DIGITALIZATION OF SUPPLY CHAIN MANAGEMENT PRACTICES: CHALLENGES AND ENABLERS IN SELECTED COMPANIES IN ETHIOPIA

A Thesis Submitted to the Addis Ababa University School of Commerce for the Partial Fulfillment of the Requirements for the Degree of Master of Arts in Logistics and Supply Chain Management

BY

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DECLARATION

I, the undersigned, declare that this thesis entitled “digitalization of supply chain management practice; challenges and enablers in selected companies in Ethiopia “is my original work, has not been presented for a degree in this or any other university, and all sources of materials used for the thesis have been fully acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institution to earn any type of degree.

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Signature:

Place: Addis Ababa University

Date of Submission: September 2022

This thesis has been submitted for examination with my approval as a university advisor.

…… _____ _____

Advisor’s Name Signature Date

CERTIFICATION

ADDIS ABABA UNIVERSITY

DEPARTMENT SUPPLY CHAIN MANAGEMENT

This is to certify that the thesis prepared by Henok Bogale entitled "digitalization of supply chain management practice; challenges and enablers in selected companies in Ethiopia**"** and submitted in partial fulfillment of the requirement for the degree of master of art in Logistics and supply chain management complies with the regulation post-graduated program of Addis Ababa university and meets the accepted standards concerning to originality and quality.

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Internal Examiner: _____ Signature _____ Date _____

Advisor: _____ Signature _____ Date_____

Name of Chairman _____ Signature _____ Date_____

ACRONYMS AND ABBREVIATIONS

- CAD= Computer-Aided Design
- CNC= Computerized Numerical Control
- CPPS= Cyber-Physical Production System
- CPS= Cyber-Physical Systems
- CRM= Customer Relationship Management
- DSCM= Digitalization Supply Chain Management
- ERP= Enterprise Resource Planning
- ESLSE = Ethiopian Shipping and logistics service Enterprise
- IoS= Internet of Services
- IoT= Internet of Things
- IT= Information Technology
- KPI= Key Performance Factors
- LSP= Logistic Service Providers
- MES= Manufacturing Execution System
- MOTL = Ministry of Transport and Logistics
- PCA= Principal Component Analysis
- SC= Supply Chain
- SCM= Supply Chain Management
- SOA= Service-Oriented Architecture
- WIP= Work Instruction Package

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ABSTRACT

Almost all organization needs supply chain management, as a critical component. Supply chain management includes logistics strategy, design, operation, and monitoring, acquisition, warehousing, inventory management, production, distribution, other business activities and fulfillment of orders. Digitalization of supply chain management is one of the most effective approaches for any firms to improve their organizational performance and remain competitive. But organizations in Ethiopia cannot fully implement supply chain management digitalization. On this study the researcher was aiming to found out the practice of supply chain management digitalization its enablers and main challenges in the Ethiopian Ministry of Transport and Logistics and Ethiopian shipping and logistic enterprise. The researcher used a descriptive research design, and questioners were the main method of question. After the data was collected it was entered into SPSS for data analysis. Mean value and percentage was the main way of data interpretation and the analyzed data was depicted with tables and figures including pie chart, histogram, and bar graph. Before the actual data concerning the title of the study was analyzed the demographic profile of the respondents was depicted and explained. About the practice of supply chain management digitalization the researcher found out it was practiced moderately. Also, a lot of challenges were identified as a problem so the organizations are recommended to sole those challenges to address the implementation of supply chain management digitalization. Also, the organization should implement supply chain management digitalization fully, since there are a lot of enablers that force it to do so.

Keywords: Digitalization, Management, Supply, Enablers, Challenge, Practice

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

Almost all organization needs supply chain management, as critical component. Supply chain management includes logistics strategy, design, operation, and monitoring, acquisition, warehousing, inventory management, production, distribution, other business activities and fulfillment of orders (Lummus & Vokurka, 1999). Supply chain management (SCM), which covers all procedures that convert raw materials into finished commodities, is the handling of the movement of goods and services (LeMay, Helms, Kimball, & McMahon, 2017). It entails the deliberate simplification of a company's supply-side operations to optimize customer value and achieve a competitive edge on the market. Systems for managing the supply chain efficiently reduce costs, waste, and manufacturing cycle time. Digitalization leads to just-in-time distribution network, whereby retail sales immediately transmit replenishment requests to manufacturers, has emerged as an accepted practice. Then, store shelves can be refilled virtually as soon as merchandise is sold. Using the information from supply chain partner to determine where more changes made is one technique to further enhance this procedure(Attaran, 2012).

Modern supply chains are concerned on the administration of data, activities, and commodities organized into solutions, whereas yesterday's supply chains primarily concentrated on the existence, transportation, and pricing of tangible assets. Systems for managing the supply chain in the modern day involve a lot more than simply when and where. Qualities of goods and services, timing of delivery, expenses, client satisfaction, and ultimate profitability are all impacted by supply chain management(Ge et al., 2019). A digitalized supply chain made accessible 50 times more information in today’s technologically advanced world than it did only 10 years prior. Modern supply chain networks are controlled by data scientists and statistical professionals and make use of the enormous volumes of data produced on the stage of the supply chain. The future supply chain administrators will undoubtedly concentrate on maximizing the value of this

information by conducting real-time, low-latency analyses of it using the Enterprise Resource Planning (ERP) platforms they oversee(Foster, 2020).

According to (J. Gray & Rumpe, 2015) digitalization is indeed the transition to a digital business; it refers to the application of digital technologies to alter a business strategy and offer additional revenue and real worth options. As stated by (Savić, 2020) the term "digitalization" describes the use of digital technologies and computerized data to enable or improve processes. Digitalization consequently entails digitization. Simple example of this might include sequencing logic for a batch operation, automatic termination logic, PID management in a microprocessor-based machine, etc. It may also be something a little more complicated, such as a transmitter fault that results in the creation of a project schedule for a maintenance technician.

Conventional supply chains had to undergo huge shift as a result of the digital age. Critical supply chain activities are currently experiencing a hastened digitalization process(Attaran, 2020). One of the primary factors driving the progress of the supply chain is technologies and inventions. The term "digital supply chain" (DSC) refers to a service platform in which it is "customer-centric" so this absorbs and makes the best use of real-time or actual data from numerous sources. Demand stimulating, matching, detection, and administration are made possible, allowing for performance optimization and risk minimization(Rajkumar, 2021). traditional supply chain architecture are being replaced by sophisticated digital ones because to the use of digitalization like Big Data, Cloud, analysis tools powered by machine learning algorithm, and Internet of Things (IoT). Improved visibility, valuable insights, co - operation, and quicker response periods are made possible by this emerging digital supply chain (Chase 2019). Digital supply chain promotes greater competitiveness primarily by concurrently sending data in real time to numerous supply chain stakeholders (Whipple & Russell, 2007).

1.2 Problem Statement

Supply chain susceptibility has emerged as a significant concern for many firms in today's unpredictable and competitive marketplace. Due to worldwide procurement and the ongoing tendency of leaning down, the supply chain is currently growing more complicated, which is leading to a rise in supply chain concerns? Today's commercial organizations face the task of reducing that risk by building more robust supply chains. The factors driving firms' adoption of risk management strategies are global rivalry, technological change, and ongoing fight for competitive advantage (Patil, 2015). Industry's that has experienced significant internationalization has seen a rise in supply chain aspect that affects demand and supply uncertainty.

Customers are the utmost importance for ministry of transport and Ethiopian shipping and logistic enterprise; customer's satisfaction is of paramount importance to the shipping and logistic industry. In the logistic industry, customer-related activities such as production, transportation of goods and service are given utmost importance.

Avoiding time-consuming, wasteful, and pointless procedures that impose artificial barriers to acquisition of raw materials, order approval, and reconciliation is the first step in achieving meaningful performance improvement through supply chain digitalization (Omran, Henke, Heines, & Hofmann, 2017). And it all begins with gathering accurate, consistent data, classifying it, and then presenting it in insights that can be used. A lot of researcher find out how supply chain management digitalization be beneficial for organizations, this includes quicker decisions can be made supported by precise usage, cost, and overall performance interpretations, Reduction of effort redundancy caused by multiple departments entering the same data for various objectives, Minimal disruption as maintenance is better coordinated and part failure is predicted because of machine learning and analytical modeling(Barbosa-Povoa & Pinto, 2020).

A digital supply chain offers substantially more transparency into its constituent pieces and mechanical components than do traditional supply networks(Saqib, Saqib, & Ou, 2019). With real-time insight into supplier management, organizations are better able to spot any gaps that could lead to interruptions and fix them. According to (Min, Zacharia,

& Smith, 2019) digital supply chains are also more focused on the demands of the client, allowing businesses to better comprehend those needs and take steps to enhance user experiences.

The manifestation of digitalization According to (Fatorachian & Kazemi, 2021) business operations are automated as a result of digitalization, which enhances employee work performance, production, and competitiveness. Sensors and other digital instruments enable real-time stock control throughout the whole supply chain. In the end, electronic interconnectivity enables businesses to construct new business strategies and maximize the supply chain. Also (Tan & Zhan, 2017) states that the ability to detect performance bottlenecks, shorten time - to - market, speed up innovations, and boost return on invention are all made possible through enhanced data sharing and cooperation. Advanced analytic which depict data could also be offered via a digital supply chain, enabling users to make forecasts, learn from failures and make better decisions according to(Awan, Kanwal, Alawi, Huiskonen, & Dahanayake, 2021).

This implies that digitalization of supply chain management is one of the most effective approaches for any firms to improve their organizational performance and remain competitive. But organizations in Ethiopia cannot fully implement supply chain management digitalization. To find out the reason behind this issue conducting a scientific research is essential since enough research was not conducted on the digitalization of supply chain management practice its challenge and enablers in Ethiopia. Therefore, this study was all about assessing the practice identify the challenges and find out enablers of supply chain management digitalization ministry of transport and Ethiopian shipping and logistic enterprise; more to this, the paper was contribute to fill the gap that has been identified above.

1.3 Research Questions

1. How digitization of the supply chain management in Ethiopian ministry of transport and Ethiopian shipping and logistic enterprise is being practiced?
2. What are the challenges in supply chain management digitalization?
3. What are the enablers for supply chain management digitalization?

1.4 Research Objective

1.4.1 General Objective

The general objective of this research is to study the practice of supply chain management digitalization in Ethiopia including its enablers and challenges.

1.4.2 Specific Objectives

The specific objectives of the study are:

- To identify the current practice of supply chain management digitalization in Ethiopian ministry of Transport and Logistics MOTL and Ethiopian shipping and logistic Service enterprise ESLSE.
- To identify enablers for supply chain management digitalization in Ethiopian ministry of transport and Ethiopian shipping and logistic enterprise.
- To find out the likely barriers for supply chain management digitalization in the supply chain logistics industry.

1.5 Significance of the Study

Ethiopia has consistent economic growth in recent years. Supply chain plays an important role in enabling a rapid economic growth to ensure sustainable development. Yet, the Ethiopia has experienced poor supply chain performance against basic logistics performance indicators. This has become one of the hindrances to attract investment and a bottleneck for trade competitiveness of the country.

Nowadays it has become imperative to transform the country's supply chain system to a higher level to enable the logistics to play a significant role in facilitating the smooth flow of the country's international trade.

In this regard, reforms have become dire and urgent as ships carrying Ethiopian import cargo are staying for months at anchorage of destination ports thereby incurring huge logistics costs to the country. This has become not only a bottleneck for international

trade competitiveness but also a cause for misunderstanding with development partners and operators. Creating an enabling supply chain sector for the country has great impact for sustainable economic development.

Accordingly, Businesses can leverage supply chain in a variety of ways to gain an advantage over their competitors. They can streamline their core business, reduce transaction costs, and make intellectual property ownership and payments more transparent and automated through digitalization of supply chain (Felin and Lakhani 2018). Many researchers have discussed the application of supply chain. After analyzing these studies, the researcher believes that organizations can be beneficial by applying supply chain digitalization in their logistics system.

Recent adoptions of the Internet of Things and supply chain digitalization support better supply-chain provenance (Kim and Laskowski 2018). When the product goes from the manufacturer to the customer, important data are digitalize. Companies can get full information about their products if their supply chain system is digitalized.

1.6 Scope of the Study

The scope of this study is strictly limited only on the assessment of supply management digitalization practice, its enablers and challenges.

The study is conceptually limited to assessment of supply management digitalization practice, its enablers and challenges in addressing the logistic efficiency. Even if the supply chain management is a big concern, due to time and financial castrate, this study is geographically limited to selected organization in Ethiopia. Time constraint was prevented through proper review of empirical and theoretical data that are related to the study.

Methodologically, this study is aimed only to do assessment on supply chain management digitalization in Ethiopian, accordingly it was focused on secondary data sources and bench marking practices, the primary data source was through closed ended

questioners focused higher officials from Ministry of Transport and Ethiopian shipping and logistic enterprise respected concerned government offices.

For this thesis report, the researcher conducted extensive primary and secondary research. Under primary data collection, the researcher used closed ended questioners for senior management staffs from logistics sector including Ministry of Transport and Ethiopian shipping and logistic enterprise, these people was share their professional experiences that can help the researcher understand the business case for supply chain and identify core issues in its digitalization. It involved a lot of qualitative inputs to get a comprehensive understanding of the subject matter under study. For secondary data, the researcher referred to research material and books available through different library and also referred to online available papers, blogs, & articles.

1.7 Organization of the study

This study consists of five consecutive chapters. The first chapter included background of the study, statement of the problem, objectives of the study, significance of the study, scope of the study, limitation of the study delimitation of the study and definition of key terms. The next chapter, chapter two, deals with review of related literature. The third chapter is concerned about research methodology; chapter four is about analysis of data and the last chapter, chapter five, deals with summary, conclusion and recommendation of the study. Finally, lists of reference materials used in the study and questionnaires was attached to the research document.

CHAPTER TWO

LITERATURE REVIEW

2.1 Theoretical Literature Reviews

2.1.1. Supply Chain Overview

The collection of producers, suppliers, wholesalers, retailers, and companies that will provide shipping, data, and other integrated logistics services are collectively referred to as the supply chain, (Copacino, 2019). A supply chain for a company includes both internal and external partners. According to (Ayers & Odegaard, 2017) a supply chain is a set of life cycle operations that involve physical items, information, and capital inflows whose goal is to provide end users with the products and services they need from a network of connected, diversified providers.

The management difficulty of all businesses has been impacted by changes in the global business environment and greater organization-to-organization competition. (Kembro & Selviaridis, 2015) also noted that modern corporations must control both upstream enterprises or the distribution system that supply and provide after-market service to clients as well as suppliers who provide both direct and indirect contributions. Using this as a foundation, (Türkay, Saraçoğlu, & Arslan, 2016) provided a thorough definition of the supply chain as well as its strategic planning: The supply chain includes all processes involved in moving and transforming items from the stage of raw material (extraction) to end consumers, as well as the data flow related to those processes. Both data and materials move up and down the supply chain. The administration of technologies, activities, and assembling, procurement, production planning, order fulfillment, stock control, shipping, storage, and customer support are all included in the supply chain.

Fundamentally, supply chains are a network of connected providers. Supply chains are simply a network of interconnected suppliers and consumers, where each client serves as a provider to the company upstream before the completed product is delivered to the final end consumer.

Also (Mak & Max Shen, 2021) claim that the synchronization of businesses that deliver goods or services to marketplace is sometimes referred to as the "supply chain" idea. Producers, distributors, shippers, storage, distributors, retail, various intermediates, and even consumers themselves are all part of the supply chain. Any item transacted on the consumer goods market goes through a number of subsequent transactions on the marketplace for businesses to businesses as it develops from a raw material into finished items. For instance, whenever a final consumer buys a glass of Coca-Cola, they are not purchasing it straight from Coca-Cola; instead, they purchase it from a middleman (such as a super market or local store), and the item ends up going through many deals upon that market for business to business cycle Coca-Cola distributor, retail chain, ultimate customer, etc… (Felea & Albăstroiu, 2013). This shows what supply chain works.

A supply chain, on the other hand, is defined by (Doan, 2020) as including all relevant stakeholders involved directly or indirectly completing a client request. The supply chain in every business, such as a factory, entails all activities that go into receiving and completing a client request. New product creation, marketing, management, sales, financing, and customer support are just a few of these duties.

A traditional supply chain, according to (Bala, 2014), is a system of linkages for processing resources, information, and activities that exhibits supplier, transformations, and demand characteristic. The supply chain typically has three phases: manufacturing, transportation, and acquisition. According to, each of these steps could consist of a number of facilities spread across the globe (Felea & Albăstroiu, 2013). For instance, in the automobile sector, assembly factories are situated in different nations than the providers of specific parts, and marketing takes place on a global scale.

Depending on the number of participants and the diversity of the business processes, the supply chain might range from simple to complex; however there is always a core structure. The supply chain as a financial phenomenon still exist whether or not this entity manages the entire thread, and even if it is not controlled (J. V. Gray, Skowronski, Esenduran, & Johnny Rungtusanatham, 2013).

(Felea & Albăstroiu, 2013) a comprehensive supply chain framework can typically include three interconnected streams: economic, analytic, and resource. Financial flow includes payments made to supplier and also subcontractors for the products and service as well as payments made by customers to retailers for the finished product. Flow of materials have themselves three different phases, this are purchasing, transformation, and also distribution.

According to (Emmett & Crocker, 2016), the supply chain does not always go from the initial provider to the last client. For a variety of reason, including maintenance or repair, reprocessing, recycle, or destruction, products may move back up the supply chain. In areas like consumer happiness, recycle, and environmental conservation, the backward chain can sometimes be crucial.

Managing product returns, composting, reusing materials, sewage disposal, renovating, or reprocessing are some examples of related events that fall under the category of reverse logistics. Reverse logistics implies a collection of initiatives or competencies designed to move goods in the supply chain on the opposite direction (from consumer to manufacturer).

2.1.2. Definitions, Concepts and Drivers for Supply Chain Management Digitalization

The idea of supply chain management was first presented in the 1980s, and as a result of the focus it is receiving today, the definition has undergone a substantial amount of modification. The planning and oversight of item sourcing and the procurement, conversions, and logistics management operations are all included in supply chains management, according to (Anca, 2019).

It's significant that it also involves channel partners suppliers, middlemen, third-party service provider, and customers—in cooperation and also in coordination. Supply chain management essentially unifies both supply and demand control inside and among businesses.

Supply chain management, according to (Queiroz, Telles, & Bonilla, 2019), is the methodical, corporate strategy cooperation of traditional business function and the strategies across all these business function inside a specific organization and across business areas, with the goal of enhancing the lengthy efficiency of each individual industries and the whole supply chain management process in general.

To enhance customer satisfaction and gain an advantage over rivals, supply chain management is defined by (Al-Douri, 2018) as the administration of equipment, finance, men, and information inside and throughout the supply chain. In addition to dealing with supply and demand, it now comprises suppliers, logistics companies, consumers, and other participants; as a result, it is not a simple sequence but rather a complicated system (Al-Doori, 2019). Therefore, it is crucial to comprehend every supply chain participant who has direct or indirect impact on productivity in order to comprehend things better.

The goal of supply chain management is to analyze and oversee supply chain networks. This idea's justification is the possibility (alternative) of cost savings and improved customer service. Despite intense competition and often shifting client expectations, improving a company's competitiveness on a global scale is a crucial goal (Briggs, 2015).

By creating dedicated data model that gathers data through your whole supply chain also from some alternative entities, supply chain digitalization (also known as the process of supply chain digital transformation) is the way of converting analog supply chain activities into electronic versions or digital method according to (Schallmo & Daniel, 2018). Software's that focuses on automating by business intelligence whether out-of-the-box, customized, or a mixture of both, is the primary tool for supply chain digitalization.

Every industry are being disrupted by digitalization, but it is also having a transformative effect that creates value and networking advantages. Digitalization affects product management through improving product flow and usage, boosting system dependability, and enhancing supply chain efficiency and transparency(Attaran, 2020).

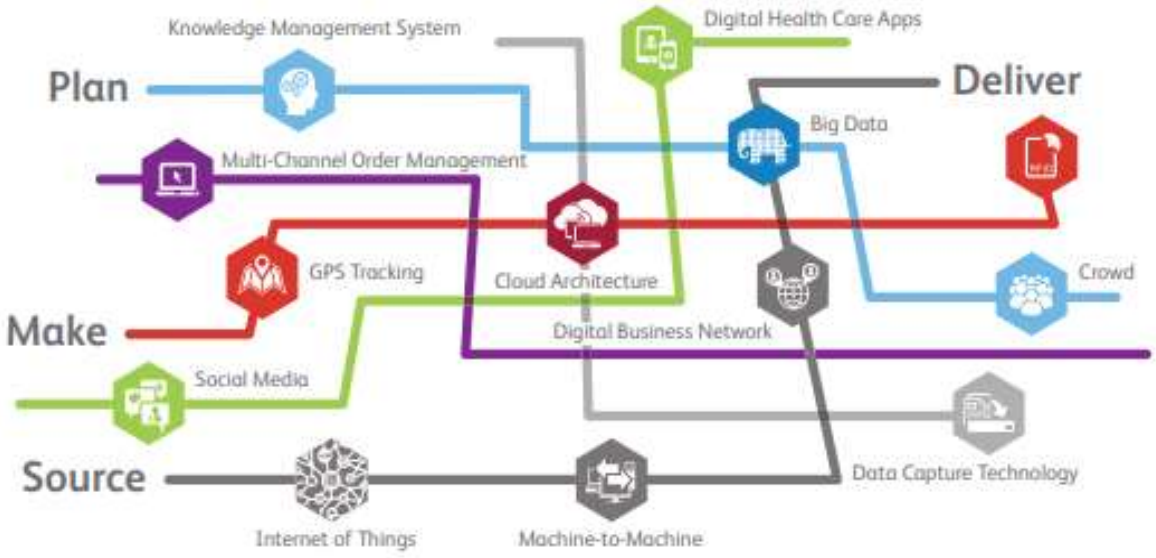


Figure 2.1 Digitalization Trends in Supply Chain Management

(Source: (Attaran, 2020))

2.1.3. Supply Chain Management Digitalization Objectives

A corporation starts to manage its assets, resources, inventories, or even people better when it implements a digital supply chain management (DSCM) system. After all, businesses relocate them in accordance with the demands of the moment in order to save money. The company will eventually be capable of quantifying the outcomes in terms of time, cash, and raw material savings.(Agrawal, Narain, & Ullah, 2019).

A business should have the ability to track machinery, stock levels, consumers' product engagements, and carrier positions in real-time. Any type of supply chain, including agile and lean supply chains, can be digitalized. It would then make better plans and carry them out by using all this knowledge(Barreto, Amaral, & Pereira, 2017).

A corporation would be able to have more control out over supply chain once it chooses to digitalize in supply chain management. Efficiency is increased by providing the appropriate material and manufacturing ability at the appropriate time, according to (Min et al., 2019). Without a doubt, one of its main advantages is the firm's capacity to begin thinking ahead and moving more quickly. The productivity and performance of the

business will improve if the opposite strategy is used rather than a solely back into the past one.

The other objective of supply chain management is to connect and relate data sources. It is essential for a business using digital supply chain management to be able to track many parts of the business in real time. The business can only do this in order to enhance processes, find more efficient ways to transfer products, and do preventative maintenance.

There is a large amount of information available each day, as it is surely well known. The main issue, though, is that many businesses are ill-equipped to manage and organize enormous data. Data visualization can be used to accomplish this, enabling you to quickly see a visual definition of what is happening throughout the company's many divisions. Then ascertain the areas that necessitate performance and efficiency improvements by studying this data(Kaisler, Armour, Espinosa, & Money, 2013).

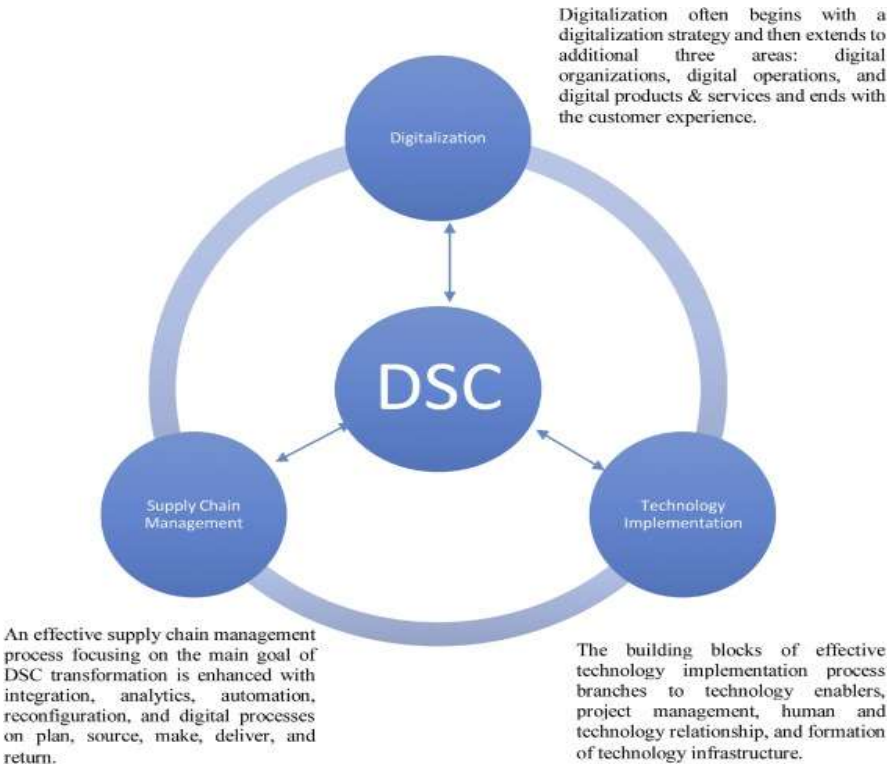


Figure 2.2 Supply Chain Digitalization process

(Source: ((Kaisler, Armour, Espinosa, & Money, 2013))

2.1.4. Supply Chain Management Digitalization Practices

Supply chain management practices are a collection of actions made by organizations to support efficient supply chain. According to (Koh, Demirbag, Bayraktar, Tatoglu, & Zaim, 2007), Supply chain management practices are a collection of actions made by organizations to support efficient supply chain management. Also (Koh et al., 2007) went further and asserted that SCM caused changes in the organizational structure by fusing internal tasks and connecting them to the external operations of suppliers, clients, and other supply chain players. The understanding of how all processes are linked to create goods, services, and knowledge that add customer value is improved by studying supply chain management (SCM) principles.

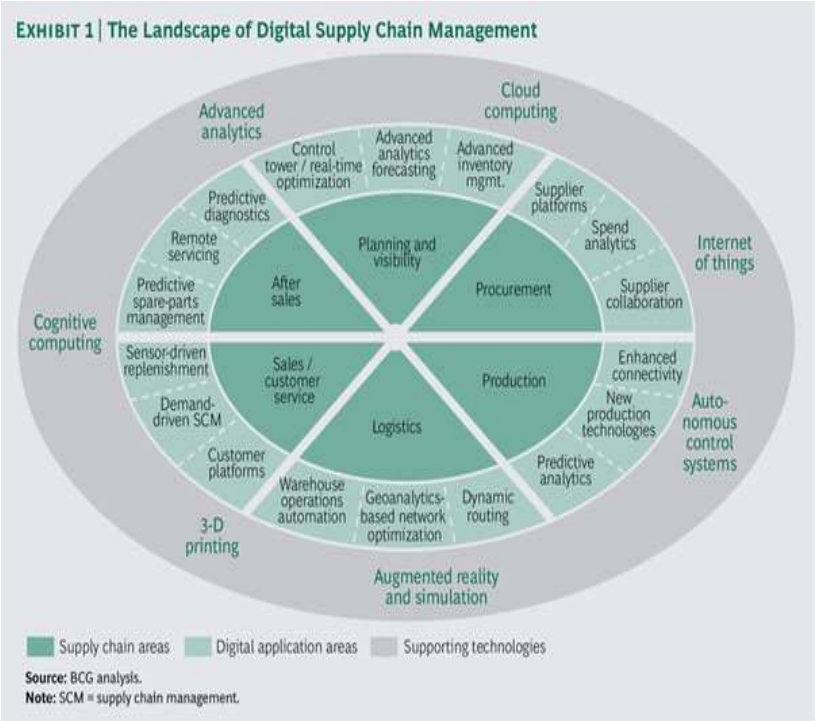


Figure 2.3 Supply Chain Management System Practice

(Source: ((Koh, Demirbag, Bayraktar, Tatoglu, & Zaim, 2007))

2.1.5. Challenges of Digital Supply Chain Management

There are many supply chain management difficulties for an expanding company. The cost of purchasing is growing, supply chains have become increasingly complicated, and organizations are managing more and more cooperative partnerships with suppliers in the present business climate. Even though it can seem challenging for many organizations to stay up, it is definitely worth the money to engage in the supply chain expertise. Supply chain management takes a crucial role in the contemporary competitive environment and demands considerable study attention as businesses struggle to find solutions to meet steadily expanding customers' expectations are sustainable cost. To achieve this, companies must identify the supply-chain process components that are not viable, identify the client needs that aren't being satisfied, set performance targets, and quickly implement the necessary changes. The following are the main problems for supply chain management digitalization according to(Hugos, 2018).

Lack of flexibility is regarded as a major challenge as well. The interviewee points out that people and their aversion to change are more to blame for inflexibility than the actual processes. Furthermore, the most difficult technology problems are said to be those involving money. It is challenging to create a commercial case for digitalization because of its late amortization. The inability to accurately measure the advantages complicates things even more. When the benefits are only felt in certain stretches of the supply chain, it is particularly challenging to persuade everyone to take part.

According to (Hellweg, Meierkort, Severin, & Hellingrath, 2021) The difficulty of employee certification and technological proficiency is likewise rated as severe. Being current is getting harder since there are so many new technologies, training takes so long, and change happens so quickly. Additionally, supply chain managers frequently lack IT expertise. It is necessary to combine technological and functional expertise. The interviewee considers privacy protection and IT security concerns to be major hurdles, which is a final but crucial point. A chain's weakest connection is frequently targeted, and propagating a virus along supply networks that are becoming more interconnected might have serious consequences.

Changes to information systems and other infrastructure that must be made while continuous operations are frequently overlooked. A present system can indeed be suspended, and tests are frequently required in day-to-day operations. It is mentioned that the need of good change administration cannot be overstated when asked whatever is thought to be the biggest challenge globally.

2.2 Empirical Review

The empirical literature in the research field is few, but the following sources are considered crucial for shedding light on the fundamental principles of digitalization's effects on supply chain management specifically on Ethiopian ministry of transports and Ethiopian shipping and logistic enterprise.

Since 1993, when just 3% of the world's recorded data was saved digitally, this percentage has increased significantly with the development of computer technology, reaching 94% by 2007 (Hilbert & López, 2011). The greater the amount of digitization of a network-for example, a complete supply chain or a particular logistics process—the better information and activities are gathered and handled, the more technologies become intelligent, the more these systems are connected with one another through links. (Vanessa, Marta, and Ana, 2018) In the fashion sector, where client demand is very variable, reflect the function of digitalization as a rapid reaction on the manufacturing side and a dynamic variety planning with regular modifications. Quick response in the fashion brands may take use of any existing facts from present and future customers, have a flexible supply chain, and place investment program regularly (not just before each season) (Irfan, Wang, & Akhtar, 2019). However, compared to conventional shops, these businesses have greater production expenses.

Digital revolution in the supply chain, travel, and tourist industries is anticipated to have the following effects between 2016 and 2025: Boost industry profitability by up to $305 billion, transfer $100 billion in value from seasoned players to new rivals, minimize environmental impact, increase safety and security, and help users save money and time to the tune of $700 billion for them and the rest of society, result in a net loss of jobs in the sector, which is anticipated to be somewhat compensated by the development of

skilled opportunities for the next generation both inside and beyond the supply chain ecosystem (Hines, 2014). Digitization rates were usually on the lower side of the spectrum overall. Thirty-eight percent (38%) of the survey participants in survey questionnaire reported no income from internet retail, fifty percent (50%) reported revenue from digital shopping that was lower than twenty percent, but only twelve percent (12%) reported revenue from online sales that was twenty percent (20%) or more. According to a descriptive research, firms are digitizing their outward and intra organizational supply chains more than their incoming supply chains(Zhou & Wang, 2021). The percentage is somewhat greater for outbound operations than for intra-organizational ones, with over sixty two (62%) of the business reporting that several outbound supply chain functions are conducted online.

So as to maintain end-to-end transparency, digitization via connection allows joint ventures through supplier to client as well as interconnection among rivals and other business associates along the distribution chain (Connectivity). Integrating digital skills throughout the organization levels of governance, procedures, data and employee evaluation, and information systems is the core of a digital operational model. It enables the necessary degrees of process integration and uniformity (Cooperation). In digital technologies, logistical system integration is the act of technically or operationally connecting several computer platforms and software programs to work as a single, well-coordinated logistical flow. Because of interconnections across logistical subsystems, it offers additional value. Three different connections are feasible: the firts one is end-to-end digital integration of logistics throughout the full value chains, the second one is vertical integration and connected logistics systems, and the third one is horizontal integration via value networks(Kayikci, 2018).

According to empirical findings (Han, 2018), customer performance and responsiveness performance are not significantly impacted by supplier integration or customers' needs. Nevertheless, it was discovered that customer integration was important for quality execution. It appears that a key factor in producing high-quality Performance is client integration. As a client integration approach, freight data sharing between shipping companies and port operating companies helps to reduce cycle time for vessels in the era

of giant ships. A win-win approach for both sides is close cooperation facilitated by effective communication between the terminal provider and the carrier. Relying on cooperative planning, or managing freight movements from end to end, is one approach to do this. In marine logistics, effective cooperative planning might increase dependability, execution on time, and save shipping costs.

2.3 Literature Gap

The majority of the literature on this field of study lacks precise information on how to quantify the success of digitalization on shipment monitoring operations and shipment handling value chain integration using an empirical study technique. Instead of integrating the digitalization of the entire value chain, which includes all supply chain partners, researchers in the field appear to concentrate more on the specialized process automation of shipment monitoring and handling. Furthermore, the literature's findings and outcomes are too generic to have any discernible consequences for or effects on business process output in the context of key supply chain integration metrics.

Despite the discussions about implementing new technology to create new revenue models for the shipment handling service through simplified continuous improvement, there are few quantitative industry performance metrics that demonstrate the degree of supply chain integration. Finally, the data collection upon which the research' generalization of facts and results is based is restricted to certain case studies and businesses, which makes it challenging for the sector as a whole to adopt a points of agreement to shipment monitoring business model.

2.4 Conceptual Framework

A conceptual framework illustrates what you expect to find through your research. It defines the relevant variables for your study and maps out how they might relate to each other. A researcher should construct a conceptual framework before begin collecting data. It is often represented in a visual format. According to Cohen, (1994), conceptual framework is the relationship between variables in a study. The conceptual framework

assisted the researcher to quickly detect the relationship revealed. This study's conceptual framework of represented as follow in figure below.

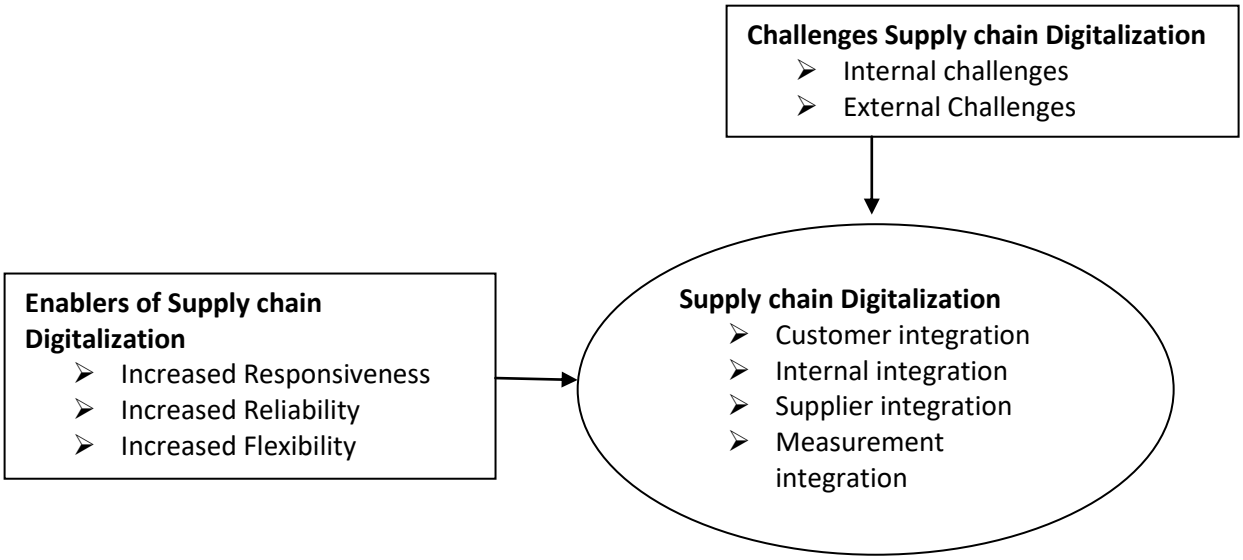


Figure 2.4 Conceptual Framework

(Source: (Develop by researcher based on Theoretical and Empirical review, 2022))

CHAPTER THREE

RESEARCH DESIGN AND METHODS

In this section the researcher presents the research design and methodology. So the research design, sample size (sampling frame) and sampling technique, the type of data source and the data collection method, procedure of data collection, questionnaire is going to be explained. The last section was depicting data analysis method.

3.1 Description of the Study Area

The area of the study was focused on digitalization of supply chain management practice, challenges and enablers in selected companies in Ethiopia. All the data that are important to this study was collected from supply chain management companies with in Ethiopia.

3.2 Research Design

Research design refers to the overall strategy that one chooses to face the problem which requires integration of different components of the study in a coherent and logical way, thereby, ensuring to solve the problem in efficient way. Research methods are ways to get information from the sample (Grove, 2015).

The researcher used descriptive research design to study digitalization of supply chain management practice, challenges and enablers in Ethiopia.

Descriptive research sets out to describe and to interpret what is. It aims to describe the state of affairs as it exists. While a researcher used descriptive statistics to summarize a data that was collected from the selected sample. As this study is descriptive type of research, the collected data was analyzed by using frequency, percentage and mean value. To show and rank the respondent's responses, tables and graphs was used.

3.3 Research Approach

A mixed research methodology was used in this study, with both qualitative and quantitative research methodologies being used. By integrating diverse quantitative and qualitative data sources, mixed methods research aids in a more complete evaluation of action/intervention implementation. The ability to transfer research results to multiple contexts has been facilitated by mixed methods research.

Quantitative research uses objective measurement and statistical analysis of quantitative data to understand and explain a phenomenon. Saunders, Lewis, & Thornhill, (2007) defines quantitative research as a method that emphasize on objective measurements that use any data collection technique (such as a questionnaire) or data analysis procedure (such as graphs or statistics) that generates or uses numerical data. Quantitative research helps to determine the relationship between set of variables. In this case, the researcher described the frequency of digitalizing supply chain management practice and its key attributes, such as challenges and enablers of Ethiopia supply chain management performance.

3.4 Population and Sampling Technique

3.4.1 Target Population

As most researchers agreed a population is a group of individuals who have the same characteristic. A target population (or the sampling frame) is a group of individuals (or a group of organizations) with some common defining characteristic that the researcher can identify and study (Creswell, 2016).

The process of identifying target population is known as sampling. Sampling is the process of selecting a statistically representative sample of individuals from the population of interest the researcher was used (Kamangar F, 2013). As is stated before the main aim of this paper is to study the practice of digitalization of supply chain management its challenges and enablers in Ethiopia, therefore the selected sample units are discussed here under at sample size determination sub topics. The target population of

this research was the employee of Ethiopian shipping and logistics service enterprise and Ministry of transport.

3.4.2 Sampling Techniques

The process of selecting a number of study units from a defined population is called sampling. The sampling design for this population is simple random sampling. In simple random sampling the researcher select the important respondents for the study randomly. The key respondents for this study includes senior employer in transaction process the managers of Ethiopian Shipping and Logistics service enterprise, Maritime Authority, Ministry of Transport, Fright Forwarding Agencies.

3.4.3 Sample Size Determination

The sample size of this research was collected from the employee of Ethiopian Shipping and Logistics service enterprise and Ministry of Transport. From the total 380, the researcher was used as sample 195 employees to collect the data. According to Yamane (1967) sample size determination formula,

$$n = \frac{N}{1 + Ne^2}$$

Where

n= number of sample size (195)

N= Total number of study population (380)

e= Level of precision (5%)

$$n = \frac{380}{1 + 380 \times 0.05^2}$$

$$\frac{380}{1.95} = 194.9 = 195$$

So, the sample size of study was 195 employees

Target population, out of the total Size of target population 380 researchers takes a sample size of 195.

3.5 Data Type and Data Source

The researcher used primary data and secondary datas are used as reference.

- ***Primary data***

This is an original data that was collected from the original source of information by using open and close ended questionnaire.

- ***Secondary data***

These types of data for this research were collected from reading different literature from the internet and in the library. Sources such as websites, books, and journals released by the supply chain management organizations were also used. Data collection method that was used in this research is self-administered questionnaire that comprises both open end and closed end question.

3.6 Method of Data Collection

The questionnaires were generated using the same format as the questionnaires previously used by Iyoha and Faboyede (2011) and Sharif (2010). For closed-ended questions, a respondent was asked to indicate their level of agreement on the developed questions. For the open-ended questionnaire, respondents were asked to provide open-ended responses to the opinion questions, and if they had opinions, they felt the researcher would find them useful. The questionnaire is designed in English and had three parts, the first part was related to the demographic profile of the respondents, and the second part was close ended supply chain management questions, and the last parts are open-ended questions. The questions on the questioners are developed based on a literature review.

3.7 Validity and Reliability

3.7.1 Validity Test

Validity shows the power of the research methodology to get precise realism. If a study is said valid this surely shows that what was proposed to be assessed has been evaluated accurately. If a researcher knows that his/her study is valid then it can be confident on the findings that really show some uniqueness in the issue being studied. If a study misses validity, then thesis shows there was misses of accuracy on research findings (Churton, 2010).

3.7.2 Reliability Test

Reliability entails that measure of consistency in producing similar results on different but comparable occasions. If research is said to be reliable that entails if it is replicated, similar or identical outcomes will be depicted. If a researcher is sure that his/her study is reliable then there will be high probability of accepting the study result demonstrated by his/her sample and using it to make conclusion about the population as whole (Bediako, 2017, p. 29)

Those Cronbach's alpha suits the most widely used indicators of internal consistency. Cronbach's alpha coefficient should be at minimum 0.70 and the higher the better. The reliability test of the questioner items are depicted as follow.

3.8 Methods of Data Analysis

In statistics the next step after the data is collected, the researcher would be analyzed it. Analysis involves preparing data for analysis, running the analysis, reporting results, and discussing them. After the quantitative data is collected through questionnaires was entered into SPSS version 25 and analyzed. The researcher used descriptive statistics in the analysis process. From descriptive statistics mean, frequency and percent was used in this study. In this study, descriptive analysis is chosen because of its simplicity and clarity.

On the same way to quantitative data the qualitative data collected through open ended questions was analyzed. Analyzing qualitative data requires understanding how to make sense of text and images so that it can form answers to the research questions. Analyzing qualitative data involve a simultaneous process of analyzing while you are collecting the required data.

When the data is collected, the researcher was analyzed other information previously collected, looking for major ideas. In the quantitative data collection, the researcher collected information from individuals and return for more information to fill in gaps in their provided information as the researcher's analysis of their information proceeds. Finally, since qualitative research is interpretive research in nature, the researcher made a personal assessment as to an explanation that was fit the themes that capture the major categories of information.

3.9 Ethical Consideration

Most research would be difficult to perform since some of it would elicit requirements and include ethical issues that must be met by the researcher in order to raise and ensure the reliability and validity of the research findings. Depending on the nature of the research, ethical considerations can take many different shapes. By completing the required steps, the researcher was able to meet some ethical considerations for this research or study. Furthermore, the researcher received formal confirmation from respondents to participate in the data collection activity, and the researcher did not attempt to use any force or sympathy on the respondents, and the data was collected confidentially. The nature of this survey was also kept in mind so that the research respondents may react freely and without fear of implication.

CHAPTER FOUR

DATA ANALYSIS

This chapter presents various data obtained from the research participants analyzed though SPSS. It consists of characteristics of the respondents (demographic variables) in terms of their sex, age, educational qualification and also work experience. Besides, it contains data obtained by making use of questionnaire, and document analysis with detailed interpretation of all the collected data.

4.1 Response Rate

One hundred ninety five questionnaires were distributed to the respondents in the selected organization that the study was conducted. The entire respondent returned back the questioner and they were different personal characteristics and background.

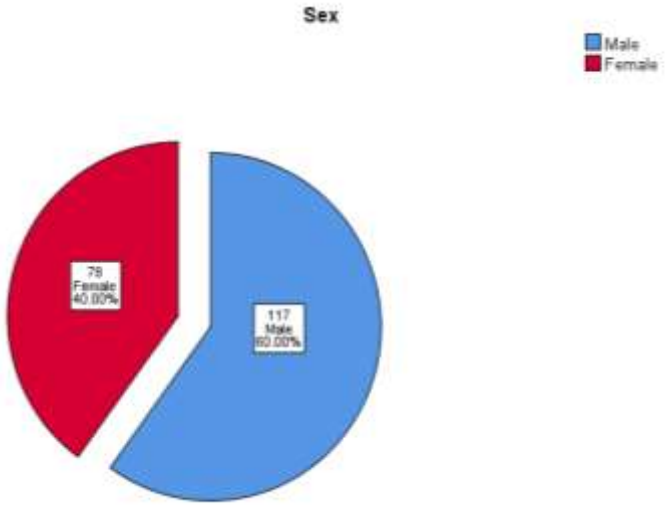
4.2 Demographic Data

The demographic characteristics include: gender, age, level of education and other characteristics too. Also, how long they are working in the organizations presented too. The researcher also studied their department and their role on the existing system. These types of data analysis study the personal information of the respondents that fill the questionnaires. The figures and tables below in this sub section present the details of background information of the respondents.

4.2.1 Gender of the Respondents

As depicted on the figure below 70% of the respondents were male and the remaining 40% of the respondents were female. This shows the number of male employees on the selected organizations was much greater than female.

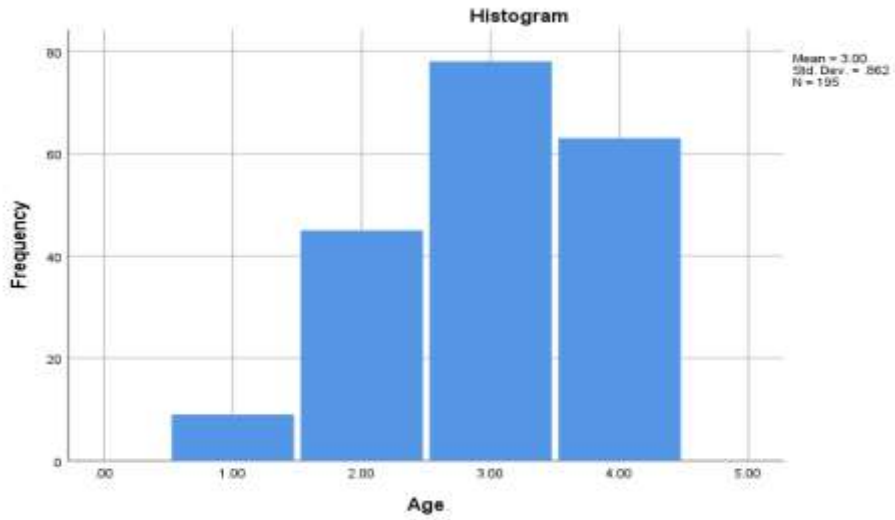
Figure 4.1 Gender of the Respondents
(Source: (Own Survey 2022))



4.2.2 Age of the Respondents

In terms of age majority of the respondents (40%) were between 36 and 45. While 32.3% of the respondents were above 45 years. The remaining 23.1% and 4.6% of the respondents were from 20-35 years old and below 20 years.

Figure 4.2 Age of the respondents
(Source: (Own Survey 2022))

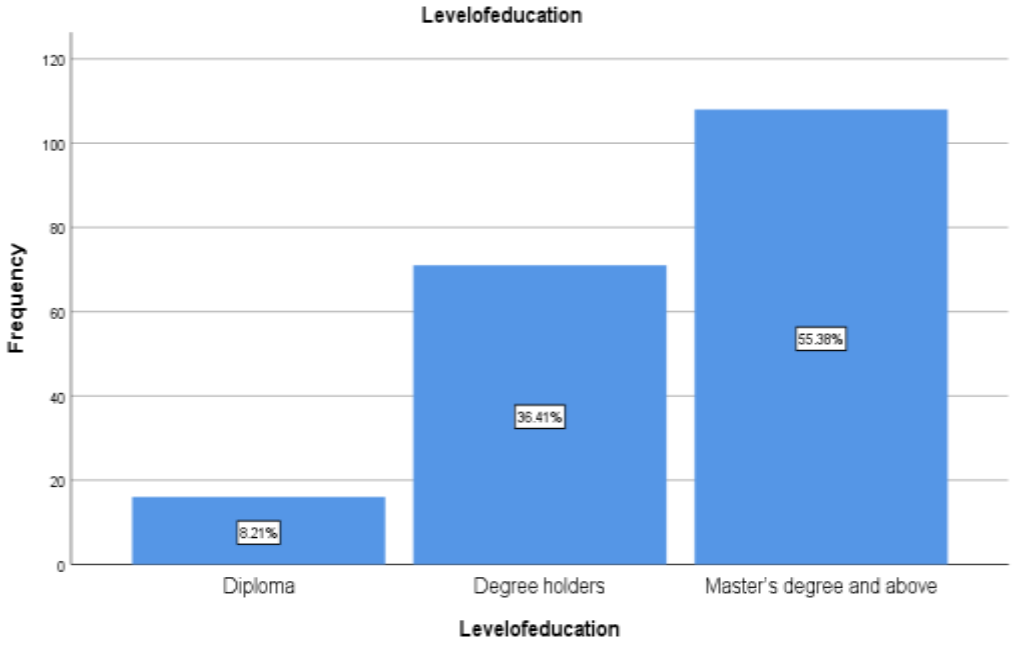


4.2.3 Educational Level

As it is clearly shown on the figure below 55.38% of the respondents were master's degree holders while 36.41% of the respondents were first degree holders. The remaining 8.21% of the respondents were diploma holders.

Figure 4.3 Respondents level of education

(Source: (Own Survey 2022))

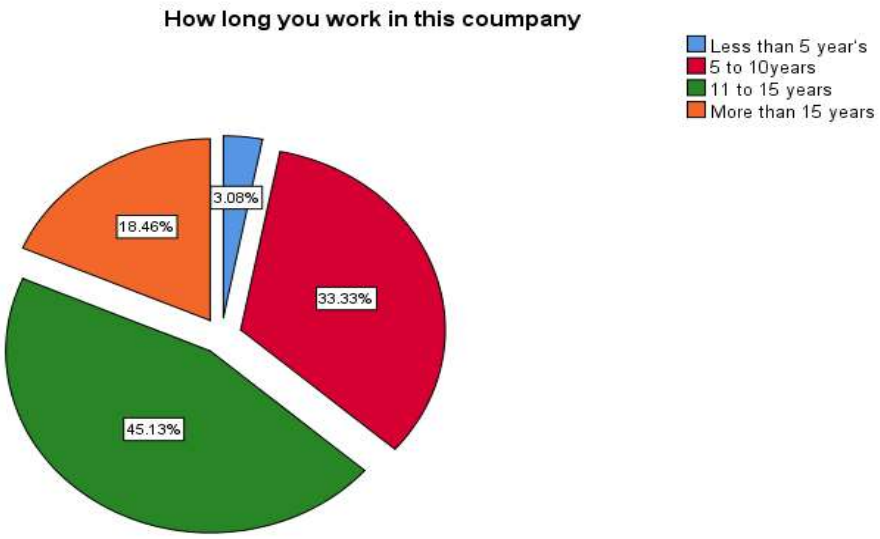


4.2.4 Respondents Work Experience

In terms of work experience majority of the respondents had 11to 15 years' work experience. From this it is possible to conclude that most of the employees are well experienced. Also 33.3% of the respondents had five to ten years work experience. Respondents with more than fifteen years' experience accounts 18.45%. On the other hand the remaining 3.08% of employees accounts for less than five years job experience.

Figure 4.4 Work Experience

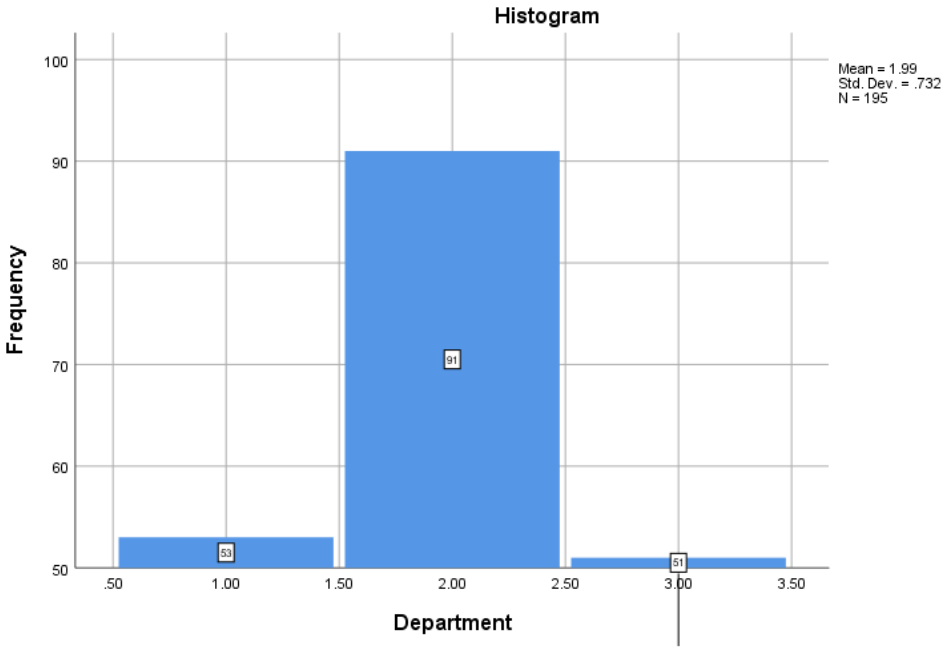
(Source: (Own Survey 2022))



4.2.5 Respondents Department

Figure 4.5 Respondents Department

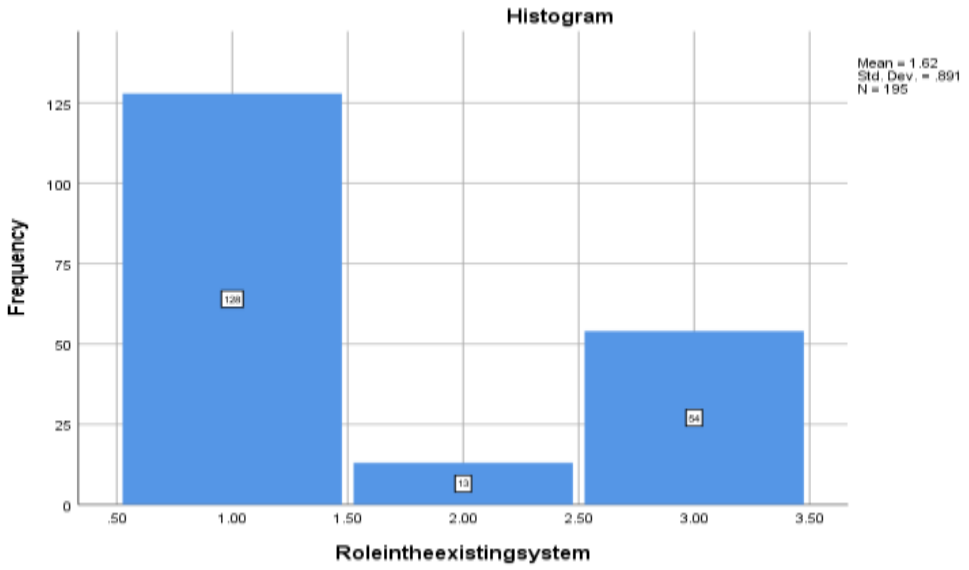
(Source: (Own Survey 2022))



4.2.6 Roles in the Existing System

Figure 4.6 Roles in the Existing System

(Source: (Own Survey 2022))



4.3 Descriptive Analysis

The measurement of central tendency and dispersion or variability of a set of data is done using the mean or media and standard deviation. In order to comprehend the descriptive coefficient measurement to the function of digitization on supply integration and factors on digitization, the researcher utilizes SPPS to run frequency and descriptive on each set of variables. The following assumptions was be used to depict the mean statistical values of the items based on the 5-point Likert scale: If the mean (M) score is less than 2.5, the respondents are likely to disagree with the statement; between 2.5 and 3.5, the respondents are likely to prefer to remain Neutral; and above 3.5, the respondents are likely to agree with the statement.

4.3.1 The Digitization Practice

The organizations activities were identified to measure their level of digitization practice on practical base throughout the value chain. The digitalization practice means applying digitalization in the organization all activities including parking and dispatching containers, coordination of shipping serving activities, assistance of shipment routine maintenance planning and preparation, application of IT on product movement, cargo loading and unloading guidance by automated information system and digitalization of staff allocation scheduling system.

Table 4.1 Supply Chain Management Digitization Practice (n=195)

(Source: (Own Survey 2022))

Supply Chain Management Digitization Practice	**Mean**	**Std. dev.**
Digitalization of transported containers parking and dispatching.	3.70	0.71
Coordination of shipping serving activities with IT.	3.15	0.68
Assistance of shipment routine maintenance planning and preparation with IT.	3.10	1.14
Application of IT on products/ containers movement data preparation.	3.44	0.53
Cargo loading and unloading is guided by automated information system.	3.68	0.58
Digitalization handles staff allocation and scheduling system.	3.74	0.44
Grand mean	**3.47**	

Source: Own Survey 2022

The first statement on digitalization practice was about the digitalization of transported containers parking and dispatching. The mean value of the employees' response lay on 3.702 with standard deviation of 0.706. This implies that transported containers was parked and dispatched with digitalized systems. The other issue about digitalization practice was coordination of shipping serving activity with IT. The mean value of the

respondents was 3.148 with standard deviation of 0.683. The assistance of shipment routine maintenance planning and preparation with IT reviled a mean value of 3.10 with standard deviation of 1.14. This can be interpreted as on the selected organizations assistance of shipment routine maintenance planning and preparation with IT, is at good stage and progress. The application of IT on products/containers movement had also mean value of 3.44 and standard deviation of 0.52. Since this mean value is above three it is possible to say that digitalization is well integrated on the organizations product or containers movement. On the other way the organizations cargo loading and unloading guided by automated information system shows a mean value of 3.67 and standard deviation of 0.577. Based on this finding the researcher concludes that automated information system is help us to guide cargo loading and unloading on the company. Finally, the digitalization of staff allocation and scheduling system reviled a mean value of 3.74 with standard deviation of 0.4.

The overall digitalization of supply chain management accounts a grand mean value of 3.47, this shows digitalization of supply chain management is moderately practiced.

4.3.2 The Digitalization Challenge

The second variable the researcher studied was digitalization challenges on supply chain management. Those challenges encountered while digitalization was divided in to two. The first one was internal challenge while the second was external challenges. Internal challenges are identified as difficulties with in the organization and they are under the control of the organization. This means the organization can reduce/eliminate those challenges and come up with better supply chain digitalization practice.

A. **Internal Challenges Affecting Digitalization**

Table 4.2 Internal Challenges affecting Digitalization (n=195)

(Source: (Own Survey 2022))

Internal Challenges affecting Digitalization	Mean	Std. dev.
System user‘s lack of technical and IT knowledge	3.30	1.08
System user‘s fear for technology acceptance	3.24	1.09
Inadequate training on system utilization	3.30	1.07
Lack of system user‘s commitment on IT knowledge development	2.83	0.86
System developer‘s understanding of operational issues is low	3.08	1.08
System developer‘s knowledge level on business process is low	3.25	1.05
Company‘s top management commitment for digitization initiatives is limited	2.64	0.95
Company‘s top management‘s underestimates the economic benefit of digitization	2.51	0.84
Grand mean	**3.02**	

Source: Own Survey 2022

Under the category of internal challenge the first statement asked by the researcher was whether or not system users lack technical and IT knowledge. The mean value of the employees respond was 3.302, this implies majority of the system user lack technical or IT Knowledge. So to overcome this, basic technical and IT training or education should be given about the developed supply chain management digitalization system. On the other hand there is also a fear of technological acceptance, by the system users. So it is better to inform about the technology for respondents so respondents will accept the digitalization technology fully and they will perform their action without hesitation about this technology. As most respondents said (with mean value of 3.32), there is an inadequate training about utilization this supply chain management digitalization system.

So as to overcome this internal challenge adequate amount of training should be given for employees, since if the employees cannot utilize this system the overall system utilization will fail in the organization.

The fourth internal challenge studied was whether or not lack of commitment by the system users about IT knowledge development. The mean value of the response lay on 2.83, this can be interpreted as most of the respondents said there is no lack of commitment by the system users on IT knowledge development. This is a good advantage for the organization, because if there is committed system user about IT knowledge development the digitalization process will be implemented smoothly.

On the other hand the digitalization system developers understanding of operational issue was low (mean value of 3.0). It is highly recommended that system developer's operational issue knowhow must be high so as to implement the digitalization process fully. If system developers does not know how to solve operational problems and come up with a solution it will be impossible to shift the existing supply chain management system in to a digitalized supply chain management.

System developers' knowledge level on business process should be also high. Company's top management commitment for digitalization initiative should be unlimited (since based on this research the mean value was 2.6). If top management's commitment for digitalization is low how to achieve the digitalization over the company? It is impossible. So this issue should be addressed by different mechanisms, like giving training to them and by busting their understanding.

The last internal challenge identified while implementing digitalization was top managers understanding for the economic benefit of digitalization on supply management was low. This was mainly due to lack of know how about the system, resistance to change from the existing system, fear of failure since they are not trustworthy on IT, becoming disinterested for funding so as to implement and so on. As a final point those listed challenges discussed above should be solved, then implementation of the system will be much easy and straight.

Conclusively, the overall internal challenges for supply chain digitalization accounts a grand mean value of 3.02, this shows internal challenges to supply chain digitalization found to be moderate influential challenge.

B. External Challenges affecting Digitalization

External challenges are identified as difficulties outside of the organization and they are not under the control of the organization. Some of those challenges include cost of digitalization, maintenance and monitoring of digitalization, legal frame work of digitalization, legal experts understanding of digitalization and lack of modern ICT infrastructure.

Table 4.3 External Challenges affecting Digitalization (n=195)

(Source: (Own Survey 2022))

External Challenges affecting Digitalization	Mean	Std. dev.
Digitization in the value chain needs much cost.	2.84	0.95
Digitization is affected by lack of enough budgets.	3.82	0.66
Digitization will incur huge maintenance and monitoring.	3.66	0.72
Digitization is affected by the working legal framework of stakeholders	3.45	0.87
Digitization is affected by the legal system of nations	3.52	0.78
Digitization is affected by the capability of legal expertise in understanding Information systems.	3.73	0.82
Lack of modern ICT infrastructure (physical & virtual) in the country affects digitization.	4.09	0.97
Grand mean	**3.59**	

Source: Own Survey 2022

As depicted on the table above most of the respondents said digitalization in the value chain needs not that much cost, compared to its advantage but digitalization can be impacted by lack of enough budget. So the main external challenge for supply chain

management digitalization process is concerned with budget. Not only has this even after digitalization, as most of the employees responded, it will incur huge maintenance and monitoring. Also digitalization of supply chain management can be affected by the working legal frame work of stakeholders. So before implementing it is better to see what is the stakeholder's legal framework seems like. After understanding those frame works it is much easier to become productive and successful. The legal system of the country is also a great factor for digitalization practice as respondents replied. The mean value of the response was 3.5, this implies a nations legal system should be developed with high intention for digitalization. The legal system should promote digitalization positively unless it will be impossible to implement it fully. Even the capability of the legal expertise in understanding information system is a huge motivation for supply chain management digitalization. So according to the respondents response on this research with mean value of 3.7, digitalization is highly impacted by the capability of legal expertise understanding about information system and its digitalization on supply chain. The other factor respondents give emphasis was about lack of infra-structure. This was about ICT infrastructure. As most of the respondents agreed with (mean value of 4.09), lack of modern ICT infrastructure both physical and virtual in the country affect digitalization highly. So it is recommended that implementing full infrastructure is vital so as to come up with implementation of the digitalization process fully.

Conclusively, the overall external challenge for supply chain digitalization accounts a grand mean value of 3.59, this shows external challenges to supply chain digitalization found to be highly influential challenge.

4.3.3. Enablers of Digitization on Supply Chain Management

On this study the main enablers studied was the following. The digitalization process and its impact to increase company's responsiveness, the flexibility of customer integration practice, the company's reliability to customer integration, company's reliability information sharing platform, the flexibility of cross functional planning between departments.

Table 4.4 Enablers for digitization of Supply Chain Management (n=195)

(Source: (Own Survey 2022))

Enablers of Digitization on Supply Chain Management	Mean	Std. dev.
Digitization increase company‘s Responsiveness to customer integration.	4.01	0.92
Digitization increased the flexibility customer integration practices.	3.95	1.02
Digitization increased the company‘s reliability to customer integration.	3.94	0.96
Digitization increase company‘s Responsiveness to its internal integration practices.	3.88	0.95
Digitization increases company‘s reliability information sharing platform	4.33	0.91
Digitization increased the flexibility of cross functional planning between departments.	4.37	0.82
Digitization decreases the cost of common compliance & standardization procedures.	4.15	0.92
Digitization increase company‘s Responsiveness to its supplier integration practice.	4.44	0.74
Digitization decreases the cost of information uncertainty and transaction frequency during communication with suppliers.	3.65	0.72
Digitization increase company’s Responsiveness to its measurement integration practices.	3.78	0.84
Digitization increase company‘s reliability in enabling easy benchmarking.	3.56	0.82
Digitization increase company‘s responsiveness in sharing of real time & accurate information flow as its information integration practice.	3.57	0.75

Source: Own Survey 2022

All the enablers studied on this research are a great factors/ reasons why we implement digitalization on supply chain management. The first statement about digitalization enablers was whether or not digitization increase company‘s responsiveness to customer integration. The repliers highly agreed that digitization definitely increase company‘s responsiveness to customer integration with mean value of 4.005. Also majority of the respondents (with mean value of 3.95) replied as digitization can increased the flexibility of customer integration practices. The other enabler force to the implementation of supply chain digitalization practice the reason that digitization increased the company‘s reliability to customer integration with mean value of repliers response 3.93. On the other hand respondents also highly agreed that digitization increase company‘s Responsiveness

to its internal integration practices (mean value of respondents was 3.88). The other enabler for implementation of supply chain management digitalization was since digitization can increases company‘s reliability information sharing platform and (with mean value of research participants reply become 4.32) also digitization highly increase the flexibility of cross functional planning between departments (mean value of the respondents lay on 4.369).

The other enabler founded was digitization decreases the cost of common compliance & standardization procedures, as respondent’s response mean value lay on 4.14. Furthermore digitization can increase company‘s Responsiveness to its supplier integration practice (as the mean value of the respondents response was 4.4). In addition to this digitization will decrease the cost of information uncertainty and transaction frequency during communication with suppliers. Supply chain management digitization can also increase company‘s reliability in enabling easy benchmarking, as most of the respondents confirmed this statement with mean value of 3.56. the final enabler for supply chain management digitalization founded was digitization increase company‘s responsiveness in sharing of real time & accurate information flow as its information integration practice, as depicted on the above table with mean value of respondents reply 3.57.

All the enablers studied on this research are accounts a mean value above 3.5, which show all the enablers identified found to have influential role to play enabler role for digitalization of supply chain management to increase reliability, Responsiveness and flexibility of Customer integration Internal integration, Supplier integration, Measurement integration as well as reduce cost.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 Summary of Finding

The general objective of this research was to study the practice of supply chain management digitalization in Ethiopia including its enablers and challenges.

1. Based on the study findings the digitalization practice of supply chain management in Ethiopian ministry of transport and Ethiopian shipping and logistic enterprise is at moderate level. Respondents' agreement with digitalization practice was above three (based on the mean value of their response). The transported containers was parked and dispatched with digitalized systems. The coordination of shipping serving activity with IT was at good level. Also the organizations assistance of shipment routine maintenance planning and preparation with it is at good stage and progress. On the other way the organizations cargo loading and unloading guided by automated information system shows a mean value of 3.67 so the automated information system is helping the organization to guide cargo loading and unloading.

2. Secondly the researcher studied the digitalization challenges on supply chain management. Those challenges encountered while digitalization was divided in to two. The first one was internal challenge while the second was external challenges. Under the category of internal **challenge** the first issue system users lack technical and IT knowledge. The mean value of the employees respond was 3.302, this implies majority of the system user lack technical or IT Knowledge. Also a fear of technological acceptance, by the system users was identified as a challenge. As most respondents said (with mean value of 3.32), there is an inadequate training about utilization this supply chain management digitalization system. On the other hand the digitalization system developers understanding of operational issue was low. Company's top management commitment for

digitalization initiative should be unlimited (since based on this research the mean value was 2.6. Top managers understanding for the economic benefit of digitalization on supply management was low.

The main external challenge for supply chain management digitalization process is concerned with budget. Not only had this, even after digitalization, as most of the employees responded, it will incur huge maintenance and monitoring. Also digitalization of supply chain management can be affected by the working legal frame work of stakeholders. The legal system of the country is also a great factor for digitalization practice as respondents replied. The other factor respondents give emphasis was about lack of infra-structure.

3. Thirdly the researcher found out the main enablers that forces Ethiopian ministry of transport and Ethiopian shipping and logistic enterprise to digitalize their supply chain management system. Those main enablers founded on this study was summarized and highlighted as follow.

    - ✓ Digitization increase company‘s Responsiveness to customer integration.
    - ✓ Digitization increased the flexibility customer integration practices.
    - ✓ Digitization increased the company‘s reliability to customer integration.
    - ✓ Digitization increase company‘s Responsiveness to its internal integration practices.
    - ✓ Digitization increases company‘s reliability information sharing platform.
    - ✓ Digitization increased the flexibility of cross functional planning between departments.
    - ✓ Digitization decreases the cost of information uncertainty and transaction frequency during communication with suppliers.
    - ✓ Digitization increase company‘s reliability in enabling easy benchmarking.
    - ✓ Digitization increase company‘s responsiveness in sharing of real time & accurate information flow as its information integration practice

5.2 Conclusion

On this research the researcher developed three major research questions. These were:

1. How digitization of the supply chain management in Ethiopian ministry of transport and Ethiopian shipping and logistic enterprise is being practiced?

2. What are the challenges in supply chain management digitalization in Ethiopian ministry of transport and Ethiopian shipping and logistic enterprise is being practiced?

3. What are the enablers for supply chain management digitalization in Ethiopian ministry of transport and Ethiopian shipping and logistic enterprise is being practiced?

On the practice of supply chain management digitalization the researcher found out that it was practiced moderately. The mean value of the employee's response about digitalization of transported containers parking and dispatching lay on 3.702 with standard deviation of 0.706. This implies that transported containers was parked and dispatched with digitalized systems. The other issue about digitalization practice was coordination of shipping serving activity with IT. The mean value of the respondents was 3.148 with standard deviation of 0.683. The selected organizations assistance of shipment routine maintenance planning and preparation with IT, is at good stage and progress.

The application of IT on products/containers movement had also mean value of 3.44 and standard deviation of 0.52. Since this mean value is above three it is possible to say that digitalization is well integrated on the organizations product or containers movement. On the other way the organizations cargo loading and unloading guided by automated information system shows a mean value of 3.67 and standard deviation of 0.577. Based on this finding the researcher concludes that automated information system is helping us to guide cargo loading and unloading on the company. Finally, the digitalization of staff allocation and scheduling system reviled a mean value of 3.74 with standard deviation of 0.4.

The second research question was “What are the challenges in supply chain management digitalization in Ethiopian ministry of transport and Ethiopian shipping and logistic enterprise is being practiced”?

Those challenges encountered while digitalization was divided in to two. The first one was internal challenge while the second was external challenges. Internal challenges are identified as difficulties with in the organization and they are under the control of the organization. This means the organization can reduce/eliminate those challenges and come up with better supply chain digitalization practice.

Under the category of internal challenge the first issue was whether or not system users lack technical and IT knowledge. The mean value of the employees respond was 3.302, this implies majority of the system user lack technical or IT Knowledge. On the other hand there is also a fear of technological acceptance, by the system users. So it is better to inform about the technology for respondents so respondents will accept the digitalization technology fully and they will perform their action without hesitation about this technology. As most respondents said (with mean value of 3.32), there is an inadequate training about utilization this supply chain management digitalization system. So as to overcome this internal challenge adequate amount of training should be given for employees, since if the employees cannot utilize this system the overall system utilization will fail in the organization.

The other internal challenge studied was lack of commitment by the system users about IT knowledge development. But the mean value of the response lay on 2.83, this can be interpreted as most of the respondents said there is no lack of commitment by the system users on IT knowledge development. This is a good advantage for the organization, because if there is committed system user about IT knowledge development the digitalization process will be implemented smoothly.

On the other hand the digitalization system developers understanding of operational issue was low (mean value of 3.0). If system developers does not know how to solve operational problems and come up with a solution it will be impossible to shift the existing supply chain management system in to a digitalized supply chain management.

Company's top management commitment for digitalization initiative should be unlimited (since based on this research the mean value was 2.6). If top management's commitment for digitalization is low how to achieve the digitalization over the company? It is impossible.

Top managers understanding for the economic benefit of digitalization on supply management was low. This was mainly due to lack of know how about the system, resistance to change from the existing system, fear of failure since they are not trustworthy on IT, becoming disinterested for funding so as to implement and so on..

The main external challenge for supply chain management digitalization process is concerned with budget. Not only had this, even after digitalization, as most of the employees responded, it will incur huge maintenance and monitoring. Also digitalization of supply chain management can be affected by the working legal frame work of stakeholders. So before implementing it is better to see what is the stakeholder's legal framework seems like. The legal system of the country is also a great factor for digitalization practice as respondents replied. The legal system should promote digitalization positively unless it will be impossible to implement it fully. Even the capability of the legal expertise in understanding information system is a huge motivation for supply chain management digitalization. The other factor respondents give emphasis was about lack of infra-structure. This was about ICT infrastructure, both physical and virtual in the country affect digitalization highly.

5.3 Recommendation

Depending on the above data analysis, the major finding and conclusions depicted in the above sections the researcher come out to the following recommendation.

- Even if the practice of supply chain management digitalization in ministry of transport and Ethiopian shipping and logistic enterprise are at a good level, the organizations should work hard to implement it fully.

- The main internal challenge while implementing digitalization was limited initiatives by the company‘s top management commitment for digitization and also company‘s top management‘s underestimates the economic benefit of digitization. So this issue should be addressed by different mechanisms, like giving training to them and by busting their understanding.

- Majority of the system user lack technical or IT Knowledge. So to overcome this, basic technical and IT training or education should be given about the developed supply chain management digitalization system.

- The nation legal system should be developed with high intention for digitalization. The legal system should promote digitalization positively unless it will be impossible to implement it fully.

- Lack of modern ICT infrastructure both physical and virtual in the country affect digitalization highly. So it is recommended that implementing full infrastructure is vital so as to come up with implementation of the digitalization process fully.

- The organization should implements supply chain management digitalization fully, since there are a lot of enablers that force to do so.

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APPENDIX I

QUESTIONNAIRE

Addis Ababa University

Postgraduate Program, Logistics and Supply Chain Management

Dear Respondent:

I am currently pursuing the degree of Masters of Arts in Logistics and supply chain management from Addis Ababa University Postgraduate Program. As partial fulfillment towards the completion of my graduate degree, this research titled as "**Digitalization of Supply Chain Management Practices; Challenges and Enablers in Selected Organizations in Ethiopia" is** undertaken. Hence, I kindly request you to fill this questionnaire while assuring you that the information that you provide will be treated with confidentiality and shall only be used for the purpose of this academic research. Your fair and impartial feedback will make this research a very successful one. If you need any clarification and information, you can use my e-mail *henbob152115@gmail.com* and mobile number ***+251-911410819*** Thank you for your time, cooperation and assistance. Stay Safe!!!

General Instructions

- ✓ No need of writing your name.
- ✓ In all cases where answer options are available, please tick (√) in the appropriate box.

Thank you for your cooperation and assistance!!

Part I: Demographic Profile of the Respondent

1. Gender. i. Female☐ ii. Male ☐

2. Age i. below 20 Years ☐ ii.20-35 Years ☐ iii.36-45 Years ☐ iv. Above45 Years ☐

3. Level of education? i. Diploma ☐ ii. Bachelor degree ☐

iii. Master's degree and above ☐

4. How long have you been working in this Company?

i. Less than 5 year's ☐ ii. 11 to 15 years ☐ iii. 5 to 10years ☐ iv. More than 15years ☐

5. In which department are you working?

i. Business Transformation Expert ☐ ii. Loading/unloading handling coordinator ☐

iii. Supplier ☐ (If yes) Function _____

iv. Customer ☐ (If Yes) Organization type _____

6. Role in the existing system

i. System User ☐ ii. System developer ☐ iii. Operational System support ☐

Part II: Supply Chain Management Digitization Practice

The agreement alternative has been indicated using Likert scale. Please rate the extent you agree or disagree on the issues of Supply Chain Management Digitalization Practice. Use 5 scale of rating as **Strongly Disagree (SD) =1 Disagree (D) =2 Neutral (N) =3 Agree (A) =4,**

Strongly Agree (SA) =5 and put **tick** "√" **mark** in front of each statement of agreement alternative.

Supply Chain Management Digitization Practice	**1**	**2**	**3**	**4**	**5**
Transported products (Containers) parking and dispatching is supported by automatic guidance system.					
There is a common information system to coordinate the shipping serving activities.					
Shipment routine maintenance planning and preparation is assisted with information technology					
Products/ containers movement data preparation is being done by information system application.					
Cargo loading and unloading guided by automated information system.					
Staff allocation and scheduling has its own information system application					

Part III: Supply Chain Management Digitization Challenges

The agreement alternative has been indicated using Likert scale. Please rate the extent you agree or disagree on the issues of Supply Chain Management Digitalization Challenges. Use 5 scale of rating as **Strongly Disagree (SD) =1 Disagree (D)=2 Neutral (N)=3 Agree (A)=4,**

Strongly Agree (SA) =5 and put **tick** "√" **mark** in front of each statement of agreement alternative.

A. Internal Challenges affecting Digitalization

Internal Challenges affecting Digitalization	**1**	**2**	**3**	**4**	**5**
System user's lack of technical and IT knowledge					
System user's fear for technology acceptance					
Inadequate training on system utilization					
Lack of system user's commitment on IT knowledge development					
System developer's understanding of operational issues is low					
System developer's knowledge level on business process is low					
Company's top management commitment for digitization initiatives is limited					
Company's top management's underestimates the economic benefit of digitization					

B. External Challenges Affecting Digitalization

External Challenges affecting Digitalization	1	2	3	4	5
Digitization is impacted by lack of enough budgets.					
Digitization will incur huge maintenance and monitoring.					
Digitization is affected by the working legal framework of stakeholders					
Digitization is affected by the legal system of nations					
Digitization is affected by the capability of legal expertise in understanding Information systems					
Lack of modern ICT infrastructure (physical & virtual) in the country affects digitization.					
Lack of sustainable power affects the AGH digitization.					
Poor deployment and implementation of individual systems affects digitization.					

Part III: Enablers of Digitization on Supply Chain Management

Enablers of Digitization on Supply Chain Management	1	2	3	4	5
Digitization increase company‘s Responsiveness to customer integration.					
Digitization increased the flexibility customer integration practices.					
Digitization increased the company‘s reliability to customer integration.					
Digitization increase company‘s Responsiveness to its internal integration practices.					
Digitization increases company‘s reliability information sharing platform.					
Digitization increased the flexibility of cross functional planning between departments.					
Digitization decreases the cost of common compliance & standardization procedures.					
Digitization increase company‘s Responsiveness to its supplier integration practice.					
Digitization decreases the cost of information uncertainty and transaction frequency during communication with suppliers.					
Digitization increase company’s Responsiveness to its measurement integration practices.					
Digitization of increase company‘s reliability in enabling easy benchmarking.					
Digitization increase company‘s responsiveness in sharing of real time & accurate information flow as its information integration practice.					