School of Commerce

THE EFFECT OF SUPPLY CHAINS MANAGEMENT PRACTICES ON DISTRIBUTION PERFORMANCEOF COVID-19 VACCINE: ‘‘THE CASE OF ADDIS ABABA HEALTH BUREAU”

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A Thesis submitted to Addis Ababa University School of commerce for the partial fulfillment of the degree of Masters of Art in Logistics and Supply Chain Management

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The Effect of Supply Chain Management Practices on Distribution performance of COVID-19 vaccine: The case of Addis Ababa Health Bureau

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IIDeclaration

I, Kassech kebede Dano , declare that this paper is a result of my independent research work on the topic entitled “The effect of Supply chain management practice on Distribution performance of COVID-19 vaccine: The case of Addis Ababa Health Bureau for the partial fulfillment of the requirements for the Degree of Masters of Art in Logistics and Supply Chain Management at Addis Ababa University, School of commerce. This work has not been submitted for a degree to any other university. All the references are also duly acknowledged.

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Kassech kebede

Date: _____

III Certification

This is to certify that Kassech Kebede Dano has carried out this research work on the topic entitled “The effect of Supply chain management practice on distribution performance of COVID-19 vaccine: The case of Addis Ababa Health Bureau” under my supervision. This work is original in nature and it can be submitted for the partial fulfillment of the requirements for the award of the degree of Masters of Art in Logistics and Supply Chain Management.

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Dr. Zelalem Bayisa

Date _____

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Acronyms

COVID-19	Coronavirus Disease 2019
COVAX	Working global equitable access to COVID-19 vaccine
CNCC	COVAX National Coordinating Committee
CRP	Customer Relationship
EDI	Electronic Data Interchange
EPSA	Ethiopian Pharmaceutical and Supply Agency
Gavi	A Vaccine Alliance public private global partnership with the goal of increasing Access to immunization in poor countries.
GDP	Gross Domestic Product
IFS	Information Sharing
JIT	Just in time
KPI	Key performance Indicator
LM	Logistics Management
MCDS	Major Case of Death and Suffering
NcoV	Novel Corona Virus
PP	Partnership
SC	Supply Chain
SCM	Supply Chain Management
SI	Storage and Inventor
SPS	Statistical Package for social Science
SRP	Supplier Relationship
USA	United States of America
VSC	Vaccine Supply Chain
WFP	World Food Program

WHO World Health Organization

ABSTRACT

During the pandemic of COVID-19, mass vaccination programmers are public health achievements of the contemporary world. While pharmaceutical companies are actively developing new vaccines, and demonstrating results of effectiveness and safety profiles, concerns on effective distribution performance of COVID-19 vaccine are under-reported. Supply chain management practice is the most important tools that organizations use to develop their performance. The main objective of this study was to assess the effect of supply chain management practices (partnership, supplier relationship, customer relationship, information sharing, logistics management and storage and inventory) on distribution performance of COVID-19 vaccine in Addis Ababa Health Bureau. A quantitative research approach was used to examine the effect of supply chain management practices and distribution performances at Addis Ababa Health Bureau. Descriptive and explanatory research design was employed for the study. Data were collected from 72 employees working in Addis Ababa Health Bureau supply chain management department who are working directly in the distribution of COVID-19 vaccine. The data analysis results show that; storage and inventory management practices have a positive and significant impact on distribution performance of COVID-19 vaccine at Addis Ababa Health Bureau. While partnership, supplier relationship, customer relationship, information sharing and logistics management are not significantly affecting performance. The organization has to improve storage and inventory management practices to improve the distribution performance of COVID-19 vaccine. From the seven open ended questions most respondents suggested that cold chain management is one of the issue of COVID-19 vaccines distribution.

Key words: COVID-19 vaccine, supply chain management practice, distribution performance

Chapter one

1. Introduction

1.1 Background of the study

COVID-19 is an infectious disease caused by a novel corona virus (SARS-CoV-2). It is an unprecedented crisis of the world. As of Augest 31 2022, over 598 million confirmed cases of COVID-19 andover 6.4 million deaths have been reported globaly (WHO corona virus disease 2022).This number continues to increase. Alongside its devastating human impact, the pandemic has exerted unrelenting pressure on pharma and healthcare supply chains (Jonna Nayler and Lasksmy subraminiom). Government interventions, such as social distancing and lockdowns, have led to disruptions in the health supply chain.

Therefore, on top of other preventive measures, it is crucial to receive COVID-19 vaccine to halt the spread of the disease. Vaccine production is very complex; the extent of complexity varies depending on the platform used. (Robertson et.al., 2020).

Vaccine delivery will not be a one-time event but rather a continuous effort for the duration of the COVID-19 pandemic Most countries may receive large quantities of vaccines in multiple shipments from manufacturers over a period of time. The CNCC, in partnership with local health authorities, will provide the priority sequence by which their populations are to be vaccinated as vaccines arrive in countries.

During the pandemic, speed to market was seen as critical for stemming the spread of the pandemic, so the vaccines ware being shipped by air to international destinations. Delivering them by sea is seen as a longer-term strategy.

China, where the pandemic first emerged, was also the first to start vaccinations over the summer, without waiting for a vaccine to be formally authorized but targeting the most vulnerable.

African countries require thoughtful planning and unprecedented coordination across a wide-range of stakeholders. This is because due to funding gaps, weak health systems, poor supply chain infrastructure and undefined eligibility, the delivery of Covid-19 vaccines, the time to put

suitable structures in place for effective immunization is low, as urged by Gavi, the Vaccine Alliance.(Dr. L.Subramanian 2021

As the global rollout of COVAX vaccines accelerates, the first COVID-19 vaccination campaigns in Africa using COVAX doses began**on 1 March 2021**in Ghana and Côte d'Ivoire. These campaigns are among the first to use doses provided by the COVAX Facility's Gavi COVAX Advanced Market Commitment (AMC).

The AMC is the COVAX Facility's mechanism to provide donor-funded vaccines to lower-income countries.

Ethiopia began on March 13, 2021, to vaccinate HCWs (Health Care Workers) for COVID-19 with the AstraZeneca vaccine Adane et al. (2022). The access to Covid-19 vaccine is by procurement and by donation from different countries like USA and Germany. This is done by the ministry of health of Ethiopia in collaboration with Covax and Gavi. After the arrival of the vaccine the minister of health and EPSA (Ethiopian Pharmaceutical supply Agency) will take over the distribution on nationwide. EPSA is the only government organization which have a cold chain and ultra-cold chain store and also cold chain trucks which performers the logistic activity all over the country.

The study will help in investigating the effect of supply chain management practices on performance of the distribution of Covid-19 vaccine in Addis Ababa Health Bureau. As per Li, et al., (2005), Supply chain management practices namely Partnership, Supplier relationship, customer relations, information sharing, Logistics management and Storage and Inventory Management on the performance of COVID-19 vaccine distribution in Addis Ababa health bureau.

Properly managed and well applied supply chain management practices of the vaccine distribution will help on the lifesaving of the nation and equal distribution of the vaccine.

1.2 Statement of the problem

Vaccine delivery will not be a one-time event but rather a continuous effort for the duration of the COVID-19 pandemic. Supply chain management plays the major role in distributing and delivering of the vaccine.

From the beginning of the pandemic, the topic of COVID-19 vaccine has been extensively covered in the academic literature. For instance, Guttieres et al. (2021) modeled a framework to assess COVID-19 vaccination strategies. The authors purport that the proposed framework can help with scenario planning and assessing tradeoffs among vaccination strategies. Abbais et al. Concentrated on allocation of vaccine in the downstream supply chain and proposed a model for different distribution and allocation of vaccine. (Jarrett et al. 2020) investigated the role of manufacturers to combat vaccine counterfeiting for implementing global traceability standards in the vaccine supply chain. (Rele 2020) examines the vaccine development during a pandemic and identifies gaps and opportunities for combating future pandemics.(Fahrni et al.2022), Management of covid-19 vaccine cold chain practices, issues related to mass production, storage and distribution of COVID-19 vaccines, however**,** aspects which are under-researched and under vaccine cold chain logistics. He also investigates Pharmaceutical companies, which are focused on meeting the demands for supply, and on demonstrating results of good immune responses.

In Ethiopia also different researches and journals were written (Mohammed et al.2021) studied about Covid -19 vaccine hesitancy among Health Care Workers (HCW) in Ethiopia, This study aimed to assess HCWs intention to be vaccinated against COVID-19 and the reasons underlying vaccine hesitancy. As Oyekal et.al.(2021) studied about Willingness to take covid-19 vaccine in Ethiopia; he analyzes the factors influencing the willingness of Ethiopia's population to take COVID-19 vaccines**.**

COVID-19 vaccine hesitancy in Addis Ababa, by Dereje et.al.(2021) which asses the level of COVID-19 vaccine acceptability among the population in Addis Ababa,

The corona virus intervention in Ethiopia and challenges by Nigussie et al. (2021), examined the COVID-19 intervention and the challenges for implementation in Mekelle, Tigray, northern Ethiopia

While all these works related to COVID-19 vaccine are praiseworthy, they missed to specify the supply chain management practice and its effect on COVID-19 distribution performance. Hence, this study investigates all possible supply chain management practices on performance of COVID-19 vaccine distribution in Addis Ababa Health Bureau.

1.3 Research Questions

This study tries to answer the following questions,

- What is the effect of applying partnership on the distribution performance of COVID-19 vaccine in Addis Ababa Health Bureau?
- What is the effect of applying supplier relationship on the distribution performance of COVID-19 vaccine in Addis Ababa Health Bureau?
- What is the effect of applying customer relationships on the distribution performance of COVID-19 vaccine in Addis Ababa Health Bureau?
- What is the effect of applying information sharing on the distribution performance of COVID-19 vaccines in Addis Ababa Health Bureau?
- What is the effect of applying Logistics management on the distribution performance of COVID-19 vaccines in Addis Ababa Health Bureau?
- What is the effect of applying Storage and inventory Management on the distribution performance of COVID-19 vaccines in Addis Ababa Health Bureau?

1.4 Objective of the study

General objective

• The general objective of the study will focus on identifying the effects of supply chain management practices on the performances of COVID-19 vaccine distribution.

Specific Objectives are

- The effect of partnership on the performance of COVID-19 vaccine distribution.
- The effect of supplier relationship on the performance of COVID-19 vaccine distribution
- The effect of customer relationships on the performance of COVID-19 vaccine distribution.
- The effect of information sharing on the performance of COVID-19 vaccine distribution.
- The effect of logistics management on the performance of COVID-19 vaccine distribution.

- The effect of storage and Inventory on the performance of COVID-19 vaccine distribution.

1.5 Hypothesis of the study

- Applying partnership have a positive effect on the performance of COVID-19 vaccine distribution
- Applying supplier relationship have a positive effect on the performance of COVID-19 vaccine distribution
- Applying customer relationships have a positive effect on the performance of COVID-19 vaccine distribution.
- Applying of information sharing have a positive effect on the performance of COVID-19 vaccine distribution.
- Applying of Logistics management have a positive effect on the performance of COVID-19 vaccine distribution.
- Applying of storage and inventory management have a positive effect on the performance of COVID-19 vaccine distribution.

1.6 Significance of the Study

This study aims to investigate a model describing an association between distribution performance of COVID-19 vaccine and their supply chain management practices. SCM practices are known as the activities performed by organizations to management its supply chain practices effectively. The study focuses on different Supply Chain Management Practices on the performance of COVID-19 vaccine distribution in Addis Ababa Health Bureau. This study would provide some beneficial guidance to study and apply SCM practices in COVID-19 vaccine distribution and to assist further to have research in this area. Adding to this, by providing a measure with multi dimensions of building SCM practices and by defining its overall efficiency to improve organizational distribution performance, this study gives SCM managers some important tools for the evaluation of comprehensiveness of current practices of supply chain management.

1.7 Scope of the study

The SCM practices provide many different concepts that include upstream as well as downstream segments of the supply chain. This study includes the variables of,partnership, customer relationship, supplier relationship, information sharing, logistics management, storage and inventory management and distribution performance. The study will tend to identify Effect of Supply Chain Management Practices on COVID -19 vaccine distribution. And will use the practice and challenges of supply chain management in Addis Ababa health bureau. This study is delimited to only Addis Ababa health bureau in the department of supply chain management working in COVID-19 distribution. The study will also include only the time of COVID-19 pandemic.

1.8 Organization of the paper

This paper is organized as follows.

Chapter 1 Introduction: This chapter comprises; background, statement of problem, basic research question, objectives of the study, (general objective and specific objective), hypothesis of the study, definition of terms, significance of the study and finally scope of the study.

Chapter 2 Literature Review: This chapter comprises Theoretical review, Empirical Review and Conceptual frame work.

Chapter 3 Methodology: This chapter comprises Research Approach, Research Design, Sampling Design, Data source, type, and collection method, Research Instrument, Population of the study, Procedure of data collection, Method of data analysis, Reliability and Validity and Ethical consideration.

Chapter 4 Result and discussion/Data presentation analysis and interpretation" this chapter comprises, Data sample information, Descriptive analysis, Descriptive analysis on demographic statistics, Descriptive analysis of the dependent and independent variables, Inferential statistics, Correlation analysis, Multiple regression analysis, Findings based on the research question

Chapter Five Summery, Conclusion, Limitation and Recommendation

1.9. Definition of terms

Supply Chain

A supply chain is a network between a company and its suppliers to produce and distribute a specific product to the final buyer. This network includes different activities, people, entities, information, and resources. The supply chain also represents the steps which take to get the product or service from its original state to the customer. (Kenton 2021)

Supply Chain Management

Supply chain management is the management of the flow of goods and services and includes all processes that transform raw materials in to final products. It involves the active streamlining of a business's supply-side activities to maximize customer value and gain a competitive advantage in the market place. (Fernando 2022) _

Distribution

Distribution is a management system within logistics that is focused on order fulfillment throughout distribution channels. A distribution channel is the chain of agents and entities that a product or service moves through on its way from its point of origin to a consumer. (Schwarz 2021)

Performance

Performance is the process of ensuring that a set of activities and outputs meets an organization's goals in an effective and efficient manner. It is the achievement of qualified objectives and also how they are achieving.

COVID- 19

First known infections from SARS-coV-2 were discovered in Wuhan, China. The name was chosen because the virus is genetically related to the corona virus responsible for the SARS outbreak of 2003.

Corona Viruses

Corona Viruses are a large family of viruses that cause illness from the common cold to more Sevier disease. A novel coronavirus (ncoV) is a new strain that has not been previously identified in humans.

Vaccine

Vaccine is a biological preparation that provides active acquired immunity to a particular infectious disease. Vaccination is a simple safe and effective way of protecting people against harmful diseases, before they come into contact with them.

Chapter Two

2. Literature Review

Introduction

This chapter reviews theoretical, empirical, and conceptual frame work of the study written by other researchers. The chapter presents related literatures about the effects of COVID-19 pandemic on the supply chain practices, the effect of supply chain management practices and challenges on the distribution of COVID-19 vaccine, supply chain management, supply chain management practices, vaccine supply chain management practices and distribution performance are reviewed.

2.1 Theoretical reviews

2.1.1 Supply Chain Management

Supply chain management is the management of information, process, capacity and other activities across the supply chain that create value for end customers in the form of products or services (Ellram, 2004). According to Gwako,(2008), supply chain management can be defined as a collaborative effort of multiple channel members to design, implement and manage seamless value added processes to meet the real needs of the end customers; also states that supply chain management as it represents a state-of-the-art management tool used to enhance overall customer satisfaction that is intended to improve competitiveness and profitability. It addresses such modern business issues as: long-term strategic alliance and supplier-buyer partnership, cross-organizational logistics management, joint planning and control of inventory and information

sharing. (Christopher, 1998) Defined supply chain and its management as the management of upstream and downstream relationships with suppliers and customers to deliver superior customer value at less cost to the supply chain as a whole. According to (Faisal, et al., 2011) SCM is seen as an approach to improve competitive performance by integrating the internal functions of an organization and linking these with the external operations of suppliers, Customers and other members of the supply chain. This may lead to changes in the loop traditional structure of the organization. SCM focuses on coordination and configuration of the processes that are necessary to make products on time (no delay), reproducibly, and in a satisfactory condition (quality assurance) together with handling procurement of the material/service inputs. The Council of Supply Chain Management Professionals defines supply chain management as follows: "Supply Chain Management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies. Supply Chain Management is an integrating function with primary responsibility for linking major business functions and business processes within and across companies into a cohesive and high performing business model. It includes all of the logistics management activities noted above, as well as manufacturing operations, and it drives coordination of processes and activities with and across marketing, sales, product design, and finance and information technology (Ali et al, 2013).

2.1.2 Supply Chain Management Practices

Supply chain management practices is defined as a set of activities aimed at improving the performance of the whole supply chain. (Kean Chon,2008, Koh,2007, and Tan,2002). Supply chain managment practices have been defined as a set of activities undertaken in an organization to promote effective management of its supply chain. Describes the latest evolution of SCM practices, which include supplier partnership, outsourcing, cycle time compression, continuous process flow, and information technology sharing use purchasing, quality, and customer relations to represent SCM practices. (Tan et.al. 2002). In the management of all these perspectives, the opportunities offered by information systems are of vital support since they can contribute in the planning phase of resource and knowledge; in supporting communication, coordination, and

collaboration within and beyond the borders of the organization in particular, and the entire SC in general (Frohlich, 2002)

Many authors have examined different dimensions of SCM practices. As per Li, et al., (2005), Supply chain practices are divided into six dimensions namely strategic supplier partnership, customer relations practices, information sharing, information quality, lean system and postponement. (Min and Mentzer 2004) agreed vision and goals, information sharing, risk and reward sharing, cooperation, process integration, long-term relationship and agreed supply chain leadership. (Burgess et al. 2006) Leadership, intra-organizational relationships, inter-organizational relationships, logistics, process improvement orientation, information systems and business results and outcomes. (Kim, 2006) Technical initiative, structural initiative and logistics. (Koh et al. 2007) Close partnership with suppliers, close partnership with customers, just-in-time supply, strategic planning, supply chain benchmarking, few suppliers, holding safety stock e-procurement, outsourcing, subcontracting, third-party logistics and many suppliers. (Kotzab 2011) focused on customization and information technology based on the application of postponement activities as an essential determinant of the application of SCM practices. (Cook et al. 2011) Information sharing, long-term relationships, advanced planning systems, leveraging the internet, supply network structure and distribution network structure. (Sukati et al. 2012) Strategic supplier partnership, customer relationship and supply chain integration (Jie et al. 2013) Strategic supplier partnership, customer relationship, information sharing, information quality, lean systems and commitment and trust. (Tatoglu et al. 2016) E-procurement, outsourcing, 3PL, strategic planning, supply chain benchmarking, few suppliers, many suppliers and holding safety stock. Thus the literature portrays SCM practices from a variety of different perspectives with a common goal of ultimately improving organizational performance. (Sundram et al. 2016) presented different dimensions of SC practices: customer relationship, supplier strategic partnership, information quality, information sharing, shared vision and goals, postponement, risk and reward sharing. (Khalil et al. 2019) Strategic partnership with suppliers, level of information sharing, quality of information sharing, internal supply chain process and lean practices.

Among the issues of competitive advantage in the ever-changing global environment that has emerged in recent years, the issue of sustainability of the corporate SC arises as critical. According to Gualandris et al. (2014), sustainability practices include the participation of senior management and organizational culture. Consequently, organizational culture has a powerful influence on SC practices. Previous studies have shown that if companies meet certain conditions, supply chain practices will have a substantial impact on company performance (Flynn et al., 2010; Frohlich & Westbrook 2001; Malhotra & Mackelprang 2012); (Romano,2003; Rosenzweig et al,2003; Zhao et al., 2008). The orchestration process emerges as crucial for achieving a capable supply Chain.

Thus the literature portrays SCM practices from a variety of different perspectives with a common goal of ultimately improving organizational performance. In reviving the literature six distinctive dimensions, including, partnership, Supplier relationship, customer relationship, information sharing, Logistics managements and storage and inventory management are selected for measuring SCM practice in the performance of COVID-19 vaccine supply chain. The six constructs cover upstream (Partnership and supplier relationship) and downstream (customer relationship) sides of a supply chain, information flow across a supply chain (information sharing), and Coordination, Cooperation and inter-organizational cross functioning's (logistics management and inventory and storage management). It should be pointed out that even though the above dimensions capture the major aspects of SCM practice on the distribution of the vaccine, they cannot be considered complete.

2.1.2.1 Partnership

According to Ebrahim & Mahmoud, (2014) supplier partnership defined as the long term relationship between the organization and its suppliers. According to Woods, (2001) supplier partnerships designed to leverage the strategic and distribution capabilities of individual participating organizations to help them achieve significant ongoing benefits. According to Wijetunge, (2016) a strategic partnership emphasizes direct, long-term association and encourages mutual planning and problem solving efforts. Such strategic partnerships are entered into to promote shared benefits among the parties and ongoing participation in one or more key strategic areas such as technology, products, and markets. Partnerships with suppliers enable

organizations to work more effectively with a few important suppliers who are willing to share responsibility for the success of the products.

Suppliers participating early in the product-design process can offer more cost effective design choices, help to select the best components and technologies, and help in design assessment. Strategically aligned organizations can work closely together and eliminate wasteful time and effort. An effective supplier partnership can be a critical component of a leading edge supply chain. According to Kiprop, (2015) partnership is designed to influence the strategic and distribution capabilities of an individual partnership participating organization to help them achieve certain significant strategic goals and objectives of the entity.

2.1.2.2 Supplier relationship

For the success of an organization suppliers has been identified as an important SCM practice (Li *et al.*,2006; Tan *et al.*, 2002). Supplier relationship refers to strategic collaborative relationship developed between the supply chain team and its suppliers which leverages on each other capabilities. (Li *et al.*, 2005; Li *et al.*, 2006; Sundram *et al.*, 2011). Entering into strategic partnerships with suppliers allows both parties to collaborate and work toward reducing stock-outs, minimizing waste, reducing costs and meeting delivery schedules (Polo Redondo and Cambra Fierro, 2007). Developing strategic supplier relationships at an early stage of the organization helps the organization to enjoy stable supply of products or service and opens avenues for exploring added services like customization and just-in-time operations (Fawcett *et al.*, 2013).Supplier relationship management (SRM) is the systematic approach to evaluating vendors that supply goods, materials and services to an organization, determining each supplier's contribution to success and developing strategies to improve their performance.

The SRM discipline helps to determine the value each supplier provides and which ones are most critical

to business continuity, service and performance. It also enables managers to cultivate better relationships with suppliers based on each supplier's importance.

2.1.2.3Customer relationship

Managing relationships with customers also features prominently as an important SCM practice. (Li *et al.*, 2006; Tan *et al.*, 1998). Customer relationship is defined here as the practice of

managing customer complaints and building long-term relationships with customers (Li *et al*, 2006). Long-term business to business relationships with buyers will ensure the firm has a stable customer base (Moberg *et al.*, 2002; Sukati *et al.*, 2012). Good communication with customers will also enable the organization meet the needs of their customers through innovation and mass customization. Good relationships with supply chain members, including customers, are needed for successful implementation of supply chain management programs.

2.2.2.4Information sharing

Information has been identified as a key resource driving in organizations growth (Rudberand and Olhager, 2003). Managing supply chain information is identified as a key supply chai managementpracticesandhas
been explored in two ways in the literature. Volume of information shared and quality of information shared (Li *et al.*, 2006). Supply chain information sharing relates to the volume of information shared between organizations and its partners. Organizations are encouraged to share important supply chain information with supply chain partners to enhance the effectiveness of the supply chain and its partners the effectiveness of the supply chain and create value(Monczkaet.et.al,1998)

Sridharan and Simatupang (2002) defined information sharing as the access to private data between business partners thus enabling them to monitor the progress of products and orders as they pass through various processes in the supply chain. They identified some of element that comprise information sharing, consisting data acquisition, processing, storage, presentation, retrieval, and broadcasting of demand and forecast data, inventory status and location, order status, cost-related data, and performance status Internet, Intranet, and Extranet can be distinguished based on characteristics including access, users, and information

Streamlining and making sure an organization's information flow is visible throughout its chain and is critical to an integrated and effectively supply chain (Childe Rehouse and Towel, 2003;Mentzer et al.,2001)Sridharan and Simatupang [39] defined information sharin as the access to private data between business partners thus enabling them to monitor the progress of products and orders as they pass through various processes in the supply chain. They identified some of element that comprise information sharing, consisting data acquisition, processing, storage, presentation, retrieval, and broadcasting of demand and forecast data, inventory status

and location, order status, cost-related data, and performance status Internet, Intranet, and Extranet can be distinguished based on characteristics including access, users, and information.Supply chain information quality references accuracy, timeline, adequacy and credibility of the supply chain information exchange (Holmberg.2000; Le et al,2005). It is very important for organizations to generate and share information without errors or delays with relevant supply chain partners so as to avoid creating waste, errors and other situations that undermine the growth of the organization and the effectiveness of the supply chain (Feldman and Muller, 2003; Holmberg,2000)

2.2.2.5 Logistics Management

Logistics plays an essential part in supply chain management. It is used to plan and coordinate the movement of products timely, safely and effectively. The main role of logistics in supply chain management is primarily to increase the overall value of each delivery, which is identified by customer satisfaction, inventory value and carrying cost.

According to Darja, et al., (2009) logistics management involves the coordination, collaboration and integration of logistics activities with other functional areas in an organization. The nature of logistics is such that it involves intricacy, extensive documentation and detailed management. There is a need to streamline operations and redesign work routines and processes to eliminate redundancy of work. This allows savings of cost and time, and increases the quality of services, and ultimately value to customers (Bowersox, et al., 2002) The logistics of global equitable, widespread vaccine distribution among diverse populations and countries of various economic, racial/ethnic, and cultural backgrounds requires careful planning and consideration. (Joseph Bae2020)

2.2.2.6 Storage and Inventory management

Inventory management is always top priority for distribution companies. Keeping an organizations inventory flow is important, even when demand increases. The ability to accurately forecast and predict customer demand is essential to managing inventory and anticipating production needs. According to Das (2018), inventory management includes all activities put in place to make sure that customer have the required product or service. It helps the purchasing, warehousing and distribution work to meet the marketing requirements and organizational needs of availing the product to the customers. Proper vaccine storage and

handling are important factors in preventing and eradicating many common vaccine preventable diseases. Yet, each year, storage and handling errors result in revaccination of many patients and significant financial loss due to wasted vaccines. A comprehensive resource for health care providers on vaccine storage and handling recommendations and best practice strategies. includes guidance on managing and storing vaccine inventory, using and maintaining storage unit and temperature monitoring equipment, preparing for emergency situations, and training staff.

2.2.2.7Distribution performances

This term refers to the aspect that how an organization is able to achieve their goals in distribution and also intrinsic goals. (Tzokas et al., 2015). The efficiency and effectiveness have been used as key indicators measuring supply chain performance.

The main challenge for companies in this complex environment is achieving a corporate culture that promotes orchestration, collaboration, and coordination with all the partners. In doing so, companies' Managers should evaluate and implement all the practices which allow companies to achieve the distribution performance of an organization.

Basically, there are two underlying approaches to the concept of effectiveness in organization theory, namely external and internal approaches (Tzokas et al., 2015). The external approach to organizational effectiveness, the most widely used effectiveness criterion of a goal-attainment model, defines organizational effectiveness as the accomplishment of a set of organizational goals and objectives (Tzokas et al., 2015). The internal approach to organizational effectiveness, on the other hand, is based on a well- managed system and competent internal processes. An organization has a well-managed system if its members are highly integrated, information flows smoothly, and employees achieve good performance, enjoy job satisfaction and are committed to the organization effectiveness is define as the resource getting the aim is to ensure the Principal’s organizational objectives for a certain period are aligned with the target of its distribution network. Distribution performance have a coordination collaboration and unified vision of an end-to-end supply chain.

2.2.3 Supply Chain managment Challenges

Supply chain management executives face distinctive challenges, with respect to integrating supply chain strategies (Hussain and Mohammad, 2010). The implementation of SCM is not an easy task. As (Handfield and Nichols 2002) explained, managers who decided to do so will most likely to face at least three challenges as categorized into several categories i.e. information systems, inventory management, and in establishing trust between SC members. While implementing information systems, problems could occur when appropriate information is not provided to the people who need it. In some cases, the information is available but the supply chain members are unwilling to share it as a result of lack of trust and the fear that the information will be exposed to competitors. Regarding inventory management, although it has been shown to be improving, the need for accelerate late shipments never seems to disappear entirely. The reasons for late shipments are; slowdown because of customs crossing international borders, adverse weather patterns, poor communication and simple human error are always inevitable. Establishing trust between parties in supply chain are the most challenging task of all. Legal experts may produce a huge quantity of contractual agreements which in the end is useless when parties inevitably have a conflict. Conflict management, especially in inter-organizational relationship is becoming more difficult to manage every day.

2.2 Empirical review

2.2.1 COVID-19 Vaccine Supply Chain

There has been an immense scientific breakthrough in the development of COVID-19 vaccines (Weintraub et al., 2021). Nations across the world have planned rollout of the approved vaccines to limit the transmission and damage due to the COVID-19 pandemic (Warren and Lofstedt, 2021). 17 vaccines entered Phase II trials and three vaccines (AstraZeneca, Moderna, and Pfizer) have been rolled out in the EU and the UK (Warren and Lofstedt, 2021). The World Health Organization (WHO) is collaborating with scientists, global health organizations, and non-profit business organizations for “Access to COVID-19 Tools (ACT)” to accelerate the COVID-19 response (Shervani et al., 2020). Availability of vaccine is critical to reduce the potential losses from the pandemic. Therefore, governments and academic institutions must respond and plan to make the vaccine available for the general population (Ocampo and Yamagishi, 2020). A critical concern is whether it will be possible for the pharmaceutical supply chains to scale up

sustainably amidst the crisis (Yu et al., 2020). Drawing on Simchi-Levi et al. (2008), a vaccine supply chain (VSC) is illustrated, each vaccine will go through a development phase and a fulfillment phase when it is approved by the health authorities in different countries and regions. Availability of the vaccine will largely depend on removal of the bottlenecks in both the development and fulfilment phases of the supply chain (Rele, 2020). While developing new vaccines and assessing their effectiveness on humans are the key focus, it is also elemental to comprehend and address VSC issues to increase vaccine efficacy (Lee and Haidari, 2017). According to WHO (2020), 42 COVID-19 vaccines are in clinical trials, whereas 151 potential vaccines are in preclinical assessment. These vaccine trials aim to enroll around 280,000 volunteers from 34 different countries (WHO, 2020). A speedy vaccine rollout is deemed to be a game changer and will allow the economy to recover faster due to lift of COVID-19 related restrictions (Goodwin, 2021). Since the beginning of the pandemic, the topic of COVID-19 vaccine has been widely covered in the academic literature. For instance, Guttieres et al. (2021) modelled a framework to assess COVID-19 vaccination strategies. The authors purport that the proposed framework can help with scenario planning and assessing tradeoffs among vaccination strategies. Abbasi et al. (2020) concentrated on allocation of vaccine in the downstream supply chain and proposed a model for different distribution and allocation of vaccine. Jarrett et al. (2020) investigated the role of manufacturers to combat vaccine counterfeiting for implementing global traceability standards in the vaccine supply chain. Rele (2020) examines the vaccine development during a pandemic and identifies gaps and opportunities for combating future pandemics. The vaccine supply chain performance (VSCP) improvement can positively facilitate the fight against the COVID-19 pandemic and address SDGs by ensuring the vaccines are uniformly distributed across the globe.

The COVID-19 outbreak has posed a significant danger to the lives and well-being of billions of citizens around the world (Ivanov and Dolgui, 2021). The pandemic has implied huge changes in the way administration associations work (Narayanamurthy and Tortorella, 2021). In the current scenario, a shortfall of vaccines due to failure of the vaccine supply chain (VSC) will make circumstances more confounded (Chakraborty and Mali, 2020). A pandemic VSC is different than that of a traditional VSC because governments are directly procuring vaccines from the manufacturers bypassing the traditional chains of wholesalers and distributors (Abbasi et al., 2020). Hence, healthcare experts and VSC analysts are looking for proper policies and adequate

strategies for appropriate vaccine manufacturing and distribution to fight against the COVID-19 pandemic. It is fundamental to look closely into pandemic VSCs and comprehend the challenges within to put an end to the devastating effects of the pandemic.

COVID-19 vaccines were Manufactured within one year after the World Health Organization declared. And due to it is an international public health emergency and due to remarkable determination in vaccine research, development and production, COVID-19 vaccine were developed within shortest period in the history of vaccine production. (Glanvill 2021)

The World Bank working in collaboration with the WHO, UNICEF and other development partners, is committed to helping the Ethiopian government to overcome bottlenecks in the area of planning and management, supply and distribution, program delivery, systems and infrastructure as identified in the COVID-19 vaccine readiness assessment in the country. This new phase and additional financing will provide vital support and investments to bring immunization systems and service delivery capacity to the level required to successfully deliver COVID-19 vaccines to every Ethiopian.

2.2.2 Organizational Challenges of COVID-19 Vaccine Supply chain management practice

Challenges of the COVID-19 vaccine supply chain are different from vaccine supply chains of similar viruses. The COVID-19 pandemic has created an immense global crisis causing severe damage to the sustainability of the human race. Vaccines increase the chance of preventing the transmission of the disease and protect people's lives. (Ras 2011) Therefore, the need to vaccinate the entire population against the COVID-19 virus is not only pressing but also the most effective way to recover from the pandemic. Development, manufacturing, distribution, and administration of vaccines are challenging.

Countries without a central health registry of their population will face challenges to monitor and track the total number of vaccinated populations. (Hodgson et al.2021) Limited number of vaccine manufacturing companies, inappropriate coordination with local organizations, lack of vaccine monitoring bodies, difficulties in monitoring and controlling vaccine temperature and vaccination cost and lack of financial support for vaccine purchase are the most critical challenges. (Joe be 2020)

2.2.3 Vaccine Supply Chain Distribution Performance

The role of the VSC is to deliver the right vaccine in the right quantity to be delivered to the right place at the right time. Improper storage and transportation can put vaccine products at risk of degradation. Therefore, an effective vaccine supply chain and logistics system is essential to ensure product quality, (Arthorn R.and Cha-onion). Since the conventional vaccine supply chain and logistics system was inefficient, resulting in wasted and expired vaccine products, inventory control issues and high cost. Governments will be required to develop evidence-based strategies for ensuring that COVID-19 vaccines lead to widespread vaccination. Considering supply chain challenges long before a vaccine is administered to the general population, it can help design successful vaccination campaigns. Appropriate vaccine development is not only the solution to the current severe situation, proper distribution of it plays a significant role. Inappropriate coordination with local organizations, may impede the rapid vaccine supply and distributions by creating communication gaps. Coordination with local organizations is customary for proper distribution COVID-19 vaccine and the quick response.

2.4 Conceptual Framework

Conceptual frame work in conducting the study, a conceptual framework was developed to show the supply chain management practices on performance of COVID-19 vaccine distribution in Addis Ababa Health Burro.

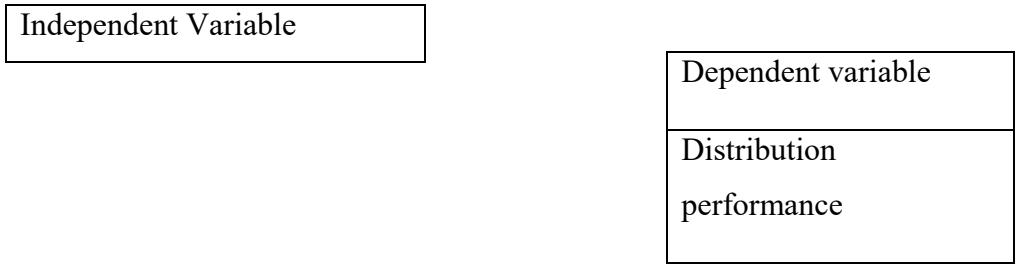
There are different supply chain management practices employed by researchers in the past to see its impact on performance. A study conducted by Li et al. [2006], confirmed that supply

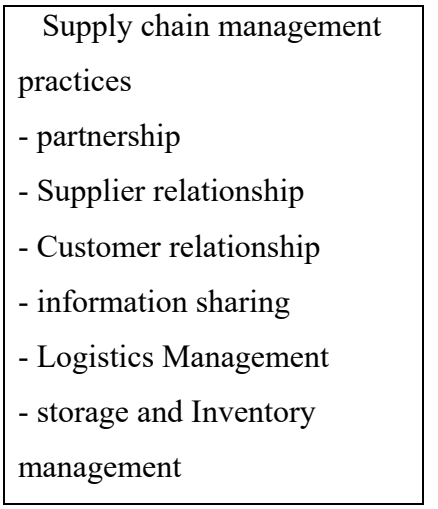
chain management practices have an impact on the performance on the organizations effectiveness. As Le et.al.Supply chain practices are divided into six dimensions namely strategic supplier partnership, customer relations practices, information sharing, information quality, lean system and postponement. (Sukati et al. 2012) Strategic supplier partnership, customer relationship and supply chain integration (Jie et al. 2013) Strategic supplier partnership, customer relationship, information sharing, information quality, lean systems and commitment and trust. (Burgess et al. 2006) Leadership, intra-organizational relationships, inter-organizational relationships, logistics, process improvement orientation, information systems and business results and outcomes. (Kim, 2006) Technical initiative, structural initiative and logistics. All the researchers have a common goal, applying the supply chain management practice have an effect on the organizations performance.

From the above literature review this study conducts six supply chain management practices (the independent variables) on the distribution performance (dependent variables) of COVID-19 vaccine distribution.

The independent variables are the supply chain management practices and the dependent variable is distribution performance of COVID-19 vaccine.

Figure 2-1 Conceptual Framework





Source: Adopted from Li et.al.(2006), (Sukati et al. 2012), (Jie et al. 2013), Burgess (2006)

Chapter Three

3. Research methodology

3.1 Description of the study

This study assessed the supply chain Management practices on performance of COVID-19 vaccine distribution in Addis Ababa health bureau. Addis Ababa Health Bureau was established in 1985 E.C pursuant to the proclamation number 311/95 Addis Ababa City proclamation of

municipality service No. 2/1995. The bureau is authorized to organize, Co-ordinate and regulate public health activities in the city.

Health Infrastructure: According to the 2012 (EFY) Health and Health Related Indicators published by MOH. Addis Ababa has 13 Hospitals, 98 Health Centers. The rationale is to identify the effect of supply chain management practices and performance on the distribution of COVID-19 vaccine at the time of COVID-19 pandemic.

This chapter explains the methods, research approach, research design, sampling design, source of data collection, research instrument and procedure of data collection and method of data analysis.

3.2 Research approach

The methodology which was carried out in this research was based on the objectives of the paper and the availability of relevant information. To comply with the objective of this research, the paper was done on applying quantitative methods by using questionnaires.

3.3 Research Design

Based on the purpose of the research and the nature of the focus area, the study employed a descriptive and explanatory research design. The explanatory type of the research design helps to evaluate and identify the casual relationships between the variables under study.

Explanatory research can also be explained as a “cause and effect” model, investigating patterns and trends in existing data that haven’t been previously investigated.

3.4 Target Population

The primary data is collected from the employees of Addis Ababa Health Bureau, who have first and second degree and above educational background and is working on the core process of the organization’s COVID-19 vaccine distribution. (Those having direct relationship with the supply chain management practice of the organization). And the secondary data is collected from the literatures, journals and different guidelines.

3.5 Sampling design

Basically there are two sampling techniques which are probability and non-probability sampling used in a research. This research had chosen non-probability sampling with purposive sampling technique which is also called judgment, selective or subjective. During this study the

respondents ware selected based on their long years of experience in the area, their profession and if they have enough knowledge to comprehend and respond to questions. Thus this sampling technique would be used considering respondent's job position and their responsibility concerning directly related to COVID-19 Vaccine SCM practice. A total of 142 sample people are considered as population under the study. At a confidence level of 95% (Sanders et.al, 2009) and (Israel 2009). From total population of 142 samples, a respondent who have a direct relationship with the issues being studied from the earlier indicated organization would be selected by applying this statistical formula: -

$n=N/1+N*(e)^2$

Where n= sample size required

N= number of people in the population

e=allowable error (%)

$n=N/1+N*(e)^2$

$n=142/1+142(0.05)^2$

n=142/1.355

n=104

3.6 Data source, type and collection methods

Both Primary and secondary data sources would be employed in this study. Primary data would be collected through survey questionnaires to the supply chain management professionals or pharmacist directly related to the distribution of COVID-19 vaccine. Secondary data was collected from company reports, published journals and online portals. For the total of 104 sample respondents, all respondents ware included under survey questionnaire.

Table 3.1 Participants distribution

Participants sources	Number of participants

Pharmacists Company employees (SCM) professionals and Other professionals work directly on COVID-19 Distribution Biomedical professionals TOTAL	21 78 5 104

3.7 Research instrument

The 5-point Likert-type scale (rating scale) that ranged from strongly disagree to strongly agree is used. A standard questionnaire was used for the practices of Supply chain management adopted from Li, et al., (2006). A standard questionnaire is adopted by referring different related studies and guideline.

The questioner has three parts.

1. The first part consists of demographic information of the respondents, which includes respondent's gender, educational back ground, years of service in the organization and designation position in the organization.

2. The second part includes question related to the extent of COVID-19 vaccine SCM practices. Accordingly, the respondents answered all the questions using a Likert scale ranging from 1 to 5 (1= strongly disagree agree and 5= strongly agree)

3. The third part consists an open ended question the respondents can write which is not included in the questioner. Most of the respondents are not answer this part but some of them suggested that including a Cold-Chan vaccine management practice is better if it is included in the research.

3.8 Population of the study

The population for this particular study ware: - Pharmacists (21) from SCM department, managers and other professionals (116) Biomedical professionals (5). Out of this 104 of them ware participated in the questioner 21 pharmacists, 78 other supply chain management professionals and 5 biomedical professionals.

3.9 Procedure of data collection

The structured questionnaire and open ended questionnaire with selected participant typically those related to supply chain management practices was participated by purposive sampling technique. Although this study is supported by both theoretical and empirical literatures and secondary data from the case studies, magazines, newspapers and books, and also used primary data to achieve aforementioned objective and to answer the research questions. Primary data would be collected from selected respondents in the organization, employee of Addis Ababa Health bureau.

3.10 Methods of data analysis

According to Rand Tromb:(2011) data analysis, the procedures includes the process of packaging the collected information putting in order and structuring its main components in a way that the findings can be easily and effectively communicated. After collecting and sorting all relevant data using the data collection tools, quantitative response was sorted using SPSS version 21 to generate statistical techniques such as percentage, frequency, figures and tabulation as investigated in the data.

3.11 Reliability and Validity

Reliability

To check the reliability of the research, Cronbach's alpha coefficient was used to calculate all items which was arranged in a five point Likert scale based on the responses of the questionnaires collected from Addis Ababa Health Burro Health professionals and supply chain staffs. Cronbach's alpha was a measure of internal consistency that how closely related a set of items ware as a group. It was considered to be a measure of scale reliability.

According to Tavakol & Dennick;(2011) Cronbach's alpha

α Less than 0.5	Unacceptable
α Less than or equal to 0.6	Poor
α Less than 0.7	Questionable
α less than 0.8 and greater than or equal to 0.7	Acceptable

α less than 0.9 and greater than or equal to 0.8 Good

α greater than or equal to 0.9 Excellent.

From the questioners were distributed to the respondents for reliability test and the reliability test presented as below

Table 3.2. Cronbach's alpha

Construct	Variables	Number of item	Cronbach's alpha
Supply chain Management practice	Partnership	8	.842
	Supplier relationship	9	.915
	Customer relationship	7	.915
	Information Sharing	8	.920
	Logistics Management	13	.936
	Storage and inventory management	13	.946
Distribution performance	Distribution performances	8	.948

Source: Survey data, 2022

As it is indicated in Table 3.3 all value of Cronbach's alpha for supply chain management practices and performance measures shows greater than 0.80. Hence, we can conclude that the data collection instruments were good and reliable.

Validity

To increase the validity of the instrument the questionnaire was pre tested on some of the respondents that have adequate knowledge on the subject. Using the expert views and suggestions, the final questionnaire was prepared and distributed to the Addis Ababa Health Burro. Regular cross checking and follow-ups was made during the data collection, to ensure accuracy, relevance, completeness, consistency and uniformity of the data.

3.12 Ethical considerations

Having the official letter from the university to the organization under study to safeguard the study participant's from problematic encounters, the researcher planned the participant's not to mention their identity, particularly their names while answering questionnaires. Respondents were informed about the purpose and benefit of the study along with the full right to accept or refuse the participation. It should also have told boldly to the participant's that their response would be kept confidential and their identity should not be exposed.

Chapter Four

4. Results and Discussion

Introduction

This chapter presents the data analysis and result interpretation part of the research. In order to presents the findings of the research effect of supply chain management practices of Addis Ababa Health bureau and its distribution performance of COVID-19 vaccine.

Due to the quantitative nature of the data inferential statistical technique was employed to analyze the information that collected through questionnaires. The data is analyzed using SPSS version 21. The statistical tools were aligned with the objectives of the research. Inferential statistics is particularly the Pearson's correlation was used to show the relationship and the strength/degree as well as direction of associations between variables. The other inferential statistics used is regression analysis so that to show the variability of dependent variable due to the change in independent variables. Thus, both the strength of the relationship between variables and the influence of independent variable on dependent variable and statistical significance were assessed.

4.1 Data Sample Information

As we have explained in the earlier chapter, this research has attempted to examine the application of standard supply chain management practices and its impact on the distribution performance of Addis Ababa Health Bureau. Based on the specified research methodology the primary data was collected from the target population of Addis Ababa Health Bureau. The data was collected from the employees of the organization, and having direct relationship with supply chain management practices which are directly involved in the distribution of COVID-19 vaccine.

In order to have the better picture about the SCM practices of the organization the questionnaires are distributed to the Pharmaceutical department, Biomedical department and other departments which are working supportively in the distribution of COVID-19 vaccine. And the information collected from them is believed sufficient enough to conduct the analysis.

As we mentioned in the methodology part, a total of 104 questionnaires were distributed for Addis Ababa Health Bureau. Out of which 72 were returned and two questionnaires were rejected due to unfilled data. Therefore, 70 questionnaires served as data for analysis to present

the findings and draw conclusion. Response rate is the total number of respondents who participated in the study and out of the total questionnaires distributed that is104**,** out of which 72 were participated in the survey. The percentage of response rate was 70%. According to Saunders et al, (2009) a response rate above 60% is good, and above 70% is very good.

4.2 Descriptive Analysis

In this part of analysis, the researcher has divided and described it in to two parts. The first part focuses on the demographic information of the respondents so frequencies and percentage were used for the analysis. The second part focused on the basic questions which are intended to acquire the perceptions of the respondents towards supply chain practices i.e. partnership, supplier relationship, customer relationship, information sharing, logistic management and storage and inventory managment practices in the organization and also focuses on the perceptions of the employees towards the distribution performance of COVID-19 vaccine of the organization. Therefore, for the analysis mean and standard deviation are used to describe the findings.

4.2.1Demographic Data of the Respondents.

The profile of the respondent's in the selected department of employees of Addis Ababa Health Bureau department of pharmacy, biomedical and supply chain management practices who are directly related in the distribution of COVID-19 vaccine are summarized in to four parts in this survey. The first one is about the respondent's gender, the second is educational qualification, the third service year of the employees in the organization and the fourth one is about employee level or position in the organization**.**

Table 4.1. Respondents' gender

	Frequency	Percent	Valid Percent	Cumulative Percent
Male	52	74.3	74.3	74.3
Female	19	25.7	25.7	100.00
Total	70	100.00	100.00	

Survey source 2022

From the demographic table 4.1we can see 52 males and 18 females were participated.

That means 74.3% of the respondents are males and 25.7% are female respondents.

Table 4.2. Respondents educational level

	Frequency	Percent	Valid Percent	Cumulative Percent
Degree	34	48.6	48.6	48.6
Masters	36	51.4	51.4	100.00
Total	70	100.00	100.00	

Survey source 2022

Table 4.2 shows that almost all of the respondents have an educational level above first degree. Specifically, 48.6% of the respondents have a qualification of second degree and above 51.4% have a first degree. This implies that they are capable of conceptualizing and respond authoritatively on issues and practices.

Table 4.3. Respondents service year in the organization

	Frequency	Percent	Valid Percent	Cumulative Percent
<2 years	4	5,7	5.7	5.7
2-5 years	19	27.1	27.1	32.5
6-10 years	29	41.4	41.4	74.3
>10 years	18	25.7	25.7	100.0
Total	70	100.00	100.00	

Survey source 2022

The other main variable that the respondents work experience at the organization were asked and 25.7% have more than 10 years, 41.4% have 6-10 years, 27.1% have 2-5 years and 5.7% have less than 2 years of experience. Based on the Table 4.2, 67.3 % of the respondents have more than six-year experience on the organization. Therefore, we can conclude that they can understand the supply chain practices and their response can be taken as reliable result.

Table 4.4. Respondents level in the organization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	head department	2	2.9	2.9	2.9
	senior expert	11	15.7	15.7	18.6
	Expert	20	28.6	28.6	47.1
	Staffs	37	52.9	52.9	100.0
	Total	70	100.0	100.0	

Survey Source2022

Table 4.3 shows out of the 70 participants 2.9% head departments, 15.7% are senior experts, 28.6% are experts and the rest 52.9% are other staffs of the organization working on COVID-19. This implies that due to their detailed involvement on supply chain management activities of the organization, the information gathered from them are accurate and relevant for the study.

4.2.2 Descriptive Analysis on Independent Variables and Dependent variables

4.2.2.1 Partnership

In order to assess the effect of partnership, the selected employees of Addis Ababa Health Bureau were requested to respond for eight related question in the distribution of COVID-19 vaccine. The questions are focused on criteria for partnership.

Table 4.5. Descriptive statistics for partnerships.

	N	Mean	Standard deviation
Our organizations' supply chain partnership has been found to elicit benefits including top management support and information sharing	70	4.04	.690
Our organization have a cross-functional partnership between our supply chain teams	70	3.99	.860
Our organization have an integrated partnership between a warehousing, transportation, inventory management, purchasing, demand planning for effective distribution of COVID-19 vaccine distribution.	70	3.96	.690
Our organization prepared a policy for public and private health facilities partnership	70	3.86	.767
Our organization have a collaboration between public and private health facilities in training professionals on COVID-19 vaccine and its logistics	70	3.93	.748

By working closely with our supplier and eliminating wasteful time can help the distribution of the vaccine	70	3.70	.749
Designing to influence the strategic and operational capabilities of an individual partnership participating organization in the distribution of the vaccine to help them achieve certain significant strategic goals and objectives of the entity	70	3.89	.894
Working more effectively with a few important suppliers who are willing to share responsibility for the success of effective distribution COVID-19 vaccine	70	3.84	.735

Survey Source2022

As it is analyzed in table 4.5, most of the respondents agree that our organization's supply chain partnership has been found to elicit benefits including top management support and information sharing as a number one criteria to select vendors (M=4.04, SD=0.690). Our organization have a cross-functional partnership between our supply chain teams (M=3.99, SD=.860), our organization have an integrated partnership between a warehousing, transportation, inventory management, purchasing, demand planning for effective distribution of COVID-19 vaccine distribution (M=3.96, SD=.690) and our organization have a collaboration between public and private health facilities in training professionals on COVID-19 vaccine and its logistics (M=3.93, SD=.748). However, the result shows that partnership in Addis Ababa Health Bureau in distribution of the vaccine is moderate in the rest of the questions. Our organization prepared a policy for public and private health facilities partnership (M=3.86, SD=.767), By working closely with our supplier and eliminating wasteful time which can help the distribution of the vaccine (M=3.70,SD=.749), designing to influence the strategic and operational capabilities of an individual partnership participating organization in the distribution of the vaccine to help them achieve certain significant strategic goals and objectives of the entity (M=3.89, SD=.894), working moreeffectively with a few important suppliers who are willing to share responsibility for the success of effective distribution of COVID-19 vaccine(M=3.84, SD=.738).

4.2.2.2 Supplier relationship

In order to assess supplier relationship, the selected employees were requested to respond nine related questions.

Table 4.6 Descriptive statistics of supplier relationship

	N	Mean	Standard deviation
Our Organization has built long term relationship with suppliers	70	3.69	.894
As a result of the supplier's relationship, Our organization have continued improvement programs that include our supplier's processes and this has helped our organization to improve its various performances measures	70	3.73	.894
The COVID-19 vaccine come from different sources or suppliers	70	3.40	1.041
Our organization regularly solve problems jointly with the suppliers of COVID-19 vaccine	70	3.47	1.073
Our organization help our major supplier to improve their process to better meet our needs	70	3.63	1.092
Our organization have continuous improvement program that include our supplier in the distribution of COVID-19 vaccine	70	3.46	1.125
Our organization usually resolves issues together with suppliers	70	3.36	.917
Our organization regularly gets feedback from the supplier	70	3.61	.921
The supplier relationship has created unique knowledge on our organizations needs and challenges that has been applied to improve knowledge and Distribution performance.	70	3.79	.946

Survey Source2022

As it is analyzed in table 4.6, most of the respondents agree that as a result of the supplier's relationship**,** our organization have continued improvement programs that include our supplier's processes and this has helped our organization to improve its various performances measures (M=3.73, SD=.894). The supplier relationship has created unique knowledge on our organizations needs and challenges that has been applied to improve knowledge and distribution performance. (M=3.79, SD=.946). Our organization has built long term relationship with suppliers. (M=3.69, SD=.894). The COVID-19 vaccine comes from different sources or suppliers. (M=3.40, SD=1.041). Our organization regularly solves problems jointly with the suppliers of COVID-19 vaccine. (M=3.47, SD=1.073). Our organization help our major supplier to improve their process to better meet our needs.(M=3.63,SD=1.092).Our organization have continuous improvement program that include our supplier in the distribution of COVID-19 vaccine.(M=3.46, SD=1.125) Our organization usually resolves issues together with suppliers.(M=3.36,SD=.917).Our organization regularly gets feedback from the supplier.(M=3.61,SD=.921) ,However the result shows that supplier partnership is moderate effect in the distribution of COVID-19 vaccine in Addis Ababa health Bureau.

4.2.2.3 Customer relationship

In order to assess customer relationship, the selected employees were requested to respond seven related questions.

Table 4.7 descriptive statistics of customer relationship

	N	Mean	Standard deviation
Our organization have long-term relationship with our customers	70	3.73	.962
There is a close involvement of our major customers in deciding upon issues such as customers Relationship management	70	3.89	1.001
Our organization frequently measure customer handling satisfaction	70	3.66	1.062
Our customers give us feedback on our vaccines quality performance	70	3.76	.984
Our organization has developed a customer relationship management process team	70	3,77	1.038
Our organization provides supplier team with formal boundaries for the degree of customization desired	70	3.73	.993
There is an information sharing of COVID-19 vaccine between our organization and private health facilities	70	3.89	.894

Survey Source2022

As it is analyzed in table 4.7, most of the respondents agree that, there is a close involvement of our major customers in deciding upon issues such as customer's relationship management. (M=3.89, SD=1.001). and there is an information sharing of COVID-19 vaccine between our organization and private health facilities. (M=3.89, SD=.894). Our organization have long-term relationship with our customers. (M=3.73, SD-.962) Our organization frequently measure customer handling satisfaction. (M=3,66, SD-1.062). However, the result shows that customer relationship in Addis Ababa Health Bureau in distribution of the vaccine is moderate in the rest of the questions. Our customers give us feedback on our vaccines quality performance. (M=3.76, SD=.984), Our organization has developed a customer relationship management process team. (M=3.77, SD=1.038), Our organization provides supplier team with formal boundaries for the degree of customization desired, (M-3.73, SD=.993)

4.2.2.4 Information Sharing

In order to assess information sharing, the selected employees were requested to respond seven related questions.

Table 4.8 descriptive statistics of Information Sharing

	N	Mean	Standard Deviation
Our organization has effective information sharing between the supply chain team about COVID-19 vaccine distribution	70	3.79	.931
There is effective information sharing with the suppliers about the impoundment of the vaccine production	70	3.34	.991
Our organization has adequate ability to share standardized information	70	3.41	1.014
Our organization exchange information with the supply chain team on important distribution practices	70	3.50	.974
Our organization has appropriate technology in place to enhance information sharing	70	3.53	.959
Information has also facilitated internet-based technology information flow with in the organizations department	70	3.57	.926
Data is shared between our organization and the suppliers to enhance productivity	70	3.30	1.026
Our organization has adequate information technology training for supply chain teams on the distribution of COVID-19 vaccine	70	3.47	.928

Survey Source2022

As it is analyzed in table 4.7, most of the respondents agree that, our organization has effective information sharing between the supply chain team about COVID-19 vaccine distribution. (M=3.79, SD.931). However, the result shows that customer relationship in Addis Ababa Health Bureau in distribution of the vaccine is moderate in the rest of the questions. There is effective information sharing with the suppliers about the impoundment of the vaccine production. (M=3.34, SD=.991). Our organization has adequate ability to share standardized information. (M=3.41, SD=1.014). Our organization exchange information with the supply chain team on important distribution practices. (M=3.50, SD=.974). Our organization has appropriate technology in place to enhance information sharing. (M=3.53, SD=959). Information has also facilitated internet-based technology information flow with in the organizations department. (M=3.57, SD=.926). Data is shared between our organization and the suppliers to enhance

productivity. (M=3.30, SD=1.026) and our organization has adequate information technology training for supply chain teams on the distribution of COVID-19 vaccine (M=3.47, SD.928).

4.2.2.5 Logistics Management

In order to assess logistics management, the selected employees were requested to respond thirteen related questions.

Table 4.9. Descriptive statistics of logistics management

	N	Mean	Standard Deviation
There is no challenge in getting adequately refrigerated vehicles to transport cold chain and ultra-cold chain COVID-19 vaccines	70	3.49	.928
There is no a delay in assigning vehicles to transport COVID-19 vaccine	70	3.49	.944
Our organization has no challenge in assigning adequately refrigerated vehicles to transport cold chain and ultra-cold chain COVID-19 vaccine.	70	3.41	1.042
Our organization established a distribution system of COVID-19 vaccine for all levels	70	3.74	.912
There is no delay in receiving COVID-19 vaccine after being ordered	70	3.39	1.011
The supply chain management team have an integration with the logistics management system	70	3.61	.873
The logistics management system report includes Stock on hand	70	3.40	1.041
The logistics management system report quantities used	70	3.56	.879
The logistics management system report includes losses and adjustments of the vaccine	70	3.59	.970
The logistics management system is automated	70	3.41	.789
There is no delay in sending reports to the higher level and lower level	70	3.60	.923
There are written provisions for the redistribution of over stocked vaccines	70	3.54	1.003
There is no disproportioning of COVID-19 vaccine during distribution	70	3.61	.906

Survey Source2022

As it is analyzed in table 4.8, the mean value of logistic management COVID-19 distribution of Addis Ababa Health Bureau is low. There is no challenge in getting adequately refrigerated vehicles to transport cold chain and ultra-cold chain COVID-19 vaccines, (M=3.49, SD=.928). There is no a delay in assigning vehicles to transport COVID-19 vaccine, (M=3.49, SD.944).

Our organization has no challenge in assigning adequately refrigerated vehicles to transport cold chain and ultra-cold chain COVID-19 vaccine, (M=3.41, SD=1.042). Our organization established a distribution system of COVID-19 vaccine for all levels. (M=3.74, SD=.912). There is no delay in receiving COVID-19 vaccine after being ordered, (M=3.39, 1.011). The supply chain management team have an integration with the logistics management system, (M=3.61, SD=.873). The logistics management system report includes stock on hand, (M=3.40, SD=1.041). The logistics management system report include quantities used, (M=3.56, SD=.879). The logistics management system report includes losses and adjustments of the vaccine. (M=3.59, SD=.970). The logistics management system is automated. (M=3.41, SD.789). There is no delay in sending reports to the higher level and lower level. (M=3.60, SD=.923). There are written provisions for the redistribution of over stocked vaccines, (M=3.54, SD=1.003). There is no disproportioning of COVID-19 vaccine during distribution, (M=3.61, SD=.906).

*4.2.2.6*Storage and Inventory Management

In order to assess Storage and inventory management, the selected employees were requested to respond thirteen related questions.

Table 4.10. Descriptive statistics of Storage and inventory management

	N	Mean	Standard Deviation
There is no challenge in the availability of forms used to keep track of COVID-19 vaccine in stock	70	3.57	1.174
There is no delay in assigning vehicles to transport COVID-19 vaccine	70	3.61	.982
There is adequate cold chain and ultra-cold chain stores for Covid-19 vaccine	70	3.29	1.079
There is a challenge in getting adequately refrigerated vehicles to transport cold chain and ultra-cold chain COVID-19 vaccine	70	3.46	1.188
There is a challenge in getting adequately refrigerated vehicles to transport cold chain and ultra-cold chain COVID-19 vaccine	70	3.46	1.045
Damaged and expired COVID-19 vaccine are removed from stock records at all levels	70	3.59	1.000
There is occurrence of over stock of COVID-19 vaccines	70	3.36	1.143

There is occurrence of stock out of COVID-19 vaccines	70	3.63	.966
There is occurrence of expiry of COVID-19 vaccine	70	3.39	.977
Stock level of COVID-19 vaccine is reviewed periodically	70	3.53	1.086
There is a policy of storing and issuing stock according to FEFO inventory control procedure	70	3.34	.961
Our organization have Summaries of consumption data of COVID-19 vaccine	70	3.27	1.086
There are written provisions for the redistribution of over stocked vaccine	70	3.31	.941

Survey Source2022

As it is analyzed in table 4.8, the mean value of storage and inventory management of COVID-19 vaccine distribution of Addis Ababa Health Bureau is low. There is no challenge in the availability of forms used to keep track of COVID-19 vaccine in stock, (M=3.57, SD=1.174). There is no delay in assigning vehicles to transport COVID-19 vaccine. (M=3.61, SD=.982). There is adequate cold chain and ultra-cold chain stores for Covid-19 vaccine.(M=3.29, SD=1.079). There is a challenge in getting adequately refrigerated vehicles to transport cold chain and ultra-cold chain COVID-19 vaccine,(M=3.46, SD=1.188). Our organization established distribution system for COVID-19 vaccine for all levels, (M=3.46, SD=1.045) Damaged and expired COVID-19 vaccine are removed from stock records at all levels, (M=3.59, SD=1.000). There is occurrence of over stock of COVID-19 vaccines, (M=3.36, SD=1.143). There is occurrence of stock out of COVID-19 vaccines, (M=3.63, SD=.966).There is occurrence of expiry of COVID-19 vaccines,(M=3.39, SD=.997). Stock level of COVID-19 vaccine is reviewed periodically, (M=3.53, SD=1.086). There is a policy of storing and issuing stock according to FEFO inventory control procedure, (M=3.34, SD=.961). Our organization have Summaries of consumption data of COVID-19 vaccine, (M=3.27, SD=1.086).There are written provisions for the redistribution of over stocked vaccine, (M=3.31, SD=.941).

From the open ended questions most of the respondents suggested that it is better if cold chain management practice is included.

4.2.2.7 Distribution Performance

In order to assess distribution performance, the selected employees were requested to respond thirteen related questions.

Table 4.11. Descriptive statistics of distribution performance

	N	Mean	Standard Deviation
In the distribution of COVID-19 vaccine Our supply chain orchestrates a new streamlined service model for vaccine distribution	70	3.61	1.146
Our organization has shared and unified vision of end-to end supply chain for COVID-19 vaccine distribution	70	3.70	1.134
Our organization have a network and collaboration across our supply chain team.	70	3.61	1.067
In the distribution on COVID-19 vaccine Our organization leverage integrate and augment across the existing technology infrastructure to accelerate level of collaboration, communication and digitalization across supply chain networks	70	3.59	1.070
Our organization streamline and translate continually updated demands and risks for COVID-19 vaccine into action across existing logistics distribution and transportation practices	70	3.71	1.065
Our organization use the best process and technology solutions available that can embed product integrity and security at a scalable level (including continuous temperature monitoring across supply chain network	70	3.51	1.151
Our organization reconfigure regional or localized manufacturing and distribution network against criteria including product stability and storage capacity utilization, temporary manufacturing	70	3.54	1.176
Our organization has a standard guideline for the storage, handling and distribution of COVID-19 vaccine		3.57	1.162

Source: Survey 2022

As it is analyzed in table 4.9, the mean value of distribution performance of COVID-19 vaccine distribution of Addis Ababa Health Bureau is moderate. In the distribution of COVID-19 vaccine Our supply chain orchestrates a new streamlined service model for vaccine distribution, (M=3.61. SD=1.146). Our organization have a shared and unified vision of end-to-end supply chain for COVID-19 vaccine distribution. (M=3.70, SD=1.134). Our organization have a network and collaboration across our supply chain team. (M=3.61, SD=1.067). In the distribution of COVID-19 vaccine our organization leverage, integrate and augment across the existing technology infrastructure to accelerate level of collaboration, communication and digitalization across our supply chain networks, (M=3.59, SD=1.070).Our organization streamline and

translate continually updated demands and risks for COVID-19 vaccine into action across existing logistics distribution and transportation practices,(M=3.71, SD=1.065). Our organization use the best process and technology solutions available that can embed product integrity and security at a scalable level (including continuous temperature monitoring) across supply chain network, (M=3.51, SD=1.151). Our organization reconfigure regional or localized manufacturing and distribution network against criteria including product stability and storage capacity utilization, temporary manufacturing, (M=3.54, SD=1.176). Our organization has a standard guideline for the storage, handling and distribution of COVID-19 vaccine. (M=3.57, SD=1.162).

4.2.3 Descriptive analysis of the independent and dependent variables

To present the result descriptively, the average respondents were neutral and agree about the supply chain management practice of Addis Ababa Health Bureau with mean value of 3.64. However, the respondents have relatively less mean value for distribution performance with the mean value of 3.61. This implies that the organization has relatively better distribution performance with better supply chain management practice.

Table 4.12. Descriptive statistics for independent variables and dependent Variable

	N	Mean	Standard Deviation
Partnership	70	3.91	.54441
Supplier relationship	70	3.66	.75043
Customer Relationship	70	3.77	.80610
Information Sharing	70	3.49	.77692
Logistics Management	70	3.53	.70945
Storage and Inventory	70	3.45	.82012
Distribution Performances	70	3.61	.96127

Source: Survey 2022

The results of the table 4.2 indicates that to what extent the average values of partnership, customer relationship, Supplier Relationship, information sharing, logistics management and storage and inventory affects organizational performance. From this partnership and customer relationship highly affects distribution performance as it was shown by statically results of (M=3.91, SD=.5444) and (M= 3.77, SD=.8061) respectively, information sharing also affects distribution performance as it were shown by statically results of (M= 3.49, SD=.77692),

supplier relationship, (M=3.57, SD=.7604). logistics management (M=3.53, SD=.7094) and storage and inventory, (M=3.45, SD=.8201) affects distribution of COVID-19 vaccine at lower level, and this indicates that customer relationship, partnership, supplier relationship and information sharing have effects on the distribution performance of COVID-19 vaccine in Addis Ababa Health Bureau. This indicates that level of supply chain management practice affects distribution performance by mean value of 3.64.

4.3 Inferential Statistics

According to (Gill Marshall and Leon Jonker 2009), Pearson's Correlation coefficients often denoted as r, it can have positive meaning that in a related way that one variable increases in relationship to another or negative, i.e. one variable decreases in relationship to another. They vary from +1, meaning a perfect positive relationship to -1, which is a perfect negative or inverse relationship. If the r value is 0, it implies that the two variables are unrelated. Statistics for Dummies, 2nd edition by Deborah J. Rumsey, also describe the interpretation of the values Pearson correlation coefficient r to the closet values. And according to Deborah J. Rumsey, the values closet to Pearson correlation coefficient r +/– 0.70 considered as strong, +/– 0.50 moderate and +/– 0.30 weak linear relationship. The P- value is the probability of whether the differences seen in the relationship is present, because of a true difference in population means or because of chance seen only in this sample not the population. The p-value also indicated the probability of this relationship's significance.

4.3.1Correlation Analysis

4.3.1.1 Correlation between SCM Practices and Distribution Performance

In this section we are going to analyze the linear relationship practices include, partnership(PP), supplier relationship(SRP), customer relationship(CRP), information sharing(IFS), logistics management(LM) and storage and Inventory(SI) with the distribution performance(DP)

Table 4.13: Correlation between supply chain practices and distribution performance

Correlations

		PP	SRP	CRP	IFS	LM	SI	DP
PP	Pearson Correlation	1	.775**	.649**	.415**	.507**	.559**	.375**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.001
	N	70	70	70	70	70	70	70
SRP	Pearson Correlation	.775**	1	.816**	.413**	.496**	.614**	.484**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000
	N	70	70	70	70	70	70	70
CRP	Pearson Correlation	.649**	.816**	1	.460**	.551**	.607**	.488**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000
	N	70	70	70	70	70	70	70
IFS	Pearson Correlation	.415**	.413**	.460**	1	.815**	.722**	.673**
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000
	N	70	70	70	70	70	70	70
LM	Pearson Correlation	.507**	.496**	.551**	.815**	1	.863**	.764**
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000
	N	70	70	70	70	70	70	70
SI	Pearson Correlation	.559**	.614**	.607**	.722**	.863**	1	.815**
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000
	N	70	70	70	70	70	70	70
DP	Pearson Correlation	.375**	.484**	.488**	.673**	.764**	.815**	1
	Sig. (2-tailed)	.001	.000	.000	.000	.000	.000	
	N	70	70	70	70	70	70	70

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

Source: Survey 2022

- All independent variables (PP, SRP, CRP. IFS, LM and SI) used as supply chain practices and distribution performance have a statistically significant relationship.
- The direction of the relationship independent variables and dependent variables are positively correlated, that means these variables tend to increase together. From the above Pearson correlation coefficient analysis table 4.13, we can see that Information sharing (IFS), logistics management (LM),storage and inventory management (SI) have positive and higher linear relationship with the distribution performance of the organization with the Pearson correlation coefficient value of (r = 0.673), (r = 0.764) and (r = 0.815) respectively. And it's statistical

significant at less than 0.01. On the other hand, partnership (PP), supplier relationship(SRP) and customer relationship (CRP) have moderate linear relationship with distribution performance with Pearson's correlation coefficient value of (r = 0.375), (r = 0.484) and (r = 488) respectively. And it's statistically significant less than 0.01. This implies that partnership, supplier relationship, customer relationship, information sharing, logistics management and storage and inventory management have positive linear relationship with distribution performance of COVID-19 vaccine. Therefore, if the organizations' partnership, supplier relationship, customer relationship, information sharing, logistics management and storage and inventory management quality practices increases, the distribution performance of the organization will increase proportionally.

4.3.2 Multiple regression analysis

4.3.2.1 Tests for the Multiple Linear Regression Model Assumptions

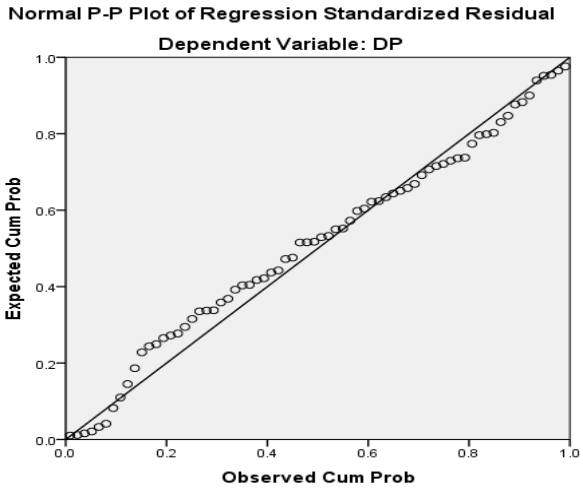
In order to make the data ready for analysis and to get reliable results from the research, the model stated previously was tested for multiple linear regression model assumptions. Among them the major ones are:

Test for linearity, multicollinearit and homoscedacity. Accordingly, the following sub-section presents the tests made.

Assumption one:Tess for Linearity

The relationship between the independent variables and the dependent variable is linear.The scatter plot graph shows that this assumption meets with the data, the dependent and independent variables are continuous. (Graphs

Figure 4.1 Normal p-p plot



Assumption two: Test for multicollinearity.

According to (Churchill and Iacobucci 2005), multicollinearity is concerned with the relationship which exists between explanatory variables. When there exists the problem of multicollinearity, the amount of information about the effect of explanatory variables on dependent variables decreases and as a result, many of the explanatory variables could be judged as not related to the dependent variables when in fact they are. How much correlation causes multicollinearity, while (Hair, et al. 2006) argued that correlation coefficient below 0.9 may not cause serious multicollinearity problem. In our data as showmen in tablethe correlation coefficient between the independent variable is less than 0.9. and as shown in tablethe tolerance of the independent variables, Partnership, supplier relationship, Customer relationship, Information sharing, logistics management and Storage and inventory managementaregreater than 0.1 and the VIP is also less than 10.

Table 4.14 Correlation between independent variables

Correlations

		SRP	CRP	IFS	LM	SI	PP
SRP	Pearson Correlation	1	.816**	.413**	.496**	.614**	.775**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	70	70	70	70	70	70
CRP	Pearson Correlation	.816**	1	.460**	.551**	.607**	.649**
	Sig. (2-tailed)	.000		.000	.000	.000	.000
	N	70	70	70	70	70	70
IFS	Pearson Correlation	.413**	.460**	1	.815**	.722**	.415**
	Sig. (2-tailed)	.000	.000		.000	.000	.000
	N	70	70	70	70	70	70
LM	Pearson Correlation	.496**	.551**	.815**	1	.863**	.507**
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	70	70	70	70	70	70
SI	Pearson Correlation	.614**	.607**	.722**	.863**	1	.559**
	Sig. (2-tailed)	.000	.000	.000	.000		.000
	N	70	70	70	70	70	70
PP	Pearson Correlation	.775**	.649**	.415**	.507**	.559**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	70	70	70	70	70	70

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

Table 1.15 table of collinearity

Table 4.15 collinearity Statistics

Coefficients[a]

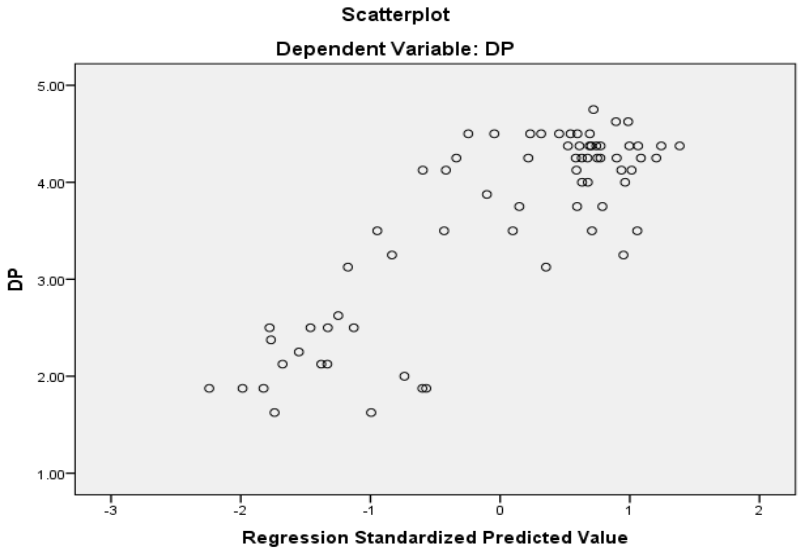
Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	.659	.529		1.246	.217		
PP	-.383	.203	-.211	-1.884	.064	.379	2.640
SRP	.199	.189	.158	1.055	.295	.213	4.698
CRP	-.035	.149	-.029	-.235	.815	.305	3.274
IFS	.141	.148	.114	.954	.344	.334	2.993
LM	.267	.227	.197	1.179	.243	.170	5.880
SI	.705	.177	.601	3.974	.000	.208	4.805

a. Dependent Variable: DP

Assumption three: the test for homoscedacity

Homoscedacity is the assumption that the variance in the residual or (amount of errorin the model)is similarat each point across the model. In other words, the spread of the residual is fairly constant at each point of the predictor variable across the linear model.

Figure 4.2Scatterplot of dependent variables



Assumption four:Teste for Normality

A normal distribution is not skewed and is defined to have a coefficient of kurtosis is between -3 – 3. To test the normality of our date the Z- value (statistics/Std. Error) should be between -3 to 3. As the table the values of Skewness and Kurtosis shows that our data is normally distributed

Table 4.16. Descriptive Statistics for Skewness and Kurtosis

Descriptive Statistics

	N	Mean	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
SRP	70	3.5698	-.272	.287	-.841	.566
CRP	70	3.7735	-.920	.287	-.027	.566
IFS	70	3.4893	-.807	.287	-.392	.566
LM	70	3.5264	-.831	.287	-.632	.566
SI	70	3.4462	-.469	.287	-1.226	.566
DP	70	3.6071	-.826	.287	-.832	.566
PP	70	3.9000	-.696	.287	.181	.566
Valid N (list wise)	70					

4.3.2.1 Regression between SCM practices and Distribution Performance

Regression analysis is conducted to know by how much the independent variable explains the dependent variable. At this point the independent variables are supply chain management practices and the dependent variable is distribution performance. A multiple regression model R-squared is determined by pairwise correlations among all the variables, including correlations of the independent variables with each other as well as with the dependent variable. The multiple correlation coefficient (R) is a measure of the strength of the relationship between Y (in this case the distribution performance) and the six predictor variables selected for inclusion in the equation as the supply chain management practices i.e. PP, SRP, CRP, IFS, and SI. Large values of the multiple R represent a large correlation between the predicted and observed values of the outcome. A multiple R of 1 represents a situation in which the model perfectly predicts the observed data. Field, (2009). Adjusted R-square is a measure of the loss of predictive power or shrinkage in regression. The adjusted R-square tells us how much variance in the outcome would be accounted for if the model had been derived from the population from which the sample was taken Adjusted R-squared is always smaller than R-squared.

Table 4.17. Regression analysis model summary between SCM practices and DP

Model	R	R square	Adjusted R square	Std. Error of the Estimate
1	.837[a]	.700	.671	.55112

a. Predictors: (Constant), SI, PP, CRP, IFS, SRP, LM

Source; survey 2022

According to the above regression analysis model summery table, Supply chain management practices have strong positive liner relationship with distribution performance with the r value of 0.700 And the adjusted R Square value of .671. It depicted that, 67.1% of the total variability in distribution performance is explained by supply chain management practices.

Based on SPSS generated data above, the adjusted R-square (coefficient of determination) explain 67.1 % of the factor affecting distribution performance of COVID-19 vaccine is

represented by the six independent variables that were studied. The other 32.9% is with other practices.

Table 4.18: Regression analysis ANOVA table between SCM practices and DP

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	44.624	6	7.437	24.487	.000[b]
Residual	19.135	63	.304		
Total	63.759	69			

a. Dependent Variable: DP

b. Predictors: (Constant), SI, PP, CRP, IFS, SRP, LM

Source: Survey 2022

In the above ANOVA table F test and p value indicate the explanatory power of the independent variable. And obviously, the null hypothesis is that; the model has no explanatory power. Which means the entire coefficient on the independent variables is zero or none of the independent variables help to predict the dependent variable. But, as it is shown in the above ANOVA table p- value for both is 0.000 and which is less than 0.05 and it is statically significant. So we conclude that there is very strong evidence to reject the null and accept the alternative. Since the p-value is statically significant we can say that there is supported relationship between supply chain management practices and distribution performance.

4.3.2.3 Coefficients of Regression Analysis

In order to know which of the predictors' i.e. storage and inventory has contributed significantly to distribution performance. The following table shows Coefficients when we explore each predictor's beta (i.e., standardized regression coefficient) and its level of significance

Table 4.19: Regression coefficient /output/ between SCM practices and distribution performance

Model	Unstandardized Coefficient		Standardized Coefficient	t	Sig.
	B	Std. Error			
(constant)	.659	.529		1.246	.217
PP	-.383	.203	-.211	-1.884	.064
SRP	.199	.189	.158	1.055	.295
CRP	-.35	.149	-.029	-.235	.815
IFS	.141	.148	.144	-.954	.344
LM	.267	.237	.197	1.179	.243
SI	.705	.177	.601	3.974	.000

s. Dependent Variable: DP

From the table 4.16 we can see that, the p value for partnership and storage and inventory management (SI), is less than 0.05 and it is statistically significant and we have strong reason to reject the null hypothesis which is the coefficient is less than 0.05 and accept the alternative. So we can say that storage and inventory management (IS) has significant contribution to the competitiveness of Addis Ababa Health Bureaucrats. However, the p value for partnership, supplier relationship(SRP), customer relationship(CRP), information sharing(IS) and logistics management (LM), are greater than 0.05 and it is statistically insignificant. Therefore, the above coefficient matrix table tell us, even if, the coefficient in the independent variable different from zero, since the p value for the above mentioned independent variables are greater than 0.05, we have a reason to accept the null and reject the alternative hypothesis. And we can say that the contribution of supplier relationship (SRP), customer relationship(CRP), information sharing(IS) and logistics management (LM), to the organization is insignificant. The regression equation between supply chain management practices and distribution performance can be written as follows:

DP = -.659+-.383PP+.199SRP+-0.035CRP+0.141IFS+.267LM+.705SI+E

4.4 Findings Based on The research questions

Based on the finding of the study, the researcher has answered for the following research questions.

“What is the effect of applying partnership on the distribution performance of COVID-19 vaccine in Addis Ababa Health Bureau?” Based on generated data, partnership is not statistically significantly effect on distribution performance of COVID-19 vaccine in Addis Ababa Health Bureau, since the p value > 0.05.

“What is the effect of applying supplier relationship on the distribution performance of COVID-19 vaccine in Addis Ababa Health Bureau?” Based on generated data, supplier relationship is not statistically significant with distribution performance of COVID-19 vaccine in Addis Ababa Health Bureau since the p value >0.05.

“What is the effect of applying customer relationship on the distribution performance of COVID-19 vaccine in Addis Ababa Health Bureau?” Based on generated data, customer relationship is not statistically significant with distribution performance of COVID-19 vaccine in Addis Ababa Health Bureau since the p value >0.05

“What is the effect of applying information sharing on the distribution performance of COVID-19 vaccine in Addis Ababa Health Bureau?” Based on generated data, information sharing is not statistically significant with distribution performance of COVID-19 vaccine in Addis Ababa Health Bureau since the p value >0.05

“What is the effect of applying logistics management on the distribution performance of COVID-19 vaccine in Addis Ababa Health Bureau?” Based on generated data, logistics managment is not statistically significant effect with distribution performance of COVID-19 vaccine in Addis Ababa Health Bureau since the p value >0.05

“What is the effect of applying storage and inventory on the distribution performance of COVID-19 vaccine in Addis Ababa Health Bureau?” Based on generated data storage and inventory is statistically significant and positive effect on the distribution performance of Addis Ababa Health Bureau where the t- statistic value was calculated to be 3.974 are significant at p value < 0.05. The value of the coefficient level of storage and inventory is also found to be 0.705 which means that, keeping other things constant, a unit change in level of storage and inventory causes 70.5 % increase in distribution performance of Addis Ababa Health Bureau. In general, the survey result showed that storage and inventory management on the distribution performance of COVID-19 vaccine in Addis Ababa Health Bureau is significant, whereas, partnership, supplier relationship, information sharing and logistics management not statistically significant with distribution performance. Therefore, by improving storage and inventory in Addis Ababa Health

Bureau, the distribution performance of the organization could significantly and positively improve.

Chapter Five

Summary, Conclusions and Recommendations

This chapter focused on summarizing the research finding, conclusion drawn from the research finding and recommendation.

5.1 Summary of findings

The main objective of this study was to assess the effect of supply chain management practices on distribution performance of COVID-19 vaccine in Addis Ababa Health Bureau and also to assess implementation of supply chain management practices and distribution performance in the organization. Multivariate results indicated that supply chain management practices, storage and inventory management has significant impact on the distribution of COVID-19 vaccine in Addis Ababa Health Bureau. However, multivariate analysis shows that partnership, supplier relationship, information sharing and logistics management are not significant. The finding indicated that 70.5 % of corresponding change in the distribution performance of Addis Ababa Health Bureau is the result of the change in storage and inventory management practice.

5.2 Conclusions

Based on descriptive statistics from the supply chain management practices most of the respondents agreed on partnership with a high score of mean value 3.91.

In the correlation analysis supply chain management practices (partnership, supplier relationship. Customer relationship, information sharing. Logistics management) and storage and inventory have significant relationship.

Supply chain management practices and distribution performances are positively correlated they increase together, Information sharing. Logistics managment and storage and inventory management have a strong and linear relationship.

In the multiple regression analysis, the R value is .837 which is a strong linear relationship between the supply chain management practices and distribution performance

The adjusted R2 value is .671 which is 67.1% of the total variability in the distribution performance is explained by supply chain management practices.

In the ANOVA table the p-value is 0.000 which is <0.05 and it is very strong evidence to reject the null hypothesize and accept the alternative

Based on the multiple regression analysis results storage and inventory management is significant and positively related with the distribution performance of VOVID-19 vaccine in Addis Ababa Health Bureau. However, partnership, supplier relationship, information sharing and logistics management are not significant with distribution performance of COVID-19 vaccine in Addis Ababa Health Bureau.

Specifically, Storage and inventory management is significantly and positively related, so storage and inventory management is one of the main predictor of the distribution performance of COVID-19 vaccine in Addis Ababa Health Bureau.

From the seven open ended questions almost all of the respondents are not filled. But some of them suggested that cold-chain management practice is one of the issues of COVID-19 vaccine distribution

5.3 Recommendations

The following recommendation can be drawn from the analysis and conclusion made.

Storage and inventor management of Addis Ababa Health Bureau will be improved if the organization have adequate cold-chain and ultra-cold chain stores and vehicles to transport the vaccine, establish distribution system, prepare summery of consumption data and have a good stock management system.

5.4 Limitation of the study

The limitation of this research is firstly, it done on quantitative research approach based on the collection and analysis of the data. Other researchers can use a qualitative approach to explore and expand its context by obtaining in-depth in sight related to supply chain management practices.Despite the practical and theoretical contributions of this research, it presents various constraints. First, this study only relies on a quantitative research methodology based on the collection and analysis of hard numerical evidence.In future studies there is a need to follow this

type of methodology for all constructs and then gather qualitative data to explore their relationships to notonly validate the results from this research, but also expand its context by obtaining more in-depth insights on firms' attitudes, thoughts, and actions, specially related to their SCM practices and the relationships with the constructs studied.

Second, in this research, a limited number of SCM practices were considered. These SCM practices were selected, based on the literature review and the input from practicing managers as those that would be the most important for the specific case of manufacturing firms.Therefore, some other SCM practices and constructs, such as infrastructure and competitive advantage, can also be considered for future research. This is part of the future research agenda derived and proposed from this study. Finally, we are proposing that Jordan is a typical case of a developing economy but there is a broad range of development stages for countries and further research in more countries on the spectrum of development would provide more insight into the practicalities of developing the antecedents of SCP presented in this paper.Despite the practical and theoretical contributions of this research, it presents various constraints. First, this study only relies on a quantitative research methodology based on the collection and analysis of hard numerical evidence.In future studies there is a need to follow this type of methodology for all constructs and then gather qualitative data to explore their relationships to not only validate the results from this research, but also expand its context by obtaining more in-depth insights on firms' attitudes, thoughts, and actions, specially related to their SCM practices and the relationships with the constructs studied. Second, in this research, a limited number of SCM practices were considered. These SCMpractices were selected, based on the literature review and the input from practicing managersas those that would be the most important for the specific case of manufacturing firms.Therefore, some other SCM practices and constructs, such as infrastructure and competitiveadvantage, can also be considered for future research. This is part of the future researchagenda derived and proposed from this study. Finally, we are proposing that Jordan is atypical case of a developing economy but there is a broad range of development stages forcountries and further research in more countries on the spectrum of development wouldprovide more insight into the practicalities of developing the antecedents of SCP presented inthis paper

The other limitation of the study is, based on the literature review a limited number of SCM practices were considered. Other researchers can include other supply chain practices which can

have an impact on the distribution performance. Finally, the other limitation of the study is the research is limited in Addis Ababa health Bureau.

5.5 Suggestion for Further Research

This study focused on supply chain management practices such as partnership, supplier relationship, customer relationship, information sharing, logistic management and storage and inventory managment of COVID-19 vaccine in Addis Ababa health bureau only. Further research can be done on integration internal lean management and so on. More researches with different sample needed to be done on storage and inventory management to verify the result as the multivariate analysis result found contrast with other empirical finding. Different research can be done on other COVID-19 vaccine and the result can be compared.

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Research Questionnaires

Addis Ababa University School of Commerce

Questionnaire for to be filled by Addis Ababa Health bureau

Dear Respondent,

My name is Kassech Kebede, a postgraduate student at Addis Ababa University, School of Commence in the discipline of Logistics and Supply Chain Management. I am currently conducting a study under the topic" EFFECT OF SUPPLY CHAIN MANAGEMENT PRACTICES ON PERFORMANCE; THE CASE OF COVID-19 VACCINE DITRIBUTION IN ADDIS ABABA HEALTH BUREAU'' for partial fulfillment of Master's Degree in Logistics and Supply Chain Management. The primary goal of the questionnaire is to collect data to accomplish the aforementioned purpose. The data will be collected purely for academic purpose only. Hence, I will assure you that it will have no negative effect on you as individual or on your organization. The effectiveness of the study depends on your genuine and frank response which will be kept confidential. Therefore, I request you to fill the questionnaire honestly and frankly. I would like to thank you for your kind cooperation in advance.

My Contact address in case you have question while completing questioners or to provide additional Information:

Kassech kebede, Mobile phone # 0911458451 or

email: kassechkebede123@gmail .com

General Instruction:

Please use tick mark in the space provided, in case where description responses are required. Please write your response in space provide. Please note that additional paper can be used where the space provided is not enough for descriptive response.

PART 1:

GENERAL INFORMATION

1. Gender Male [ ] Female [ ]

2. What is your education level?

Diploma [ ] Degree [ ] Master's Degree [ ] PhD [ ]

3. Years of service/working period

Less than 2 year [ ] 2-5 years [ ] 6-10 years [ ] Over 10 years [ ]

4. Please indicate your designation/ position

Head of department/unit/ [ ]senior expert [ ] expert [ ] staffs [ ]

Part 2: Questions related to Dependent and Independent Variables

Instruction: In this section you are expected to indicate performance of your organization's supply

chain management practices in relation to COVID-19 Vaccine Distribution based on the following

Likert Scale.

1- Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree.
Please put "X" mark on the box provided that reflect your idea

	1- What is the effect of applying partnership on distribution performance of COVID-19 vaccine?	1	2	3	4	5
1-1	Our organizations' supply chain partnership has been found to elicit benefits including top management support and information sharing.					
1-2	Our organization has a cross-functional partnership					

	between our supply chain teams.					
1-3	Our organization has an integrated partnership between a warehousing, transportation, inventory management, purchasing, demand planning for effective distribution of COVID-19 vaccine distribution.					
1-4	Our organization prepared COVID-19 vaccine policy for public and private health facilities partnership.					
1-5	Our organization has a collaboration partnership between public and private health facilities in training professionals on COVID-19 vaccine and its logistics.					
1-6	Our organizations partnership has beenworking closely with our supplier and eliminating wasteful time can help the distribution of the vaccine					
1-7	Designing to influence the strategic and operational capabilities of an individual partnership participating organization in the distribution of COVID-19 vaccine to help them achieve certain significant strategic goals and objectives of the entity					
1-8	Our organization is working more effectively with a few important suppliers who are willing to share responsibility for the success of effective distribution of COVID-19 vaccine.					
	2-What is the effect of applying supplier relationship on distribution performance of COVID-19 vaccine?					
2-1	Our Organization has built long term relationship with suppliers					
2-2	As a result of the supplier's relationship, our organization have continued improvement programs that includeour supplier's processes and this has helped our organization to improve its various performances measures					
2-3	The COVID-19 vaccine come from different sources or					

	suppliers					
2-4	Our organization regularly solve problems jointly with the suppliers of COVID-19 vaccine					
2-5	Our organization help our major COVID-19 vaccine supplier to improve their process to better meet our needs					
2-6	Our organization have continuous improvement program that include our supplier in the distribution of COVID-19 vaccine					
2-7	Our organization usually resolves issues about COVID-19 vaccine distribution together with suppliers					
2-8	Our organization regularly gets feedback from the supplier					
2-9	The supplier relationship has created unique knowledge on our organizations needs and challenges that has been applied to improve COVID-19 vaccine knowledge and Distribution performance.					
	3-What is the effect of applying customer relationships on distribution performance of COVID-19 vaccine?					
3-1	Our organization has long-term relationship with our customers in the distribution of COVID-19 vaccine					
3-2	There is a close involvement of our major customers in deciding a COVID-19 vaccine distribution upon issues such as customers relationship management					
3-3	Our organization frequently measure customer handling satisfaction during COVID-19 vaccine distribution					
3-4	Our customers give us feedback on COVID-19 vaccines quality performances					
3-5	Our organization has developed a customer relationship management process team during the COVID-19 vaccine					

	distribution.					
3-6	Our organization provides supplier team with formal boundaries for the degree of customization desired					
3-7	There is an information sharing of COVID-19 vaccine between our organization and private health facilities					
	4-What is the effect of applying information sharing on distribution performance of COVID-19 vaccines in Addis Ababa Health Bureau?					
4-1	Our organization has an effective information sharing between the supply chain team about COVID-19 vaccine distribution					
4-2	There is effective information sharing with the suppliers about the impoundment of the vaccine production					
4-3	Our organization has adequate ability to share standardized information on COVID-19 vaccine					
4-4	Our organization exchange information with the supply chain team on important distribution practices					
4-5	Our organization has appropriate technology in place to enhance information sharing					
4-6	Information has also facilitated internet-based technology information flow with in the organizations department					
4-7	Data is shared between our organization and the suppliers to enhance productivity					
4-8	There is adequate information technology training for supply chain teams on the distribution of COVID-19 vaccine					
	5 -What is the effect of applying Logistics management system on distribution performance of COVID-19 vaccines in Addis Ababa Health Bureau					
5-1	There is no challenge in getting adequately refrigerated					

	vehicles to transport cold chain and ultra-cold chain COVID-19 vaccines					
5-2	There is no a delay in assigning vehicles to transport COVID-19 vaccine					
5-3	Our organization has no challenge in getting adequately refrigerated vehicles to transport cold chain and ultra-cold chain COVID-19 vaccine					
5-4	Our organization established a distribution system of COVID-19 vaccine for all levels					
5-5	There is no delay in receiving COVID-19 vaccine after being ordered					
5-6	The supply chain management team have an integration with the logistics management system.					
5-7	The logistics management system report includes Stock on hand					
5-8	The logistics management system report quantities used					
5-9	The logistics management system report includes losses and adjustments of the vaccine					
5-10	The logistics management system is automated					
5-11	There is no delay in sending reports to the higher level and lower level					
5-12	There are written provisions for the redistribution of over stocked vaccines					
5-13	There is no disproportioning of COVID-19 vaccine during distribution					
	6 - What is the effect of applying Storage and Inventory management on distribution performance of COVID-19 vaccines in Addis Ababa Health Bureau?					

6-1	There is no challenge in the availability of forms used to keep track of COVID-19 vaccine in stock					
6-2	There is no delay in assigning vehicles to transport COVID-19 vaccine					
6-3	There is adequate cold chain and ultra-cold chain stores for Covid-19 vaccine					
6-4	There is no challenge in getting adequately refrigerated vehicles to transport cold chain and ultra-cold chain COVID-19 vaccine					
6-5	Our organization has established distribution system for COVID-19 vaccine for all levels					
6-6	Damaged and expired COVID-19 vaccine are removed from stock records at all levels					
6-7	There is occurrence of over stock of COVID-19 vaccines					
6-8	There is occurrence of stock out of COVID-19 vaccines					
6-9	There is occurrence of expiry of COVID-19 vaccines					
6-10	Stock level of COVID-19 vaccines is reviewed periodically					
6-11	There is a policy of storing and issuing stock according to FEFO inventory control procedure					
6-12	Our organization has summaries of consumption data of COVID-19 vaccine.					
6-13	There are written provisions for the redistribution of over stocked vaccines					
	7-Effective Distribution performance of COVID-19 vaccine distribution in Addis Ababa Health bureau					
7-1	In the distribution of COVID-19 vaccine Our supply chain orchestrates a new streamlined service model for vaccine distribution.					
7-2	Our organization has a shared and unified vision of end-					

	to-end supply chain for COVID-19 vaccine distribution					
7-3	Our organization has a network and collaboration across our supply chain team					
7-4	In the distribution of COVID-19 vaccine our organization leverage, integrate and augment across the existing technology infrastructure to accelerate level of collaboration, communication and digitalization across our supply chain networks					
7-5	Our organization streamline and translate continually updated demands and risks for COVID-19 vaccine into action across existing logistics distribution and transportation practices					
7-6	Our organization use the best process and technology solutions available that can embed product integrity and security at a scalable level (including continuous temperature monitoring) across supply chain network.					
7-7	Our organization reconfigure regional or localized manufacturing and distribution network against criteria including product stability and storage capacity utilization, temporary manufacturing					
7-8	Our organization has a standard guideline for the storage, handling and distribution of COVID-19 vaccine					

Part- 3- Open Ended Question

1- If there are other practices or challenges of COVID-19 vaccine in partnership, please describe

2- If there are other practices or challenges of COVID-19 vaccine in supplier relationship, please describe

3- If there are other practices or challenges of COVID-19 vaccine in customer relationship, please describe

4- If there are other practices or challenges of COVID-19 vaccine in information sharing, please describe

5- If there are other practices or challenges of COVID-19 vaccine in logistic management, please describe

6- If there are other practices or challenges of COVID-19 vaccine in storage and inventory management, please describe

7- If there are other practices or challenges of COVID-19 vaccine in distribution performance, please describe