantly predicted the dependent variable (ANOVA), and the statistical significance of each independent variable

(regression coefficients). This was done after the data was inspected and confirmed for the aforementioned needed multiple regression assumptions.

4.4 Model Summary

Table 13: Model test

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.969[a]	.939	.937	.06946

a. Predictors: (Constant), Strategic, Integration, Coordination, Information, Customer

The coefficients R in the model summary table above show a substantial correlation of 0.969a between supply chain practices and performance. The R2 (also known as the coefficient of determination) value of 0.939 (93.9%) indicates the relative importance of supply chain practices in predicting supply chain performance. This means that other factors account for the remaining 6.1 percent of supply chain performance differences. The modified R2 is.937, indicating that supply chain practices (supply chain integration, information sharing, customer relationship, strategic supplier relationship, and supply chain coordination) can explain for 93.7% of supply chain performance variance. Although various factors can impact supply chain performance, supply chain practices account for approximately 93.7 percent of the variance.

4.4.1 ANOVA Model Fit

Table 14: ANOVA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.811	5	1.962	406.713	<.001[b]
	Residual	.632	131	.005		
	Total	10.443	136			

a. Dependent Variable: Performance

b. Predictors: (Constant), Strategic, Integration, Coordination, Information, Customer

Sources: SPSS Survey 2023

ANOVA may be used to assess the overall fit of the regression model. The F-ratio in the ANOVA table is used to assess the whole regression model's adequacy as a match for the data. Given that the R and R2 values from the model summary are statistically significant at (P<0.001), it is reasonable to conclude that there is a link between supply chain management practices (supply chain integration, information exchange, customer relationships, strategic supplier relationships, and supply chain coordination) and fertilizer supply chain performance.

4.4.2 Regression Coefficients

Regression coefficients between supply chain management practices and supply chain Performance

Table 15: regression analysis

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.336	.105		3.205	.002
	Integration	.091	.022	.117	4.152	<.001
	Information	.134	.035	.123	3.885	<.001
	Customer	.228	.024	.319	9.415	<.001
	Coordination	.345	.020	.480	17.210	<.001
	Strategic	.121	.033	.145	3.625	<.001

a. Dependent Variable: Performance

4.4.3 Unstandardized beta coefficient (β)

Unstandardized coefficients are those produced by the linear regression model following training with the independent variables, leading to assessement in their initial scales, i.e., in the exact same measures in which the information from the source was obtained for developing the model. An unstandardized coefficient shouldn't be employed to rank or exclude variables (also known as independent variables) since it fails to eliminate the unit of measurement. Hence, by including the error term (ε), the model for supply chain

performance can be written as; $y = \beta0 + \beta1x1 + \beta2x2 + \beta3x3 + \beta4x4 + \beta5x5 + \varepsilon$,

Where; Y = supply chain performance

X1 = supply chain integration

X2 =information exchange

X3 = customer relationship

X4 = strategic supplier relationship

X5 = supply chain coordination

ε= Error term

β0 = Constant factor

β1 = Coefficient of supply chain integration

β2= Coefficient of level information exchange

β3 = Coefficient of customer relationship

β4 = Coefficient of strategic supplier relationship

β5= Coefficient of supply chain coordination

Y = 0.336 + (0.091) X1 + (0.134) X2 + (0.228) X3 + (0.345) X4 + (0.121) X5+0.5 E,

The constant value (0 = 0.336) shows that the fertilizer supply chain performance would be 0.336 if all other variables in the model were zero. All parameters are statistically significant in determining fertilizer performance, according to the regression coefficient values. As indicated by their P-values of (P<0.05), the statistically significant factors include supply chain integration, information sharing, customer relationship, strategic supplier relationship, and supply chain coordination. This means that increasing supply chain integration, information sharing, customer relationships, strategic supplier relationships, and supply chain coordination variables improves fertilizer supply chain performance.

4.4.4 Standardized Coefficients

In data science, the word "standardization" or "standard coefficients" refers to the method of transforming independent variables or predictor variables for a specific framework in which they have been defined in various units. The standardized coefficients of regression can be calculated by obtaining a linear regression model on the variables' standardized form. Each observation's standard deviation is divided by the mean to produce the standardized variables. The degree of supply chain coordination had the greatest standardized coefficient of (0.480), followed by the level of customer relationship (.319), as shown in the regression coefficients table. This demonstrated that the amount of supply chain coordination has a significant impact on fertilizer supply chain performance. The relevance of strategic supplier relationships (beta=.145), information sharing (beta=.123), and supply chain integration (beta= 0.117) on fertilizer supply chain performance is graded from three to five. The predictor variables of supply chain integration, information exchange, customer relationship, strategic supplier relationship, and supply chain coordination are statistically significant in predicting supply chain performance, as indicated by the regression coefficient table because all of their p-values (supply chain integration p-value=.001, information exchange p-value=.001, customer relationship p-value=.001, strategic supplier relationship p-value=.001, and supply chain coordination p-value=.001) are less than alpha level of 0.05.

4.4.5 Hypothesis Summary

Table16: Summary of Hypothesis.

Hypothesis	Remark
Hypothesis 1: Supply chain integration practice positively and significantly affects the fertilizer supply chain performance in Ethiopia.	**Accepted**
Hypothesis 2: Information exchange practice positively and significantly affects the fertilizer supply chain performance in Ethiopia.	**Accepted**
Hypothesis 3: Customer Relationship management practice positively and significantly affects the fertilizer supply chain performance in Ethiopia.	**Accepted**
Hypothesis 4: Strategic supplier management practice positively and significantly affects the fertilizer supply chain performance in Ethiopia.	**Accepted**
Hypothesis 5: Supply chain coordination practice positively and significantly affects the fertilizer supply chain performance in Ethiopia.	**Accepted**

Source: From Analysis and summary of Respondents Data.

Finally, fertilizer supply chain management practices, supply chain integration, information sharing, customer interaction, strategic supplier relationship, and supply chain coordination are found to have positive and significant effect on the supply chain performance.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The primary outcomes from the questionnaire and secondary data are summarized in this chapter of the research. A conclusion is then drawn that takes into consideration the goal of the study, and the researcher offers possible suggestions based on the outcomes of the data analysis.

5.1 Summary of major findings

The major objective of this research project was to investigate how supply chain management practices affected supply chain performance in Ethiopia's fertilizer sector. The study analyzed the current supply chain performance in the fertilizer industry and looked at how the practice of supply chain management is used in Ethiopia. To do this, the researcher developed and disseminated surveys and looked at primary data information acquired from significant participants in the fertilizer supply chain. Descriptive statistics, correlation, and regression analysis were used to analyze the data.

According to a statistical analysis of the data, the ESLSE accounted for 46.7% of respondents, while the remaining 53.3% came from the EABC, MoA, and cooperative unions. The fact that 94.9% of respondents had degrees or higher in education shows that the level of education among the respondents aids in their ability to consider and provide knowledgeable responses to the issues and practices. As evidence of their familiarity with their organizations, 92% of respondents had been employed by the companies for more than two years.

- Evaluating how supply chain management practices affected Ethiopia's fertilizer supply chain performance was the first objective. The analysis's adjusted R of 0.969 indicates a strong and favorable link between supply chain management practices and the performance of Ethiopia's supply chain for fertilizer.
- The second objective was to assess Ethiopia's fertilizer supply chain management practices. According to the results of the descriptive statistics, the four organizations generally have good levels of implementation. The respondents strongly agree that the five supply chain

management practices are used in their respective firms, as indicated by the mean score exceeding 4.21 for each independent variable.

- The third objective was to measure the supply chain performance of fertilizer in Ethiopia. According to the descriptive data, respondents are pleased with the performance of the fertilizer supply chain. According to descriptive statistics, the mean value of the supply chain performance metrics is more than 4.32, indicating outstanding supply chain performance.

5.2 Conclusion

According to the information in the preceding section. The study's findings are concluded below.

- The goal of the study was to evaluate how supply chain management is practiced in terms of supply chain integration, information exchange, customer relationships, strategic supplier relationships, and supply chain coordination. The respondents affirm that their particular organizations have a satisfactory degree of implementation.
- The objective of the study was to assess how supply chain management practices affected the performance of the fertilizer supply chain. Therefore, independent variables such supply chain integration, information exchange, customer relationships, strategic supplier relationships, and supply chain coordination were utilized to gauge their influence on the effectiveness of the fertilizer supply chain in Ethiopia. The results showed supply chain integration, information exchange, customer relationships, strategic supplier relationships, and supply chain coordination have significant and positive relationship with fertilizer supply chain performance in Ethiopia
- The study intended to assess how supply chain performance in terms of cost, responsiveness, flexibility, reliability, and quality. The respondents affirm strong level of implementation in their respective organization.

5.3 Recommendation

The study suggests the following in light of the aforementioned findings:

- All supply chain practice variables have the greatest influence on the efficiency of the fertilizer supply chain in Ethiopia; as a result, the companies involved in the supply chain must communicate with one another more frequently, create systems of information and communication that are compatible with one another, and have a stand-by agreement so that they can maintain a great interaction (relationship) with their clients and suppliers and lastly have access to sufficient supplies of fertilizer. Since it is well known that focusing just on one's achievement would not result in profit, these organizations should coordinate with one another in order to achieve a common objective. The effectiveness of Ethiopia's fertilizer supply chain would be significantly improved as a result of this. Building these relationships will benefit Ethiopia throughout the fertilizer supply chain process in addition to helping the country work toward a common goal. Particularly, firms should work closely with neighboring nations that have ports, as Ethiopia lacks these facilities to a significant extent. The improvement or fall in port capacity to handle fertilizer unloading operations is a factor that can affect the price of fertilizer procurement on the worldwide market. These factors should be considered beforehand, and a method should be set up to solve difficulties cooperatively.

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QUESTIONNAIRE

ADDIS ABABA UNIVERSITY SCHOOL OF

COMMERCE DEPARTMENT OF LOGISTICS AND

SUPPLY CHAIN MANAGEMENT

FOR PARTIAL FULFILLMENT OF THE

DEGREE OF MASTER IN

LOGISTIC AND SUPPLY CHAIN

MANAGEMENT QUESTIONNAIRE

Dear Respondents, the goal of this questionnaire is to gather information on how supply chain management practices affect the performance of the fertilizer supply chain. The study won't have any effect on you due to the fact that it has been carried out for educational reasons. Hence, the outcome of the research depends on your honest, forthcoming, and timely answer. As therefore, I humbly request that you carefully consider your responses to each section of the question.

To show whether you agree or disagree with every sentence, mark (√) the box next to the corresponding question number. The following inquiries were developed by the researcher to assess how SCM practices on fertilizer supply chain performance.

Five-point Likert scales are included on the item, and the scales' interpretations are as follows:

1. Strongly Disagree
2. Disagree,
3. Neutral,
4. Agree,
5. Strongly Agree

PART I: DEMOGRAPHIC INFORMATION

1, Educational Qualification:

Certificate diploma ☐ Bachelor's degree ☐ Post Graduate degree ☐

Doctorate Degree ☐

2, Employee Level

Staff ☐ supervisor ☐ Manager ☐ Officer ☐

3, Years stayed at the sourcing and supply chain division:

Under two Years ☐ 2-5 Years ☐ 6-10 Years ☐ Above 10 years ☐

4, Your Company

MOA (Ministry of Agriculture) ☐ EABC (Ethiopian Agriculture Businesses corporation) ☐ ESLSE (Ethiopian Shipping Lines and Logistics Enterprise) ☐

Part II: Instruments of Supply chain management practice;

Strongly Disagree (1) Disagree (2) Neutral (3) Agree (4) Strongly Agree (5)

	1. Supply chain integration	**1**	**2**	**3**	**4**	**5**
1	Organizations in our supply chain communicate more often with one another					
2	Our company takes part in the marketing initiatives of its clients					
3	Our supply chain's businesses develop a coordinated interaction and knowledge system					
4	Beyond its consumers and suppliers, our company widens its supply chain					
5	Our business takes part in the selection of its suppliers					

	2. Information Exchange	1	2	3	4	5
1	Do you share information with your trading partners that aids in the creation of business plans					
2	Does your business communicate shifting demands to its trading partners in advance					
3	Do your organization's trade partners share their expertise of your organization's fundamental business processes					
4	Do your business's trading partners provide you access to their confidential information					
5	Do your business partners notify you completely about matters that could harm the company					
6	Is communication between your company and its trading partners periodic					
7	Do your business and its trade partners communicate with one another about any events or adjustments that may have an impact on the other partners					

	3. Customer Relationship	1	2	3	4	5
1	Does your company regularly communicate with consumers to establish expectations for					

	dependability, responsiveness, and other factors					
2	Does your business regularly forecast what customers will want in the future					
3	Does your business regularly assess and quantify client satisfaction					
4	Does your company regularly assess how important a relationship with a consumers is					
5	Does your business make it easier for clients to contact you for assistance					
6	Does your business often follow up with consumers to get their opinions on the quality of the services					
7	Does your business routinely review client complaints, both official and informal					

4. Strategic supplier relationship		**1**	**2**	**3**	**4**	**5**
1	Do you have a small number of trusted suppliers					
2	Do you prioritize quality when choosing your suppliers at your company					
3	Does your business try to build lasting relationships with its suppliers					
4	Do your company's planning and goal-setting processes involve any significant suppliers					

5	Does your business frequently resolve issues with its suppliers					
6	Does your company actively include its main suppliers in the procedures for developing new products					

	5. Supply chain coordination	**1**	**2**	**3**	**4**	**5**
1	Do the supply chain's participants take an active role in establishing standardized supply chain procedures and processes					
2	Do the participants in the supply chain mutually and explicitly identify their roles and responsibilities					
3	Do you all understand which supply chain participants are in charge of which supply chain activity					
4	Do all the supply chain members Works toward a common goal					

III. Instruments of Supply chain Performance.

Very poor (1) Poor (2) Average (3) Good (4) Excellent (5)

	1. Cost	**1**	**2**	**3**	**4**	**5**
1	Direct and indirect cost of the SC					
2	Distribution and selling Expense of Products					

2. Responsiveness	**1**	**2**	**3**	**4**	**5**

1	Shortest sourcing cycle time					
2	Shortest delivery cycle time					
3	Low Shipping errors					

3. Flexibility		**1**	**2**	**3**	**4**	**5**
1	Volume flexibility					
2	delivery flexibility					
3	Time flexibility					

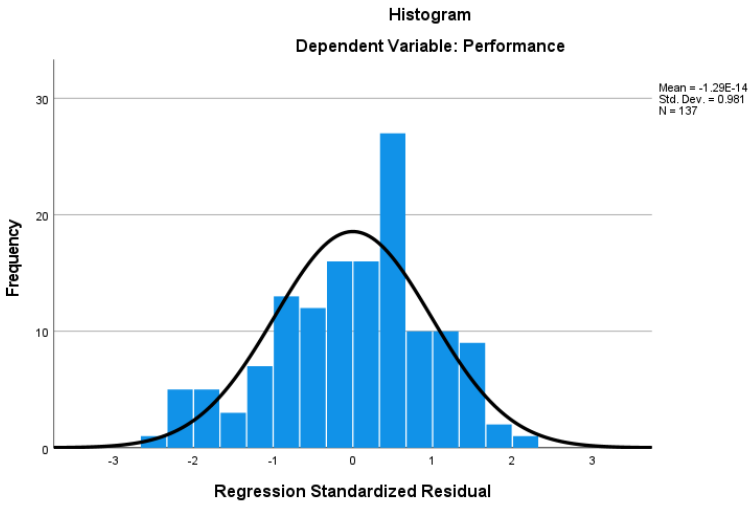
4. Reliability		**1**	**2**	**3**	**4**	**5**
1	100% delivery of order (quantity)					
2	Delivery performance to customer on time					
3	Accuracy in documentation					
4	Product delivery with perfect condition					

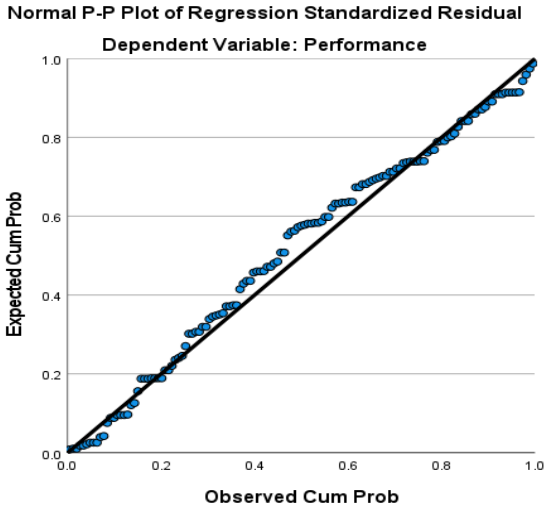
5. Quality		**1**	**2**	**3**	**4**	**5**
1	Customer satisfaction					
2	Customer response time					
3	Lead time					
4	Fill rate					
5	Stock our probability					

APPENDIX

REGRESSION MODEL ASSUMPTION TESTS

1. Normality Distribution test





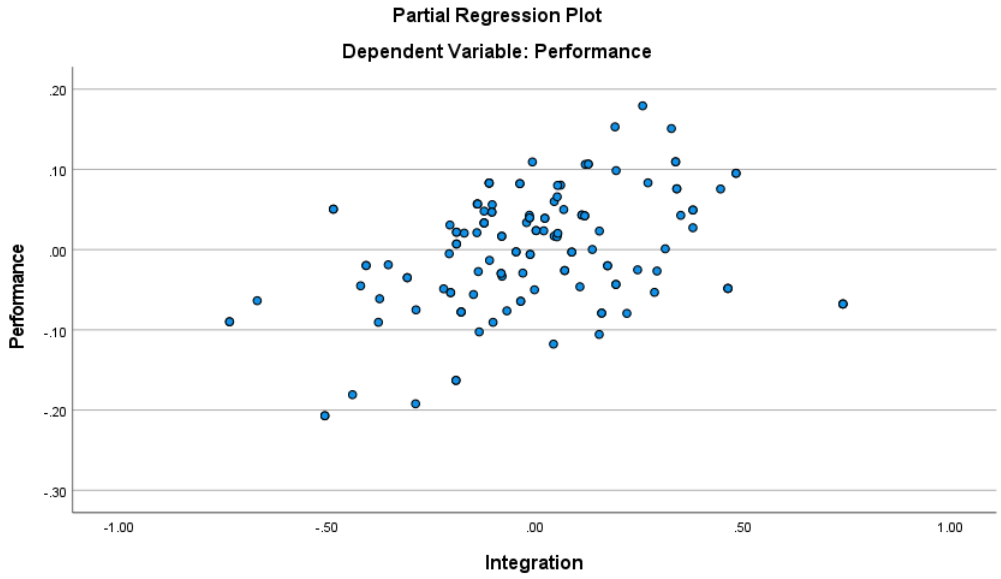
2. Multicollinearity Test

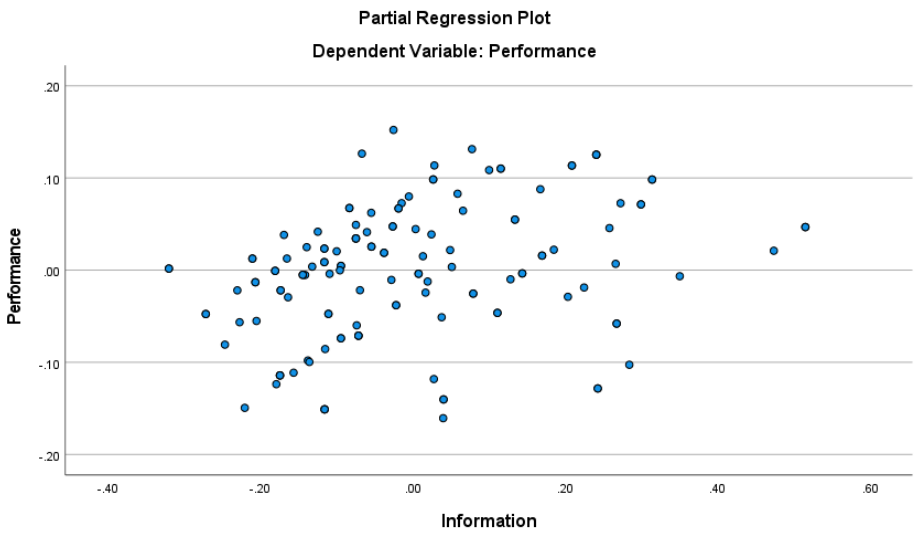
Coefficients[a]

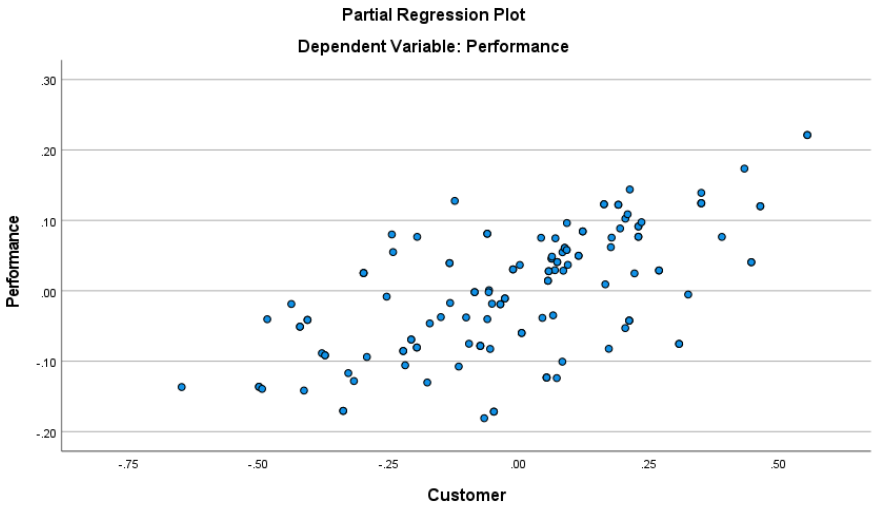
Model		Unstandardized Coefficients		Standardized Coefficients			Correlations			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	.336	.105		3.205	.002					
	Integration	.091	.022	.117	4.152	<.001	.584	.341	.089	.584	1.713
	Information	.134	.035	.123	3.885	<.001	.695	.321	.083	.460	2.176
	Customer	.228	.024	.319	9.415	<.001	.809	.635	.202	.401	2.492
	Coordination	.345	.020	.480	17.210	<.001	.847	.833	.370	.594	1.684
	Strategic	.121	.033	.145	3.625	<.001	.833	.302	.078	.290	3.454

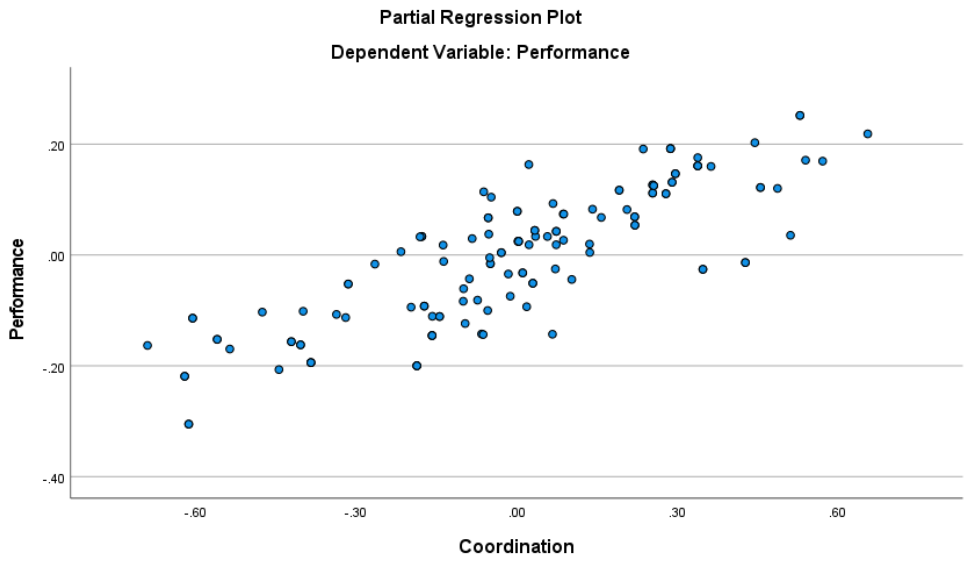
a. Dependent Variable: Performance

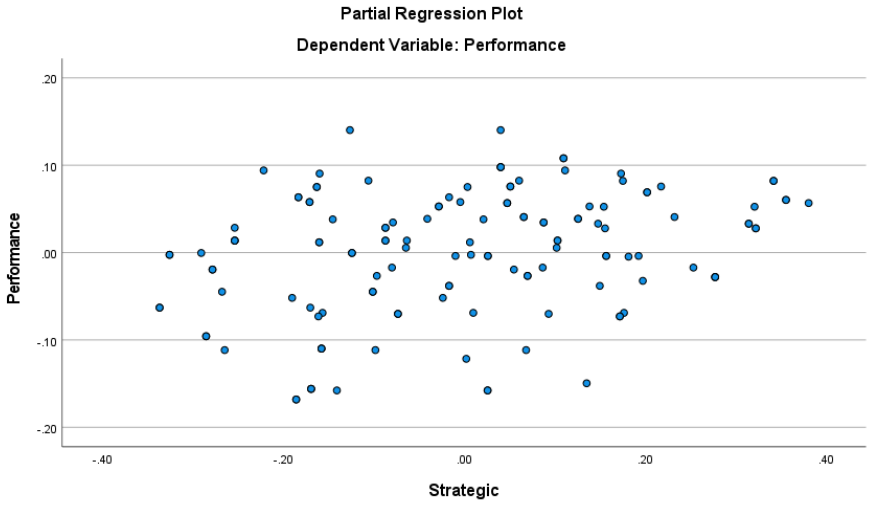
3. Linearity Test



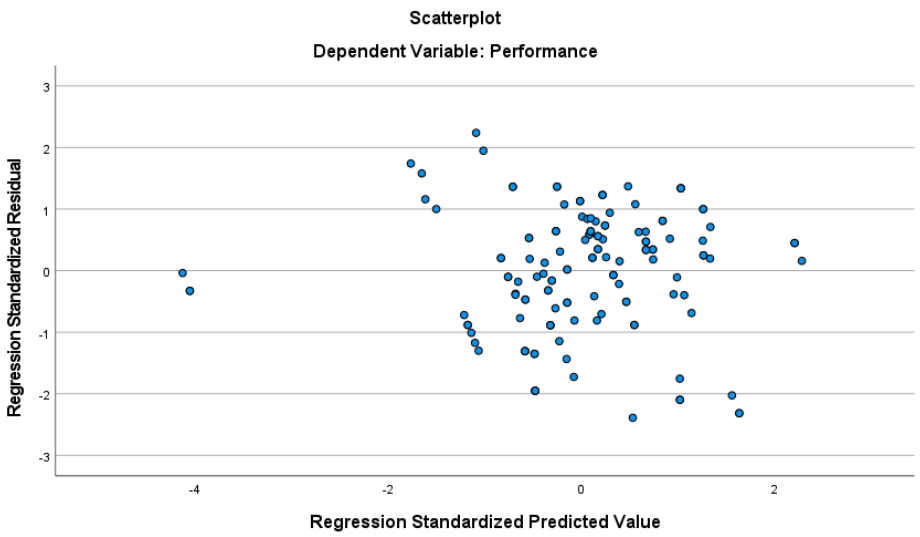

Partial Regression Plot
Dependent Variable: Performance
Performance
.20
.10
.00
-.10
-.20
-.40
-.20
.00
.20
.40
.60
Information


Partial Regression Plot
Dependent Variable: Performance
Performance
.30
.20
.10
.00
-.10
-.20
-.75
-.50
-.25
.00
.25
.50
Customer





4. Homoscedasticity Test


Scatterplot
Dependent Variable: Performance
Regression Standardized Residual
Regression Standardized Predicted Value
3
2
1
0
-1
-2
-3
-4
-2
0
2