THE EFFECT OF SUPPLY CHAIN MANAGEMENT STRATEGIES ON OPERATIONAL PERFORMANCE IN THE CASE OF LARGE MANUFACTURING FIRMS OF DEBRE BERHAN TOWN

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A THESIS SUBMITTED TO DEBRE BERHAN UNIVERSITY, COLLEGE OF BUSINESS AND ECONOMICS, FOR THE PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF ARTS IN LOGISTICS AND SUPPLY CHAIN MANAGEMENT

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ETHIOPIA

DECLARATION

This thesis, titled "**the effect of supply chain management strategies on operational performance in the case of large manufacturing firms of Debre Berhan**", is my original work and has not been submitted as a partial requirement for a MA degree in any university. I have carried out the present study independently with the guidance and support of the research advisor.

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Ayele Desta January 2023

APPROVAL

The thesis titled "**the effect of supply chain management strategies on operational performance in the case of large manufacturing firms of Debre Berhan**", has been submitted for examination with my approval as university advisor. This work is original in nature and is fit for submission for the award of the degree of Masters of Arts in Logistics and Supply Chain Management.

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Date: _____

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CONFIRMED BY EXAMINERS

External Examiner	Signature	Date
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Ayele Desta

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ABBREVIATION/ACRONYMS

SC	Supply chain
SCM	Supply chain management
SCS	Supply chain strategies
OP	Operational performance
ERP	Enterprise Resource Planning
CPFR	Collaborative Planning, Forecasting and Replenishment
WMS	Warehouse management system
VMI	Vendor managed inventory
SME	Small and medium-sized enterprises
SCMS	Supply chain management strategies
LMF	Large manufacturing firms
DB	Debre Berhan

ABSTRACT

The purpose of this study is to examine the effects of supply chain strategies on the operational performance of large manufacturing firms in Debre Berhan town. The study employed an explanatory research design in which the selection of respondents was done using a stratified proportional sampling technique. To determine the sample size Yamane, 1973 sample size determination formula was employed and based on the result 283 samples were taken from 9 large manufacturing firms. A questionnaire was used as a research tool for collecting data. The analysis was made using descriptive and inferential statistics. Descriptive statistics utilized for analyzing demographic characteristics of the respondents while inferential statistics was utilized to test significant relationship between variables and to test the hypotheses.. From the correlation analysis result, there were significant positive correlations between all variables (vendor-managed inventory; Enterprise resource planning; Collaborative Planning, Forecasting, and Replenishment (CPFR); Warehouse management system; and outsourcing) with firms' operational performance at ($p<0.005$). Finally, according to the regression analysis result, all five supply chain strategies have a positive and significant effect on operational performance. As a result, the study has managerial implications that large manufacturing firms can increase their operational performance by implementing Supply chain strategies.

Keywords: Supply Chain strategies, VMI, ERP, CPFR, WMS, outsourcing, and operational performance

CHAPTER ONE: INTRODUCTION

1.1. Background of the study

Currently, Supply chain management (SCM) has increasingly become an important topic for academicians, practitioners, and researchers (Cristini et al., 2021; Khandelwal et al., 2021; Wieland, 2021). The concept of supply chain management is a set of approaches utilized to efficiently integrate suppliers, manufacturers, warehouses, and stores (Al-Odeh & Smallwood, 2012). There has been an emphasis on the creation of an effective supply chain, which has been identified as a critical tool in managing products and services and improving competitive advantage for organizations. Flexible, adaptable, and consistent supply chain management plays a critical role in an organization's success (Xu, 2019).

Factories follow different supply chain strategies to get their products to customers with as little cost as possible. This ensures that every phase of the supply chain is optimized, including the sourcing of materials, manufacturing, delivery, and logistics (Vaiana, 2022). Companies use a supply chain strategy as a roadmap to deliver their products to customers as efficiently as possible. With this plan, every phase of the supply chain is optimized, including sourcing, manufacturing, delivery, and logistics (Boyd, 2022). Those supply chain strategies affect firms' operational performance (Lee, 2021).

A company's operational performance refers to its productivity, the quality of products, its ability to satisfy customers, its cost, its price, its ability to deliver at speed, and its flexibility (Abdel-maksoud, 2015). Operational performance refers to the measurable factors of the outcomes of an organization’s operations, including reliability, production cycle time, and inventory turns. It further affects business performance measures like market share and customer satisfaction. Operational performance is affected by many variables. Supply chain strategy is among the variables of the operational performance of firms (Liu et al., 2020).

Although supply chain is widely discussed by practitioners and academics, and the widespread international recognition of global supply chain practices and problems, little is known in the literature concerning the supply chain problems facing developing countries (Cristini et al., 2021; Msimangira & Tesha, 2014).

Thus, this research attempted to investigate how supply chain management strategies affect operation performance in the case of large manufacturing firms in Debre Berhan town, Ethiopia.

1.2. Statement of the problem

As try to discuss in the background section, the ability to manage supply chains efficiently, adaptable, and consistently plays an important role in the success of organizations (Alzoubi et al., 2020). Currently, supply chain management plays a vital role in business performance and is undeniably important (Daneshvar et al., 2020). To check this theory, an increasing number of studies have been conducted.

Daneshvar et al., (2020) conducts a study titled "Effective factors of implementing efficient supply chain strategy on supply chain performance". The finding of the study showed that there is a positive relationship between the implementation of an efficient supply chain strategy and supply chain performance. Accordingly, to reduce the costs of implementation of an efficient supply chain strategy, it is necessary to invest in factors that influence supply chain performance positively. The study identifies different factors which determine the implementation of supply chain strategy on supply chain performance. R2 for the dependent construct showed that 29 percent of the variance in the supply chain performance construct was explained in the study. 71% of the dependent variable is explained by other variables. Therefore, studies that consider other supply chain strategies are required.

Lee (2021) conducted a study entitled "The Effect of Supply Chain Management Strategy on Operational and Financial Performance". The study aimed to examine the effects of SCM on the operational performance of SMEs in Korea. The finding of the study shows that SCM strategies had a significant effect on SME organizational competencies. Besides, it shows that introducing SCM strategies directly improves business performance and is closely related to competencies such as research and development, technology commercialization, production capability, and marketing capabilities. Consequently, a combination of SCM strategies and organizational competencies can generate sustainable overall business performance among SMEs. The study sample was specific to Korea SME manufacturing firms, the results may not be generalized to other countries or industries. For this reason, studies that focus on other countries with different sector is required.

In Ethiopia Demoz (2021), conducted a study titled "the effect of supply chain strategies on organizational performance: in the case of Steely RMI PLC". In his study, conceptually supply chain management strategies attributes were delaminated into Manufacturing strategy Outsourcing strategy Channel strategy Customer service strategy Asset network. While there are other supply chain strategies like vendor-managed inventories, enterprise resource planning, and others. It is difficult to generalize the theory by using a single case company and ignoring some other parameters of supply chain strategies. Besides, the dependent variable for the study was organizational performance while this study is designed for operational performance.

An increasing number of studies have been studied on issues of supply chain management strategy (SCMS) and operational performance but, most of the studies were conducted in developed countries perspective. Thus, it is difficult to generalize the finding for countries with emerging markets like Ethiopia.

In this regard, a study is required for analyzing the supply chain-related areas from developing countries' perspectives. Therefore, this study was filling the gap of empirical research by conducting a study on the effect of supply chain management strategy on operation performance in the case of large manufacturing firms. To fill the stated problem, this study answered a basic research question:

- Does supply chain management strategy affect the operational performance of large manufacturing firms (LMF) in Debre Berhan (DB) town, Ethiopia?

1.3. Objective of the study

1.3.1. General objective

The main objective of this study is to examine the effects of Supply chain management strategies on the Operational performance of LMF of DB.

1.3.2. Specific Objectives

In order to achieve the general objective of this study the following specific objectives were formulated:

- To examine the effects of Vendor managed inventory on operational performance
- To examine the effects of Enterprise Resource Planning on operational performance

- To examine the effects of Collaborative Planning, Forecasting, and Replenishment on operational performance
- To examine the effects of Warehouse management systems on operational performance
- To examine the effects of Outsourcing on operational performance

1.4. Significance of the study

Every study has its own significance for the organization, policymaker, discipline, or other researchers. Likewise, this study has significance to manufacturing firms i.e. the findings from this study will help large manufacturing firms to know their SCMS and operational performance. Besides, the finding of this study can be used as a reference for future research.

1.5. Scope of the study

Supply chain strategies (SCS) include vast areas of managerial practice. Hence, it is difficult and unmanageable to conduct the study in all areas. Therefore, conceptually the scope of this study was delimited to SCS such as Vendor managed inventory, Enterprise Resource Planning, CPFR, Warehouse management system, and Outsourcing. Methodologically this study was explanatory research that mainly used multiple linear regressions to test the proposed hypothesis. Furthermore, geographically the study was delaminated to large manufacturing firms.

1.6. Organization of the study

This paper was organized into five chapters. The first chapter includes an introduction that includes the background of the study, a statement of the problem, and objective of the study, basic research questions, the significance of the study, and the scope and limitations of the study. The second chapter deals with a review of related literature from different sources. The third chapter involves methodologies applied in the study. The fourth chapter presents data analysis and interpretation. The fifth chapter includes a summary of the study, conclusions, and recommendations.

CHAPTER TWO: LITERATURE REVIEW

2.1. Supply Chain Management

The term supply chain management (SCM) has risen to prominence over the past ten years. Moreover, the term is frequently used to describe executive responsibilities in corporations (La Londe 1997). Corporations have turned increasingly to global sources for their supplies. This globalization of supply has forced companies to look for more effective ways to coordinate the flow of materials into and out of their companies (JSI, 2017; Power, 2005).

Today's global market is subject to intense rivalry. Businesses have been pushed to invest in and pay attention to their supply chains because of the advent of products with shorter life cycles and the rise in customer expectations. This has driven the continuous growth of the supply chain and of the methods to manage efficiently along with ongoing improvements in communications and transportation technologies (Zamparini, 2010).

There does not seem to be much agreement on what is meant by the phrase "supply chain management (SCM)". The conclusion reached by academics is that SCM "has been poorly defined and there is a considerable degree of diversity in people's ideas about what is intended." (Vecchio et al., 2007) made an effort to change this situation by putting out a comprehensive definition, not limited to any one disciplinary area, and accurately captures the range of topics that are typically covered by this term. The majority of academics agree that supply chain management is the systematic, strategic coordination of traditional business functions and the tactics across these business functions within a specific company and across businesses within the supply chain to enhance the long-term performance of the individual companies and the supply chain as a whole (Mentzer & DeWitt, 2001).

2.1.1 Supply Chain

There are many different definitions as many of those who carried to wrote about it, (Macleod et al., 1998) defined it as a group of interconnected participating companies that add value to a stream of transformed inputs from their source of origin to the end products or services that are demand by the designated end customer.

This definition includes the terms "direct supply chain," "extended supply chain," and "ultimate supply chain," which refer to three different levels of supply chain complexity. Those involved in the upstream and/or downstream flows of goods, services, money, and/or information make up a direct supply chain, together with the company that employs them. An extended supply chain encompasses all parties involved in the upstream and/or downstream flows of goods, services, capital, and/or information, including suppliers of the immediate supplier and customers of the immediate customer. The organizations participating in every upstream and downstream flow of goods, services, money, and information from the ultimate supplier to the ultimate client are referred to as participants in an ultimate supply chain(Mentzer & DeWitt, 2001).

To transmit items from a supplier to a buyer, a network of companies, people, tools, activities, data, and resources is also known as a supply chain. To produce, deliver, and sell items to customers, a system of suppliers, transporters, warehouses, retailers, and distributors collaborates. The movement and transformation of goods from the raw material stage to the final consumer, as well as the associated information and financial movements, are all a part of these processes. Finally, the term is a link between a firm or business and its suppliers and customers (Zamparini, 2010).

2.1.2 Supply Chain Management

Supply chain management (SCM) is the control of the distribution of goods, data, and money from supplier to consumer. It includes all of the organizations and commercial activities required to develop, produce, deliver, and make use of a good or service. All of the required pauses between the supplier and the consumer are also included in the supply chain. Coordinating this material flow both inside an organization and to the final consumer is the responsibility of supply chain management (Zamparini, 2010).

In order to create a seamless and highly effective business model, supply chain management, an integrating function, is primarily responsible for connecting key business operations and business processes both within and across organizations. It drives the coordination of procedures and activities with and across marketing, sales, product design, finance, and information technology. It encompasses all of the logistics management tasks mentioned above as well as manufacturing operations(Pandey, 2001).

Three main flows are found in the supply chain: Moving **products** from the supplier to the consumer and attending to customer service requirements are both included in the product flow. Order details and delivery status are included in the **information** flow. Payment schedules, credit conditions, and extra agreements are all included in the **financial** flow. Supply chain management is a set of approaches utilized to efficiently integrate suppliers, manufacturers, warehouses, and stores (Al-Odeh & Smallwood, 2012).

Companies now include various environmental initiatives in their plans to improve both their economic and environmental performance. Supply chain management operates at three levels: strategic, tactical, and operational. At the strategic level, company management makes high-level strategic supply chain decisions that are relevant to whole organizations. Strategic supply chain management (SSCM) is a crucial tactic that helps businesses outperform the competition and boost performance in general (Al-Odeh & Smallwood, 2012).

2.2. Strategic Supply Chain Management

Supply chains have historically received little empirical attention in the subject of strategic management, but allied fields like marketing and operations management have long stressed the effects of operational activities on performance. A tiny corpus of strategic management research has started to look into "strategic supply chain management" in recent years, which refers to using a supply chain to improve critical outcomes in addition to getting items where they need to go (JSI, 2017).

Strategic supply chain management is more than just innovation for the sake of being innovative. It is creating a unique supply chain configuration that drives forward your strategic objectives. The effectiveness of strategic supply chain management is demonstrated by the competitive advantages that companies like Wal-Mart, Zara, Toyota, and Dell have gained by utilizing their supply chains as competitive weapons. Conversely, neglecting to proactively manage supply networks has detrimental effects(Carnahan et al., 2010).

The strategic supply chain processes that management has to decide upon will cover the breadth of the supply chain. These include product development, customers, manufacturing, vendors, and logistics. Although a lot of research and practical experience with SCM- issues has been

obtained, we have to acknowledge that few companies have established a management environment that supports the integration required for effective SCM. Instead, many chains are still functionally oriented and are characterized by a lack of trust and credibility among the supply chain organizations(Kalinzi, 2016). The following are some of the supply chain strategies identified by prior researchers:

2.2.1. Vendor Managed Inventory (VMI)

Vendor Managed Inventory is when a business allows its supplier to fully maintain their inventory levels. Many retailers choose this route as it helps take the guesswork out of managing stock levels. Outsourcing this supply chain task helps the business stay focused on other elements of its operations while ensuring that inventory remains at the right levels at all times (American Express, 2020).

Vendor-managed inventory is a frequently used method and a widely discussed partnering initiative for improving supply chain efficiency. The purpose of implementing VMI programs is to decrease costs for inventory control and management and create transparency; the possibility of collaborative planning and replenishment, and efficient consumer response (Erikshammar et al., 2013). In some cases, this management responsibility can be expanded to inventory management support systems, related physical infrastructure, or other related services. VMI is usually the opposite of the inventory management approach taken by many organizations today. Currently, under typical models, when a custodian needs commodities, they place an order with their supplier (vendor). The customer is in complete control of the timing and size of the order being placed (IDUSG, 2012).

The approach emerged in the middle of the 1980s when the supplier is solely in charge of overseeing the customer's inventory management strategy, including the replenishment procedure. Many businesses adopted VMI; Procter & Gamble and Wal-Mart in the USA were two of the first to put the theory into practice. The primary flaw of VMI is the lack of adequate supply chain visibility; point-of-sale (POS) data and backroom inventory level data are ignored, while the replenishment process (and inventory policy) is based on the variation of stock levels in the customer's primary warehouse or distribution center(Barratt & Oliveira, 2001). This has led to the search for alternative, more effective, techniques.

According to (IDUSG, 2012) there are five VMI models:

1. Vendor Replenished Inventory (VRI)
2. Vendor Managed Inventory Services (VMIS)
3. 3rd Party Replenished Inventory (3RI)
4. 3rd Party Managed Inventory Services (3MIS)
5. Inventory Management Technical Assistance (IMTA).

The first four models include the two potential vendors true vendors and third parties in the VMI program. They also differentiate the levels of managed inventory; for example, simple inventory replenishment and inventory replenishment with additional services. In the fifth model, IMTA, the service provided is technical assistance, with additional inventory service, as needed. In this model, we do not distinguish between whether the service is provided by a true vendor or a third party.

Benefits To Vendor-Managed Inventory

According to American Express (2020), there are several benefits to vendor-managed inventory. Here are some to consider:

Improved efficiency. Having too much inventory can be costly and take up precious real estate on your shelves, while not enough inventory can cost you sales and delay customer orders. Having the right balance is important not only for your budget, but for your shelf space, and your customer satisfaction. What's more, a VMI system may handle it for you by generating purchase orders automatically, meaning there is less potential for data entry errors.

Cost reduction. Having to carry extra stock can be expensive, while inadvertently running out can cause disruptions and lost sales. With a vendor-managed inventory, there will be fewer orders, no more expensive "rush" orders, and you won't have to worry about returning overstock. Your staff also can focus on other tasks, so you can maximize productivity.

Reduced complexity. Working with a VMI partner to handle your inventory means not having to deal with multiple vendors. With all of that back and forth removed, and a predictable and reliable inventory delivery schedule, it's fewer details to worry about.

Improved data insights. As the vendor and business relationship grows, the supplier can anticipate demand and make data-driven decisions to handle seasonal or market trends.

2.2.2. Enterprise Resource Planning (ERP)

Enterprise resource planning refers to a type of software that organizations use to manage day-to-day business activities such as accounting, procurement, project management, risk management and compliance, and supply chain operations. A complete ERP suite also includes enterprise performance management, software that helps plan, budget, predict, and report on an organization's financial results (ORACLE, 2022).

It is impossible to overstate the importance of ERP in supply chain management. ERP software has significantly changed how organizations can operate and is directly related to corporate expansion. Successful ERP and supply chain management are essential components of business growth. These technologies, when purchased from supply chain specialists like QAD, combine supply chain operations under a single dashboard, allowing for visibility and efficient coordination between vendors and suppliers (Stank et al., 1999).

ERP automates demand planning, generating demand as soon as orders are received. The software implements scheduling after receiving an order. Team members can view information on how resources are being used in production in real time, which helps them plan production tasks and product delivery more effectively. Other supply chain functions, such as managing warehouse resources and moving items, can also be automat or optimized to increase efficiency (Al-Odeh & Smallwood, 2012).

The business value of ERP

It's impossible to ignore the impact of ERP in today's business world. As enterprise data and processes are corralled into ERP systems, businesses can align separate departments and improve workflows, resulting in significant bottom-line savings (ORACLE, 2022). Examples of specific business benefits include:

- Improved business insight from real-time information generated by reports
- Lower operational costs through streamlined business processes and best practices

- Enhanced collaboration from users sharing data in contracts, requisitions, and purchase orders
- Improved efficiency through a common user experience across many business functions and well-defined business processes
- Consistent infrastructure from the back office to the front office, with all business activities having the same look and feel
- Higher user-adoption rates from a common user experience and design
- Reduced risk through improved data integrity and financial controls
- Lower management and operational costs through uniform and integrated systems

2.2.3. Collaborative Planning, Forecasting & Replenishment (CPFR)

Because of the high level of cooperation and collaboration required, deals with this shortcoming and has been referred to as a step beyond ECR. Instead of attempting to predict demand patterns alone, buyers and sellers collaborate to provide accurate, precise, and realistic forecasts that serve as a guide for business operations (Stank et al., 1999). A merchant and manufacturer collaborate to develop a single, unified promotion calendar ahead of the selling period using the concepts of CPFR. This calendar is then updated in real-time over the Internet. For the consumer products trade partner, the retailer additionally supplies point-of-sale (POS) information, longer-term promotional programs, prescribed inventory levels, etc. Both businesses have product sales and order forecasts, and they work together to compare their forecasts with those of retailers. Exceptions or discrepancies are noted, and the proper managers are informed. The "team" decides on a single forecast that spans the whole supply chain by working together(Barratt & Oliveira, 2001).

2.2.4. Warehouse Management Systems (WMS)

Logistics companies to streamline warehouse operations through IT systems for better inventory tracking and management use warehouse Management Systems (WMS). WMS aids in the management and monitoring of inventory for the logistics industry. In a warehouse, a WMS primarily controls material flow and storage while processing all related operations, such as shipping, receiving, put-away, and picking. The purpose of WMS, a database-driven computer program, is to increase warehouse productivity by managing cutaways and maintaining accurate

inventory levels by documenting warehouse operations. Based on real-time data on the level of bin utilization, the systems also manage and optimize stock (Andiyappillai & Prakash, 2019; Stank et al., 1999).

Warehouse management systems aid companies in maximizing their operational effectiveness across a range of procedures. The warehouse is made waste-free, its operations streamlined, and every part of warehousing must be more efficient if these high-performance targets are to meet. Using a WMS, which is built to manage warehouse space, offer real-time order status information, improve inventory accuracy, and increase worker productivity, is one of the most proactive methods to achieve this (Pandey, 2001).

2.2.5. Outsourcing

There are numerous definitions of outsourcing provided by various authors. According to Handfield (2006), outsourcing is "the strategic utilization of outside resources to undertake operations normally handled by internal employees and resources." The practice of contracting out key operations to specialized, effective service providers who later on become trusted business partners is also known as outsourcing. Using external resources strategically to carry out company tasks that have historically been handled by internal workers is also known as outsourcing. Using a company that is outsourced will help you save money and improve efficiency by making use of the skills, technology, and knowledge of outside providers.

An organization can concentrate on a small number of strategically significant jobs by effectively using outsourcing, which will help it continuously improve its core strengths. Cost savings and shortened lead times should arise from outsourcing a company's noncore expertise. To do this, a business must concentrate on its strengths and core skills and use outsourcing as a tool for effective resource utilization. Companies have achieved remarkable performance thanks to the widespread use of outsourcing strategy(Kalinzi, 2016).

They list the preparation, vendor(s) selection, transition, managing relationship, and reconsideration as the major stages of the total outsourcing process. Answering questions like how, where, why, when, and whether or not is part of the preparation step. The following stage of vendor selection is straightforward when it comes to deciding which possible service

providers to choose and which to reject from a pool that has been discovered and qualified. The following phase deals with the transitional phase of relationship management with the authorized service provider. The final stage looks at how everything turned out and concentrates on the "what now" question(Kalinzi, 2016).

Advantages of Outsourcing

According to Vaxevanou & Konstantopoulos (2015), has the following advantages for factories

(1) Expertise and fast delivery:

Most of the time tasks or projects are outsourced to others who specialize in the particular field. The outsourced vendors must have specific equipment and technical expertise, most of the times better than the ones at the outsourcing organization. This means the tasks should be completed faster and with better quality and prompt delivery.

(2) The ability to concentrate on core processes rather than the supporting ones:

Outsourcing the supporting processes allow the organization more time to focus on the company's core business process or job assignment.

(3) Risk-sharing:

This is the most crucial factor determining the outcome of a campaign is risk analysis. Outsourcing certain components of many companies' business processes help the organization shift certain responsibilities to the outsourced vendor. The outsourced must have the ability to plan your risk-mitigating factors better

(4) Reduced costs such as Set up costs, Operational and Recruitment costs:

Outsourcing reduces the need to hire individuals in-house; hence recruitment and operational costs can be minimized to a great extent. Therefore, the time and many costs can be safe and focus on something else.

2.3. Operational Performance

Operational performance can be defined as the level to which products and services supplied by an organization meet customer expectations. It provides an indication of the potentiality of the supply chain in providing products and services to the customer. This metric is most important in supply chain management as it integrates (involves) the measurement of performance right from the supplier end to the customer end (Vorst, 2004).

Operational performance (OP) is a crucial enabler of total supply chain performance, which often results from a combination of several systemic variables and enablers. Operational metrics for a supply chain, like customer happiness and operational response to changing market demand, should be included in performance measures. The determination of the performance indicators to be examined is one of the process' most crucial considerations in logistics benchmarking (Andy Neely, 1970). The right measurements are essential to a company's success (Wong and Wong 2008). One definition of a performance measure is "a metric to quantify the efficacy and efficiency of operations.

Supply chain operational performance is the result of the systematic, strategic, and efficient collaboration of the conventional business functions within and outside the organization, consisting on processes and activities associated with transforming material inputs into finished goods. Neely et al. (1995) as cost, time, quality, delivery, and flexibility described the same essential metrics for operational performance.

The tracking and tracing of efficacy and the ability to make informed decisions regarding the chain are possible by the performance measurement of whole supply chains, which is a crucial issue. There are very few measures of company performance, though. The time-based competition puts a strain on the supply chain's businesses, forcing them to adapt to changing consumer and market demand (Chen et al., 2004).

Other researchers have various opinions about how to gauge an organization's performance. Operational effectiveness and financial results of the firms are used to gauge organizational performance. Operational performance is measured in terms of production output quality, capital usage, or delivery speed. (González-Benito, 2007).

Chen et al., (2004) examined the performance of agro-food supply chains in terms of effectiveness, adaptability, responsiveness, and food quality. Previous research revealed that incorporating SCM practices deeply into the company's daily operating procedures is the only way to generate improvements in profits, market share, and total firm revenue.

Even today, the majority of businesses prefer to benchmark using "hard" data as opposed to "soft" data, ignoring non-financial metrics including quality, dependability, customer happiness, human resources, and other factors, such as learning (Cassell et al., 2001). Therefore, it is essential that performance measurement based on both quantitative and qualitative data that contribute to performance improvement at all managerial levels.

The most effective relationships exist where supply chain partners have made aware of what performance standards they are held accountable for (Stuart & McCutcheon, 2000). Selecting performance measures intended to make sure companies accomplish the specific (collaborative) goals that they set. The supply chain performance measures that an organization sets for itself and others should be specific, measurable, and evaluated at regular intervals, and whatever measures are selected should be enforced(Lu & Swaminathan, 2015).

An effective performance measurement system ought to cover all aspects of performance that are relevant to the existence of an organization and how it achieves success and growth (Zamparini, 2010). This means that any performance measurement system ought to include more than just financial measures. This point is well established as many authors contend that any credible model of performance measurement must have more than one criterion.

2.4. Empirical Review

Truong et al., (2017) conducted a study titled "Supply chain management practices and firms' operational performance". The study consolidated relationships between supply chain management practices and operational performance. the result confirms that SCM practices have a resonant influence on operational performance explained by a 52.6 percent variance of this output concept. Particularly, customer focus, and supplier management both have direct and indirect impacts on operational performance while top management support and process control/improvement only have indirect and direct influences on OP, respectively. Even if this study is conducted to examine the effects of SCM practices and firms' OP, it doesn't consider supply chain management strategies (SCMS), which facilitate supply chain management practices. The effect of SCMS on operational performance shall also be studied.

Sajja (2021)conducted a study titled "Impact of Supply Chain Management Strategies on Business Performance" to examine the impact of SCM on the operational performance of SMEs in the United States, with a focus on organizational skills. The research indicates that implementing SCM methods enhances company performance and is linked to competencies such as R&D, technology commercialization, manufacturing capacity, and marketing capabilities. As a result, a combination of SCM techniques and organizational skills may help SMEs achieve long-term overall company success. This study's findings demonstrate that SCM strategies had a major impact on SMEs' organizational capabilities. Even though this study analyzed SCM strategies' effect on company performance. it fails to see the operational performance perspectives. Thus, a study to analyze the effect of SCM strategies on OP is also needed. OP is the process of measuring a firm's performance against standard or prescribed indicators of effectiveness, efficiency, and environmental responsibility.

Lee (2021) carried out a study titled "The Effect of Supply Chain Management Strategy on Operational and Financial Performance" This study aims to examine the effects of SCM strategies on the OP of SMEs in Korea, particularly regarding organizational competencies. The finding demonstrated that SCM strategies had a significant effect on Operational performance. Thus, according to the finding, the study demonstrates that introducing SCM strategies directly improves business performance and is closely related to competencies such as technology

commercialization, research and development, production capability, and marketing capabilities. Yet this study was conducted from a developed country's perspective by using SMEs as a unit of analysis. Therefore, it is difficult to generalize the case for developing countries or large manufacturing firms. Thus, a study to fill such gaps is essential.

In Ethiopia Demoz (2021), conducted a study titled "The Effect of Supply Chain Strategies on Organizational Performance: in Steely R.M.I Plc Debre Zeyit, Ethiopia". This study aimed to examine the effects of Supply chain management strategy on the performance of STEELY R.M.I PLC (Rolling Mill and Melting Factory). A statistically significant relationship was found between Supply chain management strategy and organizational performance. the study uses an outsourcing strategy, customer service strategy, channel strategy, and asset network as supply chain strategies. Whereas, other SCM strategies shall be included in studies like VMI, ERP, CPFR, and others. In addition, this study was try to generalize the theory by using a single case company. Case studies lack scientific rigor and cannot be generalized to the broader population due to its lack of scientific rigor. Thus, a study that considered filling those gaps is reasonable to conduct.

2.5. Hypothesis formulation and Conceptual frame work

2.5.1. VMI and Operational Performance

The study of Lee (2021) confirms that firms with SCM strategies, like VMI, had relatively higher organizational performances than those without SCM strategies. According to the study of Owusu Kwateng et al., (2022), VMI significantly affects OP. The study of Opoku et al., (2020) also confirms this theory. The study found all the different inventory management practices including VMI to be significantly associated with promoting the operational performance levels of Ghana's manufacturing firms.

H_1: Vendor-managed inventory has a positive effect on operational performance

2.5.2. ERP and Operational Performance

Based on the study of Acar et al., (2017), ERP practices have no direct impact on OP. However; the study (Madapusi & D'Souza, 2012) analyzed the relationship between the implementation status of the ERP system and changes in performance. The result suggests when the implementation level of the ERP system increases, OP is significantly influenced. This is also supported by (Lee, 2021). As part of the supply chain strategies of the ERP system has a positive effect on OP.

H_2: ERP has a positive effect on operational performance

2.5.3. CPFR and Operational Performance

CPFR is one of the SCM strategies that have been increasingly popular in many supply chains. The study of (Hill et al., 2018) provides systematic empirical evidence on the effect of the CPFR program on firms' performances. The study examines the relationship between CPFR adoption and the firm's operational performance levels. The result indicates having implemented CPFR firms can gain significant benefits in their operational performance. This result has been also proved by (Lee, 2021)

H_3: CPFR has a positive effect on operational performance

2.5.4. WMS and Operational Performance

As to Kuruba et al., (2019), WMS has a positive effect on business performance. Based on the study It was noted that the lack of technology usage in warehouse operations hinders some activities like order picking and order checking to be carried out effectively. Besides, the study of Minashkina & Happonen, (2020), the result confirms, WMS is not just a tool to bring efficiency to warehouse processes, but it also adds value to the decarburization of warehouse operations. A good warehouse management system reduces space waste, and unnecessary material movements, and keeps heating and cooling costs to a minimum by reducing space waste and unnecessary material movements.

H_4: WMS has a positive effect on operational performance

2.5.5. Outsourcing and Operational Performance

The study by Nyameboame & Haddud (2017) revealed that most of the outsourced activities including information technology, transport services, consulting and business consulting services, system infrastructure, and others were reducing operational costs, providing consistent and improved service delivery, avoiding major investment costs in technology so that operational performance can be better through outsourcing. The finding is also supported by (Lee, 2021; Nazeri et al., 2012)

H_5: Outsourcing has a positive effect on operational performance

Conceptual frame work

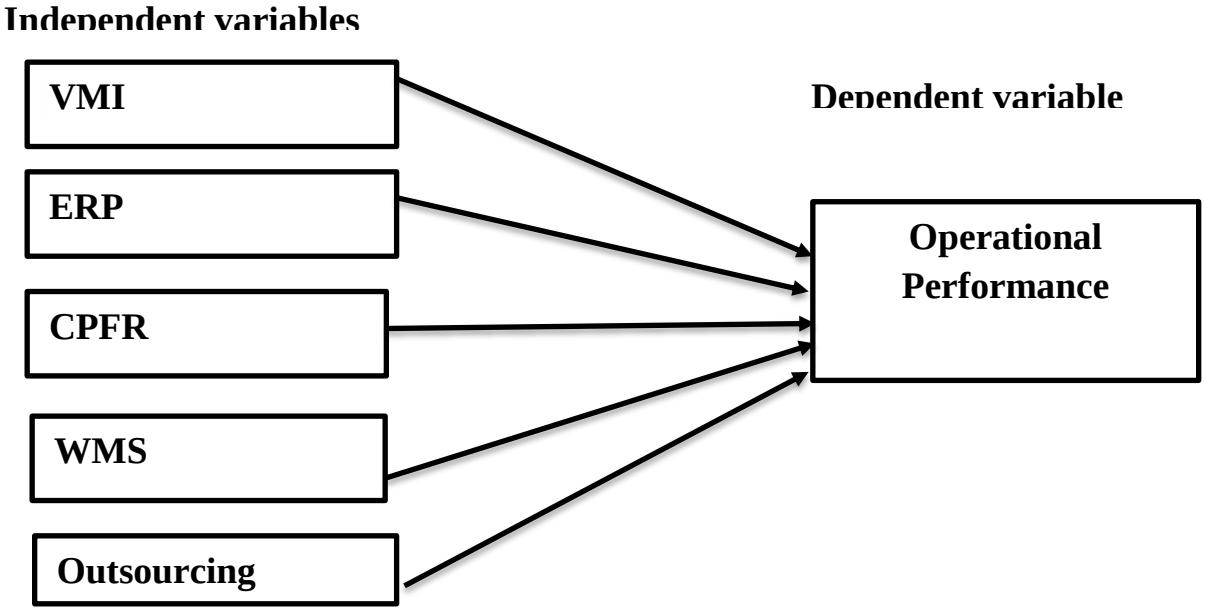

Figure 2. 1: Conceptual Framework

Source: developed from literature

CHAPTER THREE: RESEARCH METHODOLOGY

3.1. Research approach

Research approaches are plans and procedures for research that span the steps from broad assumptions to detailed methods of data collection, analysis, and interpretation (Creswell, 2014). There are three approaches in research namely qualitative, quantitative, and mixed research approaches (Kothari, 2004).

This study was adopting a quantitative research approach. Since, quantitative research is an approach to testing objective theories by examining the relationship among variables (Creswell, 2014). Quantitative study designs are specific, well structured, have been tested for their validity and reliability, and can be explicitly defined and recognized (Kothari, 2004). This study aims to examine the effects of Supply chain management strategies on the operational performance of LMF of DBT. From the nature of the study and previous literature works, it is obvious that the aim demands a quantitative answer.

3.2. Research design

Research design is the arrangement of conditions for the collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. The research design is the conceptual structure within which research is conducted; it constitutes the blueprint for the collection, measurement, and analysis of data (Kothari, 2004). As explained by Creswell (2014), there are three possible forms of research design: exploratory, descriptive, and explanatory.

This study aims to examine the effects of Supply chain management strategy on the operational performance of LMF of DB. Therefore, a choice for explanatory design is appropriate, since explanatory/Hypothesis-testing research studies are those where the researcher tests the hypotheses of causal relationships between variables. Such studies require a procedure that not only reduces bias and increases reliability but is permitting drawing inferences about causality (Kothari, 2004).

3.3. Population, sampling technique, and sample size

3.3.1. Target Population

The target population is the total number of subjects targeted by the study or the group of elements to which the researcher wants to conclude (Creswell, 2014). Accordingly, the target area for this study was Employees of large manufacturing firms located in Debre Berhan. The large manufacturing firm is well organized and can perform supply chain strategies more than small and medium enterprises. Besides, on the information obtained from the Debre Berhan investment bureau, it is also difficult to get the address of small and medium enterprises. That is why the researcher decides to choose large manufacturing firms. In addition, the researcher can collect sufficient data to attain the aim of the study from LMF**.**

3.3.2. Sample size and Sampling Technique

To determine the sample size economically (Yamane, 1973) formula is preferred and used by the current research as a method to determine sample size. According to him, this study applied the simplified formula to determine the required sample size at a 95% confidence level, and allowable error = 5%. The total numbers of permanent employees who work in large manufacturing firms in Debre Birhan town are 987.

$$n = \frac{N}{1 + N(\varepsilon)^2}$$

$$= \frac{966}{1 + 966(0.05)^2}$$

$$n = 282.8, = 283$$

To acquire data from those firms proportional Stratified sampling techniques were employed. The researcher used stratified random sampling because, the stratified sampling technique is generally applied to obtain a representative sample size from each firm and able to acquire relevant information from the concerned body (Creswell, 2014).

Table 3. 1: Sample size proportion for firms

Firms Name	Total permeant employees	Sample proportion	Allocated Sample
Amayra Textile	46	(46*283)/966	13
Dashen Brewery factory	292	(292*283)/966	86
R.Z.X Blanket Factory	15	(15*283)/966	4
Juniper Glass Factory	217	(217*283)/966	64
Azela Electronics	15	(15*283)/966	4
Habesha Berwery Factory	115	(115*283)/966	34
Debre Berhan wood processing plc	177	(177*283)/966	52
Hibret manufacturing	27	(27*283)/966	8
Etal Aluminium	62	(62*283)/966	18
Total	966		**283**

Source: Factories Human Resource (2022)

3.4. Data sources and collection Tools

3.4.1. Data sources

There are two types of data collection methods to be used for the study that is primary and secondary. The primary data are those which are collected fresh and for the first time and thus happen to be original. whereas, secondary data means data that are already available i.e. they refer to the data which have already been collected and analyzed by someone else (Kothari, 2004). In this study, the researcher used primary sources of data.

3.4.2. Data collection Tools

A data collection instrument is an instrument used to collect data in an ideal and systematic manner for the investigation. It can be interviews, questionnaires, schedules, observations, and available (Kothari, 2004). For this study, a questionnaire was used to collect primary data. Questionnaires are preferred. According to Henson (2001), it is an effective data collection

instrument that allows respondents to give much of their opinions about the researched problem. The data were collected through structured self-administered questionnaires that were distributed to employees of LMF. The researcher has used only close-ended questionnaires with a 5-point Likert scale to collect data from the sample of the respondents. The questionnaires have 5 rating scales ranging from 1-5.

3.5. Test of Validity and Reliability

Whether the planning of a research project or interpreting the findings of a work, determining the impact of the results is dependent upon two concepts: validity and reliability. Reliability and validity are ways of verifying and disseminating the rigor of research processes and the trustworthiness of research findings (Roberts et al., 2006).

3.5.1. Reliability

Reliability refers to the stability, consistency, or dependability of the data. Whenever a researcher measures a variable, he or she shall be sure that the measurement result is dependable and consistent results (Cooper & Schindler 2006)

In this study, reliability was measured by Cronbach's alpha coefficient which measures inter-item reliability or the degree of internal consistency between variables measuring one factor. i.e. the extent to which various items measuring the same variable attain consistent results. This coefficient result lies between 0 and 1. A value of 0.7 or more generally indicates satisfactory internal consistency (Hair et al., 2006).

3.5.2. Validity

Validity gives details of how well the collected data covers the actual area of investigation. It means to measure what is intended to be measured. A measure is valid if it measures what it is supposed to measure (Roberts et al., 2006). In this research, to confirm whether the collected data covers the actual area or not, content validity was utilized. The researcher measured the content validity of the questioners by selecting some academic staff to make some wording adjustments and to avoid jargon words and languages. Besides, factor loadings were utilized to test convergent validity. Factor loading value less than 0.5 means that violation of the

assumption for convergent validity (Hair et al., 2006). Convergent validity refers to how closely a test is related to other tests that measure the same constructs.

3.6. Test for Assumptions

Before proceeding to regression analysis the following assumptions were tested

Normality: Multiple regressions assume that the residuals are normally distributed. This assumption was tested by using a normality curve (Das & Imon, 2016). The normal distribution is a continuous probability distribution that is symmetrical on both sides of the mean, so the right side of the center is a mirror image of the left side.

Linearity: There must be a linear relationship between the Dependent and the independent variables. Scatterplots can show whether there is a linear relationship or not. The relationship between supply chain strategies and operational performance could be a straight line, suggesting that the relationship between these variables is linear (Das & Imon, 2016).

Multicollinearity: Multiple regressions assume that the independent variables are not highly correlated with each other. This assumption was tested by using the Variance Inflation Factor (VIF) values, and tolerance. It is safe to conclude that there is no collinearity within the data when the VIF value is well below 10 and the tolerance statistic is well above 0.2 (Field, 2009).

3.7. Data Analysis and Interpretation

In this study, a quantitative data analysis was conducted. The collected data were coded, entered into an SPSS version 23, and analyzed and presented in three types of statistical analysis i.e. descriptive statistics, correlation analysis, and multiple regression analysis.

Descriptive analysis is mostly concerned with the computation of certain indices or measures from the new data i.e. with descriptive analysis, the raw data is transformed into a form that will make them easy to understand & interpret (Zikmund et al., 2009). This study employed descriptive statistics to summarize the demographic data, which mostly used frequency of occurrence and percentages of the respondent's demographic characteristics.

Correlation analyses test the direction and strength of relationships between variables. The correlation coefficient (r) was calculated using the Pearson product-moment correlation coefficient. The output of the correlation coefficient lies between -1 and +1. A correlation coefficient of -1 indicates represents a perfect negative correlation while a correlation coefficient of + indicates a perfect positive correlation, and a correlation coefficient of 0 represents no relationship (Zikmund et al., 2009).

Multiple regression analysis refers to finding a cause-and-effect relationship between variables and forming a model. There following is the model which was developed by Multiple regression analysis.

$$\mathbf{Y = \beta 0 + \beta 1 X_1 + \beta 2 X_2 + \beta 3 X_3 + \beta 4 X_4 + \beta X_5 + } \boldsymbol{e}$$

Where; Y = Operational performance

X_1 = VMI

X_2 = ERP

X_3 = CPFR

X_4 = WMS

X_5 = Outsourcing

3.8. Ethical consideration

Ethics are standards or norms of behavior that give moral preference about one behavior and relationship with others. The aim of ethics in research is to ensure that no one is harmed or suffers adverse consequences of research activities. Thus, the goal of every research is to yield data that is obtained ethically (Kothari, 2004). beginning until the completion of the study in all cases the researcher were care of the personality of the individual or subject. In data collection, appropriate ethical clearance was obtained from Debre Berhan University college of business and Economics department of logistics and supply chain management. Confidentiality was ensured for the information by not recording the name of the respondent or other identifiers. While conducting the research, respondents were informed that the data collection process was carried out whenever they were willing to cooperate. In addition to this, any information collected via the instrument would never be used for any other purpose other than its academic intent i.e. the data would be kept confidential.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS, AND INTERPRETATION

4.1. Introduction

In this study, the researcher examined the effect of the supply chain management strategies on operational performance in the LMF of DB. To achieve this, data were collected from the employees of large manufacturing firms of Debre Berhan. Throughout this chapter, the collected data are analyzed and interpreted. The data were analyzed and presented in the form of descriptive statistics for the demographic characteristics, correlation to show the relationship, and linear regression to test the hypothesis. The analysis and interpretation of data were guided by the research objectives from which a discussion of findings has been made.

4.2. Descriptive Analysis

4.2.1. Response Rate

To achieve the aim of this study, a total of 283 questionnaires were distributed to the sample respondents. Of the total questionnaires 245 were returned, 3 questionnaires were missed, and 38 questionnaires were not returned. Thus, the researcher utilized 242 (85.51%) questionnaires for analysis.

4.2.2. Demographic Characteristics

The purpose of this section is to describe the characteristics of the sample respondents such as the proportion of males and females in the sample, the respondent's academic qualification, and their experience. Consequently, these variables are described in the tables shown below.

a. Gender of respondents

As indicated in table 4.1 below from 242 respondents 181 (63.73%) of the respondents were male and 61(37.27%) of respondents were female. This implies the majority of the respondents were male.

Table 4. 1: Gender of respondents

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	181	74.8	74.8	74.8
	Female	61	25.2	25.2	100.0
	Total	242	100.0	100.0	

b. Experience of respondents

Table 4. 2: Experience of respondents

Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 year and below	16	6.6	6.6	6.6
	1-3 years	46	19.0	19.0	25.6
	3- 5years	89	36.8	36.8	62.4
	more than5	91	37.6	37.6	100.0
	Total	242	100.0	100.0	

The respondents were asked about their working experience in the organization that currently working on. The purpose of the question was to understand how long the respondents are knowing their organization. As depicted in the above table 180 (74.4%) of the respondents had more than three years of experience. Thus, the researcher can conclude that the majority of the respondents had sufficient information to provide about their organizations.

c. Academic qualification

It was important to see the academic background of respondents to confirm if they were equipped with relevant knowledge and skills for study or not. As shown in Table 4.3 below, the majority of respondents 146 (60.3%) were bachelor's degree holders followed by 72 (29.8%) master's degree holders and the remaining 9.9% of respondents had a college diploma. These findings implied that most of the respondents were qualified to understand the nature of the study problem. It confirms that respondents have technical knowledge of the study problem so that the researcher can gather reliable and accurate data on the problem under investigation.

Table 4. 3: Academic qualification

Qualifications

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	College diploma/TVET	24	9.9	9.9	9.9
	First degree/ BA/ BSC	146	60.3	60.3	70.2
	MA/MSC and above	72	29.8	29.8	100.0
	Total	242	100.0	100.0	

4.3. Test of reliability and validity

Table 4. 4: Test of Reliability

Reliability Statistics

Variables	Cronbach's Alpha	N of Items
VMI	.932	4
ERP	.863	4
CPFR	.870	4
WMS	.921	4
Outsourcing	.877	4
OP	.958	4
Overall	.913	24

Reliability measures how dependable or uniform the instrument is in measuring the given factor (Bolarinwa, 2015). In this study, reliability was measured by Cronbach alpha values. α measure of reliability that ranges from 0 to 1, with values greater than .70 deemed the lower limit of acceptability (Hair et al., 2006). As stated in the above table the value of this study lay between .863 and 958. Thus, the internal consistency of measurement items to measure a given contract is at an accepted level.

Validity describes governing whether the research accurately measures how truth full the research results are. It refers to the degree to which a study accurately reflects or assesses the specific concept that the researcher is attempting to measure (Kazemian, 2015).

In this study, the researcher used content validity through an exhaustive literature review. The researcher concluded that the best approach for measuring the variables of this study is through adopting previously established, well-trained, and utilized in a wide range of studies questionnaire. To ensure the internal validity of the questionnaire, the researcher was given the draft questionnaire to the advisor and logistics and supply chain management staff for examination and recommendations which are made part of the final questionnaire.

In addition, convergent validity was measured by factor loading. As shown in table 4.5, the results confirm that each measurement item has a factor loading > 0.7. It indicates a test that is designed to measure a particular construct correlates with other tests that assess the same or similar construct.

Table 4. 5: Rotated Component Matrix

Rotated Component Matrix[a]

	Component					
	1	2	3	4	5	6
VMI1	.918	.091	.073	.008	.108	-.009
VMI3	.916	.088	.107	-.022	.032	.017
VMI2	.912	.102	.086	-.037	.051	.019
VMI4	.869	.014	.029	.079	.023	-.056
WMS14	.088	.903	.149	.116	.125	.111
WMS2	.102	.870	.162	.111	.131	.074
WMS3	.061	.833	.137	.045	.213	.093
WMS1	.066	.828	.221	.112	.122	.046
OP1	.123	.251	.810	.244	.209	.234
OP4	.106	.267	.805	.237	.221	.228
OP2	.095	.213	.802	.276	.198	.269
OP3	.113	.207	.788	.271	.258	.256
CPFR1	.028	.039	.213	.820	.125	.150
CPFR2	.009	.105	.210	.803	.157	.152
CPFR4	-.020	.119	.186	.780	.077	.120
CPFR3	.011	.117	.113	.770	.242	.205
OUTSOURCING3	.037	.122	.097	.145	.820	.148
OUTSOURCING2	.092	.147	.212	.094	.803	.143
OUTSOURCING1	.011	.150	.120	.183	.802	.135
OUTSOURCING4	.111	.203	.266	.188	.742	.152
ERP4	-.009	.004	.123	.175	.162	.830
ERP1	.033	.094	.243	.195	.097	.814
ERP2	.051	.119	.225	.137	.109	.779
ERP3	-.111	.103	.116	.108	.177	.753

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

4.4. Inferential analysis

4.4.1. Test for Assumption

4.4.1.1. Normality

According to Hair et al. (2010), normality is the most important of the three aforementioned assumptions in multivariate analysis and pertains to the bell-like shape of the distribution. The variables in the multiple linear regression models must follow the normal distribution. Normality states that the distribution of errors of prediction is independently and normally distributed across all levels of the dependent variable. The bell shape of the normal distribution can be accessed along two dimensions; its degree of flatness or Preakness (i.e. kurtosis) and its lack of balance (i.e. skewness). To check the normality of variables which is incorporated in the multiple linear regression model results were shown in the following diagram.

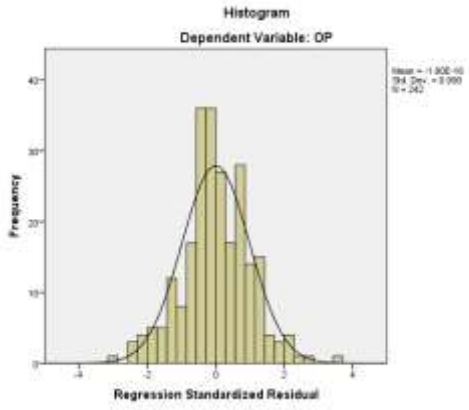

Figure 4. 1: Histogram, normality test

Linearity

Linearity defines the dependent variable as a linear function of the predictor variables (Darlington, 1968). The model should be linear in the parameters regardless of whether the explanatory and the dependent variables are linear or not. This is because of the difficulty to estimate the parameters if they are non-linear and do not know their value given with data of both dependent and independent variables. Plot the standardized residuals against the standardized predicted values to check for linearity and equality of variances. From the diagram below the data is distributed without any increment or decrement. This indicates the dependent and independent variables are linear.

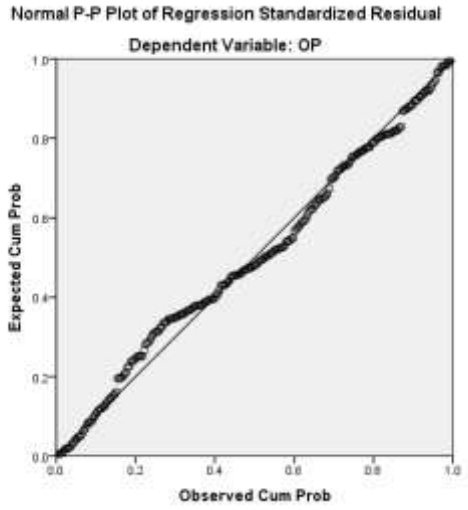

Figure 4. 2: PP plot, linearity test

Multicollinearity test

Multicollinearity occurs when two or more predictors in the model are correlated and provided redundant information about the response. It is a situation where the variables are too highly correlated. The diagnostic variance inflation factor (VIF) and tolerance value are commonly used measurements of the multicollinearity test. Multicollinearity is present when the VIF for at least one of the independent variables is large. The rule of thumb is VIF > 4 and or tolerance value below 0.25 suggests a problem with multicollinearity.

Table 4. 6: Multicollinearity test

Collinearity Statistics		
Variables	Tolerance	VIF
VMI	.952	1.051
ERP	.752	1.330
CPFR	.729	1.371
WMS	.797	1.254
Outsourcing	.685	1.460

As depicted in the above table VIF values are below 4 and the tolerance value is greater than 0.25. Thus, there is no issue of multipotentiality.

An example of homoscedasticity is when the error term (that is, random disturbance in the relationship between the independent variables and the dependent variables) is constant across all independent variables. Standardized scatter plots are the best way to detect homoscedasticity (Garson, 2012). Based on the result of this study shown in the figure below there is no issue of homoscedasticity i.e. points were fairly randomly distributed at all values of the predictor variables. All assumptions of multiple regressions were fulfilled. Thus, the researcher can process the regression analysis to examine the research hypothesis.

4.4.2. Correlation analysis

Correlation measures the extent of correspondence between two or more variables. This study measures the correspondence between supply chain strategy and operational performance. The researcher used Pearson's correlation coefficient (r), to express the strength of the relationship. The value of r always lies between –1 and 1. If Y & X are two variables and Y increases when X increases, we say that there is a positive or direct correlation between them. However, if Y decreases when X increases (or vice versa), then we say that they are negatively or inversely correlated.

Table 4. 7: Correlation analysis

Correlations							
		VMI	ERP	CPFR	WMS	OutS.	OP
VMI	Pearson Correlation	**1**					
	Sig. (2-tailed)						
ERP	Pearson Correlation	.017	**1**				
	Sig. (2-tailed)	.792					
CPFR	Pearson Correlation	.050	.428**	**1**			
	Sig. (2-tailed)	.435	.000				
WMS	Pearson Correlation	.189**	.259**	.292**	**1**		
	Sig. (2-tailed)	.003	.000	.000			
OutS.	Pearson Correlation	.157*	.401**	.427**	.403**	**1**	
	Sig. (2-tailed)	.014	.000	.000	.000		
OP	Pearson Correlation	.218**	.534**	.552**	.498**	.533**	**1**
	Sig. (2-tailed)	.001	.000	.000	.000	.000	
**. Correlation is significant at the 0.01 level (2-tailed).							
*. Correlation is significant at the 0.05 level (2-tailed).							

The range of correlation coefficient with a value of 0.19 and below is very low, with a value of 0.20 to 0.39 low, 0.40 to 0.69 modest, 0.70 to 0.89 high, and 0.90 to 1 very high Cohen and Holidays (1982).

In this section, correlation analysis was conducted in light of each research objective and hypothesis i.e. to measure the relationship between supply chain strategy and firms' operational performance by using correlation analysis. This provided correlation coefficients that indicate the strength and direction of the relationship. The p-value also indicated the probability of this relationship's significance at $p < 0.001$.

4.4.3. Multiple linier regression

4.4.3.1. Model Summary

Table 4. 8: Model Summary

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.741[a]	.549	.539	.72144

a. Predictors: (Constant), Outsourcing, VMI, ERP, WMS, CPFR

b. Dependent Variable: OP

As displayed in the above table the multiple correlation coefficient R, indicates a robust correlation between supply chain strategies and firms' operational performance i.e. .74.1 (74.1%). Besides, the R2 value of .549 (54.9%), implies the contribution of supply chain strategy on operational performance, the remaining 45.1% of the changes can be expressed by other factors, or the R Square statistic reports the proportion of explained variance in the dependent variable that is accounted for by the independent variables.

The Std. the error of the Estimate value .72144 implies regression model fits a dataset very well. With a 95% confidence level, 95% of all sample means will be expected to lie within a confidence interval of ± 1.96 standard errors of the sample mean. Based on random sampling, the true population parameter is also estimated to lie within this range with 95% confidence.

`

Table 4. 9: ANOVA

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	149.545	5	29.909	57.465	.000[b]
	Residual	122.832	236	.520		
	Total	272.377	241			

a. Dependent Variable: OP

b. Predictors: (Constant), Outsourcing, VMI, ERP, WMS, CPFR

The regression model's overall fit can be examined with the help of ANOVA. The table shows that the independent variables were statistically significant to predict the dependent variable, F =57.465, at p < .001 (i.e., the regression model was a good fit for the data). So, it can be said that there was a relationship between supply chain strategies and firms' operational performance.

Table 4. 10: Coefficients

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.686	.253		-2.716	.007
	VMI	.129	.047	.123	2.742	.007
	ERP	.317	.058	.275	5.458	.000
	CPFR	.309	.057	.277	5.409	.000
	WMS	.261	.051	.249	5.082	.000
	Outsourcing	.196	.056	.185	3.496	.001

a. Dependent Variable: OP

In the regression model, the standardized coefficient (β) of VMI, ERP, CPFR, WMS, and Outsourcing shows the relative influence on operational performance. ERP has a standardized beta value of β=.317. it has the most positive influential effect on operational performance, followed by CPFR(β=.309). Further, VMI (β=.129) had the least positive influence on operational performance while other attributes had an effect between the two points.

The significance tests of all 5 hypotheses indicate that all of the explanatory variables are significant with a p-value (P<0.05) for predicting operational performance. As it is defined in

chapter three, the unstandardized coefficients (β1 up to β5) are the coefficients of the estimated regression model. Hence, by including the error term *e* the model operational performance can be written as;

OP = **-.686 + .129VMI + .317ERP + .309 CPFR+ .261WMS + .196Outsourcing + .72144**

4.5. Hypothesis testing and Discussion of the Results

The study results show that all supply chain management strategies included in this model have a significant positive effect on firms' operational performance. These results are nearly the same as in previous research by Leen (2021) and other studies conducted on the topic.

H1: Vendor-managed inventory has a positive effect on operational performance

As stated in the table above the result of regression analysis revealed that Vendor managed inventory has a statistically significant positive effect on the operational performance of large manufacturing firms with β value of .129 at $p < 0.05$. as the significant value is met the requirement which is the value of significant at p less than 0.05. Therefore, this alternative hypothesis **(H1) is accepted**.

The result is supported by previous studies conducted by (Lee, 2021; Opoku et al., 2020; Owusu Kwateng et al., 2022). Those studies found VMI significantly and positively affects operational performance.

H2: Enterprise Resource Planning has a positive effect on operational performance

The result of regression analysis revealed that there is an impact of Enterprise Resource Planning on operational performance with β .317 at the significance level $p< 0.001$. Therefore, this hypothesis (H3) is accepted.

The study result is in contrast with Acar et al., (2017), who found ERP practices have no direct impact on OP. However, the result of this study is supported by the studies of Lee (2021) and Madapusi & D'Souza (2012). Those studies found ERP system has a positive effect on OP.

H3: Collaborative Planning, Forecasting, and Replenishment (CPFR) has a positive effect on operational performance

According to the finding of this study Collaborative Planning, Forecasting, and Replenishment strategy of firms positively affect operational performance with β .309 at $p < 0.001$. Thus, H3 is accepted. Findings from Hill et al., (2018) and Lee (2021) support the result of this study. The result indicates that implementing CPFR firms can benefit their operational performance significantly. Thus, to increase firms' operational performance, they should Plan, Forecast, and Replenish material flow with their supply chain collaboratively.

H4: warehouse management system (WMS) has a positive effect on operational performance

The multiple regression analysis was employed to determine whether WMS affects operational performance; the result of regression analysis demonstrated that the warehouse management system affects operational performance with β =.261at the significance level $p < (.001)$. Therefore, this hypothesis is supported and met the requirement so, accepted.

The result of this study is in line with the results of (Kuruba et al., 2019; Lee, 2021; Minashkina & Happonen, 2020). The result of Minashkina & Happonen (2020) found as well as improving warehouse processes, WMS also contributes to decarburizing warehouse operations. In addition, it increases firms' operational performance. This result is also supported by (Kuruba et al., 2019; Lee, 2021).

H5: Outsourcing has a positive effect on operational performance

As shown in Table (4-10) outsourcing affects operational performance with β =196. The hypothesis is accepted because the result of significance is less than 0.05 (Significance requirement standard < 0.05).

A study by Nyameboame & Haddud (2017) found that outsourcing most information technology, transportation services, consulting and business consulting services, system infrastructure, and others helped companies reduce operational costs, improve service delivery consistency, reduce significant technology investment, improve operational performance and reduce operational costs. Additionally, (Lee, 2021; Nazeri et al., 2012) support the finding.

CHAPTER FIVE

5. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The objective of this study is to examine the effects of Supply chain management strategy on the Operational performance of large manufacturing firms of Debre Berhan. A questionnaire was used as a research tool for collecting data. The analysis was made using descriptive statistics for analyzing the demographic characteristics of the respondents and the significant relationship of the independent variables with the dependent variable was analyzed by using inferential statistics (correlation and multiple linear regression analysis). This chapter provides a summary of the major findings, conclusions, and recommendations of the study.

5.1. Summary of Major Findings

- The demographic characteristics of respondents were analyzed by descriptive statistics". the result confirmed that 181 (63.73%) of the respondents were male, while the remaining 61(37.27%) were female respondents. Besides, the large number of respondents who participated in the study survey, 180 (74.4%) had experienced more than 3 years. Concerning their qualification level, the respondents had a minimum of a diploma while most of the respondents had a BA/BSc degree and above. The researcher can infer large manufacturing firms are stacked with educated employees. As a result, they had adequate exposure to the work and had the potential to bring change to the company, which reasonably increases the validity (the quality of the research as a whole).
- The correlation between the construct of supply chain strategies with operational performance is demonstrated by the correlation matrix between each construct of SCS and OP. the result confirmed that all dimensions of SCS were positively related to the OP with a high Pearson correlation coefficient and significance level is less than 0.005.
- The t-test results for each regression coefficient i.e. VMI, ERP, CPFR, WMS, and Outsourcing were 2.742, 5.458, 5.409, 5.082, and 3.496 respectively, this indicates that the probability of those results occurring by chance was less than 0.005 while the regression coefficient of each variable was statistically significant at $p< 0.005$ level. Likewise, the value of regression analysis confirms that all variables mentioned in this model have a statistically significant effect on operational performance.

5.2. Conclusions

The study aimed to examine the effect of supply chain management strategies on operational performance. To achieve this aim employees of large manufacturing firms in Debre Berhan town were used as a unit of analysis. Based on the results of this study, the following conclusions are derived.

- First, the study contributed to the existing research regarding supply chain strategies by examining the effect of supply chain strategies on operational performance. This result demonstrated that VMI, ERP, CPFR, WMS, and Outsourcing have a positive effect on operational performance.
- Second, the result of the hypothesis test indicates that all supply chain strategies mentioned in this model have a statistically significant effect on operational performance. Thus, from the finding, the researcher can conclude that supply chain strategies are a good indicator of operational performance.

5.3. Recommendations

The finding of this study, supply chain strategies have a strong and positive correlation with operational performance. Based on the findings of the study the following recommendations are made:

- As it was found, Vendor managed inventory is one of the very important factors that affect the operational performance of firms. Thus, to increase their operational performance firms can utilize VMI strategies. VMI strategies can be increased by building a VMI system infrastructure for continuous maintenance, actively using the VMI system, improving work efficiency by using the VMI system, and increasing productivity by using the VMI system.
- According to the finding of this study, to have a good operational performance, Enterprise resource planning contributes a crucial role. Accordingly, firms shall utilize ERP systems to increase their operational performance. Firms can utilize an ERP system by building an ERP system infrastructure for continuous maintenance, actively using the ERP system after persuading business parties and stakeholders of its importance,

improving work efficiency by using the VMI system, and increasing productivity by using the ERP system.

- Collaborative Planning, Forecasting, and Replenishment are important factors to increase operational performance in large manufacturing firms. Therefore, firms should utilize it. to improve CPFR firms can build a CPFR system infrastructure for continuous maintenance, use the CPFR system after persuading business parties and stakeholders of its importance, improve work efficiency by using the CPFR system, and increase productivity by using the CPFR system.
- Based on the finding of this study warehouse management system has a statistically significant effect on operational performance. Thus, firms shall increase their WMS to increase their operational performance. WMS can be increased by building a WMS system infrastructure for continuous maintenance, actively using the WMS system after persuading business parties and stakeholders of its importance and improving work efficiency & productivity by using the WMS system.
- This study finds outsourcing has a positive effect on operational performance. Therefore firms shall increase their outsourcing strategies so that they can increase their operational performance. The outsourcing strategy can be improved by building an outsourcing infrastructure for continuous maintenance, actively using outsourcing after persuading business parties and stakeholders of its importance, and improving work efficiency & increasing productivity by using outsourcing.

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APPENDICES

DEBRE BERHAN UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

DEPARTMENT OF MANAGEMENT

Dear respondents, this questionnaire is to gather data on **the effect of supply chain management strategy on operation performance in the case of large manufacturing firms of Debre Berhan town** the partial fulfilment of MA degree in logistics and supply chain management at Debre Berhan University. The study is purely for academic purpose and thus not affects you in any cause. So, your genuine, frank and timely response is vital for successfulness of the study. Therefore, I kindly request you to respond each items of the question very carefully.

Thank you for scarifying your valuable time!

General Instructions

- ✓ No need of writing your name
- ✓ Where answer options are available please teak '**X'** in the appropriate box for part I, and
- ✓ Put '**X'** for in the intersection of the question and your agreement level to each statements of part II.

Part I. Respondents Profile

1. Gender

Male ☐ Female ☐

2. Work experience

1 year and below ☐ 3- 5years ☐

1-3 years ☐ more than5 ☐

3. Education qualification

Certificate and below ☐ first degree/ BA/ BSC ☐

College diploma/TVET ☐ MA/MSC and above ☐

Part II: Instruments for dependent and independent variables

The researcher would like to know your level of Agreements with the following scale questions.

Directions: using the key below, please mark on your best responses to the following statements on a scale of 1 to 5, where; 1. strongly disagree 2. Disagree 3- Neutral 4- Agree 5- Strongly agree

No.	**VMI**	Level of agreement				
		1	2	3	4	5
1.	Your firm has built a VMI system infrastructure for continuous maintenance.					
2.	Your firm is actively using the VMI system after persuading business parties and stakeholders of its importance.					
3.	Your firm has improved work efficiency by using the VMI system.					
4.	Your firm has increased productivity by using the VMI system.					
	ERP					
1.	Your firm has built an ERP system infrastructure for continuous maintenance.					
2.	Your firm is actively using the ERP system after persuading business parties and stakeholders of its importance.					
3.	Your firm has improved work efficiency by using the VMI system.					
4.	Your firm has increased productivity by using the ERP system.					
	CPFR					
1.	Your firm has built a CPFR system infrastructure for continuous maintenance					
2.	Your firm is actively using the CPFR system after persuading business parties and stakeholders of its importance.					
3.	Your firm has improved work efficiency by using the CPFR system					
4.	Your firm has increased productivity by using the CPFR system.					
	WMS					
	Your firm has built a WMS system infrastructure for continuous maintenance.					
	Your firm is actively using the WMS system after persuading business parties and stakeholders of its importance.					
	Your firm has improved work efficiency by using the WMS system.					
	Your firm has increased productivity by using the WMS system.					

	OUTSOURCING	Level of agreement				
		1	2	3	4	5
1.	You have built outsourcing infrastructure for continuous maintenance.					
2.	Your firm is actively using outsourcing after persuading business parties and stakeholders of its importance.					
3.	Your firm has improved work efficiency by using outsourcing.					
4.	Your firm has increased productivity by using outsourcing.					

Operational performance

No.	**Operational performance**	Level of agreement				
		1	2	3	4	5
1.	Your firm has generally reduced manufacturing costs per unit.					
2.	Your firm has decreased the defect rate of products.					
3.	Your firm has generally shortened the lead time and new product development cycle.					
4.	Your firm has improved flexibility in product design changes and production fluctuations.					

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