ADDIS ABABA UNIVERSITY

SCHOOL OF COMMERCE

THE EFFECT OF SUPPLY CHAIN RESILIENCE ON SUPPLY CHAIN PERFORMANCE OF PLASTIC INDUSTRY IN ETHIOPIA

BY

ZEWDU GIDEY

A THESIS SUBMITTED TO SCHOOL OF COMMERCE, ADDIS ABABA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF A MASTER'S DEGREE IN LOGISTICS AND SUPPLY CHAIN MANAGEMENT

ADVISOR - KIRUBEL BIRUCK (PhD)

JUNE 2024
ADDIS ABABA, ETHIOPIA

ADDIS ABABA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS SCHOOL OF COMMERCE, GRADUATE STUDIES MASTERS OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT PROGRAM

THE EFFECT OF SUPPLY CHAIN RESILIENCE ON SUPPLY CHAIN PERFORMANCE OF PLASTIC INDUSTRY IN ETHIOPIA.

By Zewdu Gidey

Approved by Board of Examiners:

1. Name of Advisor **Kirubel Bruck (PhD)** Signature_____Date_____

2. Name of Internal Examiner **Busha Temesgen (PhD**)Signature____Date_____

3. Name of External Examiner Biniyam Berhe **(PhD)** Signature_____Date_____

DECLARATION

I hereby declare that this research Titled "**THE EFFECT OF SUPPLY CHAIN RESILIENCE ON SUPPLY CHAIN PERFORMANCE OF PLASTIC INDUSTRY IN ETHIOPIA**" is my original work and has not been submitted by any other person for any other requirement and I acknowledged that all sources of information are used appropriately.

Name (Student Researcher): Zewdu Gidey ID No. GSD/4956/14

Signature: _____

JUN, 2024

CERTIFICATE

This certifies that Zewdu Gidey under my supervision completed original research for her thesis, "The Effect of Supply Chain Resilience on Supply Chain Performance of Plastic Industry in Ethiopia, which she turned in partially towards the Masters of Business Administration (MBA) degree from Addis Ababa University's Postgraduate Studies. No portion of the thesis has been turned in for credit toward any other degree or diploma. The aid and support obtained throughout the investigation have been appropriately recognized. As a result, I advise that it be approved as satisfying the thesis requirements.

_____ _____ _____

Name of Supervisor Signature Date

ACKNOWLEDGMENT

The researcher would like to express gratitude to my advisor (Kirubel Biruck, PhD) from Addis Ababa University's school of commerce for his insightful recommendations and advise. Sincere gratitude is also extended to the Plastic and Rubber Association, which conducted the poll, as well as to the employees of the chosen Addis Ababa enterprises who revealed their needs and ideas. My sincere gratitude is directed at my entire family, who has supported me throughout my academic career, both materially and morally. Finally, these acknowledgements would not be complete without expressing my profound gratitude to my friends and classmates.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURE

ACRONYMS/ABBERIVATIONS

ANOVA	Analysis Of Variance
CCP	Content, Context, and Process
COVID-19	Corona Virus
CRBV	Contingent Resource-Based View
DC	Dynamic Capabilities
EPR	Ethiopian Plastic and Rubber Association
NC	Network Complexities
PLS SEM	Partial Least Squares Structural Equation Modelling
RBV	Resource-Based View
SCD	Supply Chain Disruptions
SCM	Supply Chain Management
SCP	Supply Chain Performance
SCPM	Supply Chain Performance Management
SCR	Supply Chain Resilience
SCRE	Supply Chain Resilience
SCRES	Supply Chain Resilience
SCRP	Supply Chain Resilience Performance
SCV	Supply Chain Visibility
SPSS	Statistical Software for Social Science
VIF	Variance Inflation Factor

ABSTRACT

Resilience and supply chain function have become increasingly important to businesses in recent years, and this trend is continuing. Given this, the purpose of this study was to examine, within the framework of Ethiopia's plastics sector, the relationship between supply chain performance and resilience. As a result, a cross-sectional study involving 127 industries and based on manufacturing enterprises was conducted in Addis Ababa, Ethiopia, from February to March of 2024 using the census method. However, only 103 responses were gathered, yielding an 81% response rate. The quality of the data was guaranteed by pretesting the questionnaire and training supervisors and data collectors. SPSS version 25 was utilized in this investigation to enter the data. SPSS version 25 was utilized in this study to input the data for statistical analysis. In this study, descriptive statistics, correlation, and multiple regression analysis were applied. This study found that supply chain visibility, flexibility, cooperation and agility will positively and significantly affect supply chain performance in plastic manufacturing firms. As a result, it has been determined that realizing supply chain visibility, flexibility, cooperation and agility can effectively enhance supply chain performance in plastic manufacturing firms. The supply network is enormous and convoluted with numerous players that are various organizations and it is hard to coordinate all of them along with all the items that need to be delivered. This study recommends plastic manufacturing companies to enhance their supply chain performance by mapping suppliers, enhancing production capacity, holding regular meetings, and forming partnerships to optimize distribution networks, reduce costs, and improve inventory accuracy.

Keywords: Agility, Cooperation, Flexibility, Supply Chain Performance, Supply Chain, Supply Chain Resilience, Visibility

CHAPTER ONE
INTRODUCTION

This chapter deals about background of the study; statement of the problem; objectives of the study; significance of the study; scope of the study; limitations of the study; operational definition of key terms, and organization of the study.

1.1 Background of the Study

The integration of processes that begins with the acquisition of raw materials, progresses through their conversion into semi-finished or finished goods, and finishes with the product's delivery to the ultimate consumer is known as supply chain management (SCM) (Adobor & McMullen, 2018). According to its definition, a supply chain is an assembly of tasks and procedures designed to maximize the movement of goods, services, and associated data from suppliers to consumers or centers of demand (Taweel & Al-Hawary, 2021). It reaches consumers and the customers of those customers through a number of layers in the supplier network.

The need for businesses to build supply chain resilience is mostly driven by supply chain disruption brought on by a variety of factors, including technological innovation, globalized supply chains, and expanded outsourcing (Aityassine et al., 2022). In Dhaigude & Kapoors' (2017) perspective, resilience is defined as the ability of an organization to bounce back from setbacks by reacting quickly to unforeseen circumstances. This entails being able to minimize the majority of supply chain interruptions and significantly reduce their effects when they do occur (Adobor & McMullen, 2018). According to Adobor and McMullen (2018), a resilient supply chain also means that companies may respond to global events in a proactive manner and adjust schedules to suit customer expectations.

The findings demonstrate how supply chain performance can be enhanced by supply chain resilience (Mandal et al., 2016). The term "supply chain performance" describes the actions taken by the extended supply chain to satisfy end-user demands, such as timely delivery, product availability, and the supply chain's ability to hold and utilize all necessary capacity and inventory to meet those demands. The actions of the extended supply chain in satisfying end-customer needs, such as product availability, on-time delivery, and all the inventory and capacity in the

supply chain required to deliver that performance in a responsive manner, are referred to as supply chain performance (Dhaigude & Kapoor, 2017). A flexible contingency plan and the ability to react swiftly to operational disturbances are hallmarks of good supply chain management. However, in order for a supply chain to be considered genuinely robust, it needs to be able to predict, foresee, and, most of the time, completely prevent disruptions (Dhaigude & Kapoor, 2017).

For that reason, several solutions, such as supply chain agility, redundancy, adaptability, and collaboration, are recommended for businesses to attain effective supply chain resilience (Scholten & Schilder, 2015). Resilience and other dynamic capacities can therefore be adopted to improve supply chain and organizational performance. Abdallah, Alfar & Alhyari (2021) offer managers and practitioners in manufacturing organizations guidance on enhancing their supply chain resilience. The findings provide insight into the approaches that supply chain resilience and digitalization might take to enhance performance in a volatile setting (Bevilacqua et al., 2020).

In the complicated and unstable business world of today, building a robust supply chain is essential. SCR improves supply chains' capacity to adapt, reducing the possibility that vulnerabilities would interfere with operations, preventing any negative effects from spreading, and responding swiftly to a disruption in order to restore operations to a stable state (Bevilacqua et al., 2020). The annual meeting of Ethiopian Plastic and Rubber Association in October 2023 indicated that this entails being able to minimize the majority of supply chain interruptions and significantly reduce their effects when they do occur. Several facets of the supply chain, and eventually the resilience of the organization, are vulnerable to operational risk and disruption. Basically, Ethiopian Plastic and Rubber Association was established to enhance the plastic industry in Ethiopia particularly to resolve the scarcity of plastics raw materials. All of Ethiopia's raw materials are imported, primarily from the Middle East, Europe, and Asia. For example, between 2007 and 2020, imports of raw materials for plastics increased by 13.5% yearly, from 43 kt to 224 kt, or +421% (Ministry of Industry in Ethiopia, 2023). Taweel and Al-Hawary (2021) proposed that industries may significantly increase the resilience of their supply chain by recognizing the requirement for end-to-end visibility, adopting digital operating models, and appreciating the benefits and risks. Consequently, the goal of the study investigated how supply chain performance is impacted by supply resilience in plastic industry.

1.2 Statement of the Problem

A robust supply chain is pivotal across all levels for optimizing resource utilization and meeting the demands of end-users. This is particularly critical for organizations seeking to enhance their investment base through more effective supply chain management (Abdallah et al., 2021). In Ethiopia, industries, notably in the plastic and rubber sectors, have reported substantial profit losses during the fiscal years spanning 2020 to 2022/23 (Ethiopian Plastic and Rubber Association, 2023). These losses are attributed to challenging global economic conditions exacerbated by the ongoing Russia-Ukraine conflict and the lingering impacts of the COVID-19 pandemic.

During the second annual general meeting of the Ethiopian Plastic and Rubber Association in October 2023, it was highlighted that despite global economic uncertainty and local challenges such as escalating inflation and security concerns, the plastics industry has struggled to navigate and capitalize on these circumstances. The association's emphasis on strategic adherence to a new roadmap and effective crisis management strategies underscores the critical role of supply chain resilience (SCR) in mitigating such adversities.

The association's General Office, in anticipation of its annual congress, underscored the imperative of promoting innovation and application in supply chains, emphasizing the formal recognition of modern supply networks as a national strategy. Preliminary discussions with industry experts underscored the urgent need to advocate for sustainable practices within supply chains, foster global supply chain integration, and elevate security standards. This approach not only aids businesses in understanding their economic, social, and environmental impacts but also strengthens their long-term competitiveness (Aityassine et al., 2022).

Prior research efforts (Adobor & McMullen, 2018; Taweel & Al-Hawary, 2021) have addressed aspects of supply chain risk management and green coordination but have called for deeper exploration into how supply chain resilience influences overall supply chain performance. Inconsistent findings regarding the direct impact of supply chain resilience on performance necessitate further investigation (Xinqiu & Yenchun, 2022). While some studies indicate that supply chain sustainability mediates this relationship rather than directly enhancing performance (Dhaigude & Kapoor, 2017), others demonstrate a significant positive impact of supply chain

resilience on performance (Hamidu et al., 2023).

Thus, there is a compelling need to systematically examine the interplay between supply chain performance, sustainability, and resilience, specifically exploring how resilience contributes to sustainable supply chain development and enhances overall performance. Consequently, this study aims to address the following primary research questions:

1.3 Research Questions

1.3.1 Main Research Questions

The main research question that was addressed in this study is the following; To what extent Supply Chain Resilience (SCR) affects supply chain performance in the case of plastic industry in Ethiopia

1.3.2 Research Questions

- What is the effect of supply chain agility on supply chain performance in the case of plastic industry in Ethiopia?
- What is the effect of supply chain visibility on supply chain performance in the case of plastic industry in Ethiopia?
- What is the effect of supply chain cooperation on supply chain performance in the case of plastic industry in Ethiopia?
- What is the effect of supply chain flexibility on supply chain performance in the case of plastic industry in Ethiopia?

1.4 Objectives of the Study

1.4.1 General Objective

The general objective of this research was

- To investigate the effect of Supply Chain Resilience (SCR) on supply chain performance in the case of plastic industry in Ethiopia

1.4.2 Specific Objectives

The specific objectives of this research were:-

- To find out the level of effect, supply chain agility has on supply chain performance in the case of plastic industry in Ethiopia
- To determine the level of effect, supply chain visibility has on supply chain performance in the case of plastic industry in Ethiopia
- To investigate the effect supply chain cooperation on supply chain performance in the case of plastic industry in Ethiopia
- To find out the level of effect, supply chain flexibility has on supply chain performance in plastic industry

1.5 Hypothesis

- H_1 – Supply chain agility has a positive and significant effect on supply chain performance in the case of plastic industry in Ethiopia
- H_2 – Supply chain visibility has a positive and significant effect on supply chain performance in the case of plastic industry in Ethiopia
- H_3 – Supply chain cooperation has a positive and significant effect on supply chain performance in the case of plastic industry in Ethiopia
- H_4– Supply chain flexibility has a positive and significant effect on supply chain performance in the case of plastic industry in Ethiopia

1.6 Significance of the Study

Various organizations, manufacturing industries and firms working in the supply chain greatly benefits from the research's findings since they helps them devise suitable plans for guaranteeing that the organization's supply chain operations achieve high standards of organizational performance. It gives managers instructions on how to assure outstanding organizational performance, with a particular focus on supply chain performance, by making supply chain resilience a strategic aim. Professionals working in the supply chain greatly benefits from the research's findings since they helps them devise suitable plans for guaranteeing that the organization's supply chain operations achieve high standards of organizational performance.

In order to give multinational enterprises a competitive edge, it also helps to improve the performance of their clients' supply chains and overall logistical operations. It is essential to the supply chain to minimize overall expenses while maximizing benefits to customers. The study's conclusions and suggestions help other businesses, such as suppliers, stockholders, and third-party logistics companies, offer value-added services to their clients. This is because efficient supply chain can give businesses a competitive edge by offering superior client service, including value-added services. Additionally, the study provides insights into areas that need more funding to enhance the performance of the supply chain and the delivery of logistical support services.

The report supports the government's comprehensive strategy to guarantee the expansion and improvement of manufacturing industry as well as logistics providers' performance in developing nations. The research additionally furnishes pertinent facts and insights that aid governmental and regulatory entities in devising and executing policies aimed at promoting efficient strategic supply chain management at the national level. The results of this study helps policymakers in Ethiopia evaluate and create regulations that govern logistics and supply chains. Furthermore, it gives next researchers a super chance to comprehend industrial supply chain performance setting. The study encourages researchers to use various samples from a range of industries to look at the variables influencing supply chain effectiveness.

1.7 Scope of the Study

The boundaries of the research that the author purposefully excluded from the study scope are presented in this section. The study's conceptual, methodological, geographic, and temporal scopes were specified. This study's objective to test the effect of supply chain resilience on supply chain performance, which in turn affects how well an Ethiopian company or the plastics industry performs overall.

The study's main goal is to find out how supply chain resilience affects supply chain performance in Addis Ababa's plastics industry. The primary city in the nation serves as the study's geographic boundary because the majority of industrial activity takes place there. Addis Ababa, the nation's capital, is home to more than 40% of the manufacturing sector (Addis Ababa City Administrations Industry Office, 2023). It was taken placed in Addis Ababa, Ethiopia, in

February and March of 2024. The research delimits to the four aspects of supply network resilience: supply chain agility, supply chain visibility, supply chain cooperation, and supply chain flexibility and their effects on supply chain performance using descriptive and explanatory research designs. One important factor is the capacity to respond to a crisis with effectiveness. Every business is vulnerable to risk; what makes them different is their capacity to respond swiftly, wisely, and forcefully in the event that issues arise. The foundation for building a robust supply chain is provided by including these four components into a risk mitigation strategy.

While correlation and multiple linear regression were employed in inferential analysis, the mean and standard deviation are utilized in descriptive analysis. Both secondary and primary sources of data were appropriately utilized in this research project. Conceptually, the study is constrained by dynamic capabilities framework rather than resource-based view

1.8 Definitions and Terms

- **Performance** is defined as the evaluation of constituents using efficiency, effectiveness, or social referent criteria to measure how well an organization meets the aspiration levels of constituents (Xinqiu et al., 2022).
- **Performance Measurement** is an analytical tool in the performance measurement process that records measures, displays results, and determines subsequent actions and it is a metric that can be used to quantify performance (Dhaigude & Kapoor, 2017).
- **Supply Chain Agility** pertains to an organization's capacity to promptly modify its approach, specifically concerning procurement, inventory control, and delivery, in order to fulfil constantly evolving supply chain demands (Bevilacqua et al., 2020).
- **Supply Chain Cooperation** - when two or more independent businesses plan and carry out supply chain operations together for their mutual benefit (Chandra et al., 2019).
- **Supply Chain Flexibility** means a firm can readily scale its supply chain to suit the needs of its customers (Bevilacqua et al., 2020).
- **Supply Chain Management** is defined as a discipline that integrates multi-functional approach to manage activities that not only concern single company, but the whole supply chain (Dhaigude & Kapoor, 2017).

- **Supply Chain Performance Measurement** is defined as supportive actions to ensure implementation of supply chain strategy and to ensure achievement of supply chain management objectives (Aityassine et al., 2022).
- **Supply Chain Resilience** is mainly defined the capacity for continuous reconstruction" from an organizational perspective (Lhoussaine, 2015).
- **Supply Chain Visibility** is the capacity of a management to see the entire chain and locate any disruptive events (Chandra et al., 2019).

1.9 Organization of the Study

The structure of this research project is as follows. First, the introduction briefly summarizes the study problem and its purpose. The definitions of the major terms are clarified and the thesis' boundaries are covered in the introduction. Second, the main theoretical frameworks that the thesis employs discuss the pertinent literature. Furthermore, the notion of supply chain resilience, supply chain performance, and its distinct attributes are examined from the standpoint of the organization. Thirdly, this study's research methodology is discussed. There are discussion on subjects such study design, research methodology, data collection, data analysis, and quality in qualitative research. Fourthly, empirical research employing quantitative surveys are used to present and analyze the results and conclusions depending on the supply chain of the chosen firm. A summary of the main findings, conclusions, and suggestions are given at the end.

CHAPTER TWO

RELATED LITERATURE REVIEW

In order to understand the relevant theories of supply chain performance and supply chain management, this chapter's literature review searches for pertinent industrial supply chain performance literature and related theories. It also clarifies supply chain resilience and supply chain performance management, as well as empirically related literature. These are produced using a thorough desk study of pertinent literature (journals and papers). Additionally, it offers empirical research from related studies, and at the end, the study's conceptual framework is correctly built.

2.1 Theoretical Literature Review

The definitions of supply chain resilience, agility, visibility, cooperation, and flexibility are covered in this chapter, along with how they relate to supply chain performance, performance metrics, and systems for measuring performance, as well as the significance of supply chain management. Since a commercial business's goal is to turn a profit, it also offers one of the supply chain performance measurement frameworks that is most frequently cited. To demonstrate how organizational performance assessment is connected to the competitive advantage of the company, it strikes a balance between the non-financial and financial indicators of the organization (Xinqiu et al., 2022). In summary, it provides a theoretical and empirical review together with definitions of the major topics. The chapter also demonstrates research gap and conceptual framework.

2.1.1 Supply Chain Resilience

2.1.1.1 Concept and Definitions

According to Dhaigude and Kapoor (2017), supply chain management is the process of integrating organizational units along a supply chain and coordinating the flow of materials, information, and money in order to satisfy final customer demands and increase the supply chain's overall competitiveness. In order for businesses and organizations to accomplish their

objectives, supply chain management is essential to the effective and efficient use of limited resources. By managing numerous supply chain stakeholders inside the system, meat supply chain management is utilized as an effective means of integrating resources to generate and make goods available to users.

The adaptive capability of a supply chain to anticipate and/or respond to disruptions, to make a timely and cost-effective recovery, and so progress to a post disruption state of operations – ideally, a better state than prior to the disruption – was defined as supply chain resilience based on a review of the literature. The ability of supply chains to react quickly to unforeseen circumstances in order to return operations to the prior performance level or even to a new and improved one is known as supply chain resilience, according to some definitions. Additionally, it was shown that vulnerabilities—such as resource constraints and external pressures—have a negative impact on supply chain resilience while strengths—such as efficiency, adaptation, and recovery—have a positive influence (Aityassine et al., 2022).

Supply chain resilience is currently seen as a crucial element of supply chain risk management), and as noted by various researchers, it is a very new and as of yet unexplored topic of management study (Chowdhury & Quaddus, 2017). Supply Chain Resilience is mainly defined the" capacity for continuous reconstruction" from an organizational perspective Resilience is a novel idea that has just surfaced in the realm of supply chain management (SCM) (Adobor and McMullen, 2018). Three of the many definitions of supply chain resilience that have already been compiled by Lhoussaine (2015) in the literature are given below: First, resilience is the ability of a system to return to its original state or move to a new, more desirable state after being disturbed. Second, supply chain resilience is the supply chain's adaptive capability to anticipate unforeseen events, respond to disruptions, and recover from them by preserving operations at the intended degree of connectivity and control over structure and function. Based on these definitions, the associated concept of resilience illustrates the speed at which a supply chain may resume regular operations following a hazardous incident. Resilience is really more proactive than this since it acknowledges that the chain may not have been operating at peak efficiency prior to the incident (Chowdhury & Quaddus, 2017). Finally, it is provided as a clear explanation of the relationship between vulnerability and resilience. "We can phrase this aim in terms of decreasing a supply chain's vulnerability, increasing its ability to withstand unexpected events,

improving sustainability, or increasing resilience," the author said. A supply chain's vulnerability indicates how likely it is to be impacted by dangerous occurrences (Hamidu et al., 2023).

According to Mandal et al., (2016), a robust supply chain needs to build resilience skills in order to respond to unanticipated events' negative effects and swiftly recover to its initial form. It appears that supply chain managers lack direction regarding the expected outcomes of implementing resilience-focused solutions due to a lack of clarity regarding the performance outcomes linked with resilience. They draw attention to the connection between business indicators and a disruptive event. Accordingly, disruptions in the physical and/or informational flows among supply chain participants may result in unfavorable outcomes including product shortages, delivery delays, or a lack of supply chain responsiveness (Castillo, 2023).

It is important to note that the aforementioned definitions of organizational resilience have a similar viewpoint that goes beyond the recovery limit and denotes a certain degree of adaptability, improvisation, and flexibility to both positive and negative environmental effects (Bevilacqua et al., 2020).A supply chain is said to be resilient if it can swiftly revert to its prior condition or transition to a better one (Lhoussaine, 2015). As such, it characterizes the capacity to revert to a stable condition following a disruption. Additionally, this idea seems to be pertinent to the analysis of flow continuity following a supply chain break.

2.1.1.2 Supply Chain Resilience Measurements

SCR is centered on handling transient disruptive occurrences. It can be summed up as follows: the ability to plan ahead and build a supply chain network that anticipates unforeseen difficult or unfavorable events and can respond to disruptions in a flexible way while maintaining control over the network and structure of the chain. According to Castillo (2023), SCR has the potential to improve and become more profitable, or at least recover to its initial position before to the disruption. All of the attributes of SCR—capacity, readiness, adaptive capability, and timely recovery to the initial state—or, ideally, an improved state—are covered by this description. Therefore, there is a great chance of widespread supply chain disruption during significant global trends and events. With labor shortages and inventory depletion expected to have long-term impacts well into the future, the pandemic demonstrated this fact in a way never seen before (Xinqiu & Yenchun, 2022). According to the definition of SCR, supply chain resilience is an

organizational competency. Therefore, this idea greatly benefits our investigation as the ability to manage risk is no longer the only requirement for supply chain resilience. More importantly, this capability puts a business in a stronger position than rivals to handle disruptions and even benefit from them. The improvement of actors, relationships, activities, and functions within the supply chain—which is made up of interconnected and dependent organizations—is encouraged by the creation of resilience (Castillo, 2023). The ability of the supply chain system to return to its initial condition or a better one following a disruptive incident is how it is related to supply chain resilience. Based on this, Ralston and Blackhurst (2020) contend that supply chain resilience can occasionally be related to a company's capacity to bounce back from negative events in a reasonable amount of time.

2.1.1.3 Foundation Theory of Supply Chain Resilience - A Dynamic Capabilities Perspective

Similar to the Resource-Based view, the Dynamic Capabilities (DC) based view takes a dynamic approach to examining essential concerns including the firm's performance and skills. The resource-based approach's shortcomings are addressed by the DC-based view, which also deals with questions of variable environmental dynamics and sustainable competitive advantage. The idea of DC deals with change, despite the existence of a "dynamic resource-based view". It is believed to be important to an organization's capacity to implement change in a methodical and beneficial manner. It raises concerns about how the company's resources and competencies can be continuously integrated, adjusted, or changed to deal with changes in the external environment (Yuan & Beatrice, 2012). A number of tactics are suggested to obtain this aptitude, including various suppliers, safety inventory storage, responsive pricing strategy, delay strategy, and reorganization of resources to renew and recreate the advantages. The Resource-Based View (RBV), which emphasizes the idea that resources and capabilities are the basis of competitive advantage, places a similar emphasis on capability and strategy.

2.1.2 Supply Chain Performance

2.1.2.1 Concept and Definitions

Scholars in the field of supply chain management are advocating for frameworks that can assess various firms involved in the supply chain. The idea that performance evaluation is critical to the organization's self-improvement was endorsed. Measuring the effectiveness of the entire supply chain has also become more crucial for multinational corporations to successfully alter the business climate. In fact, assessing supply chain performance is seen as a component of a business's competitive strategy (Xinqiu & Yenchun, 2022).

It is suggested that the goals of monitoring supply chain performance should be to identify areas for improvement, to manage supply networks more effectively, and to identify prospects for future success. A number of academics offer standards for effective SCPM. A paradigm for measuring the success of the supply chain that incorporates three levels of metrics—output, resources, and flexibility—is also suggested. Customer response is gauged by output, which includes things like delivery time, product/service quality, and product production volume. The resources level calculates the amount of energy used, equipment utilization, inventory levels, and overall operating expenses, including labor, maintenance, and manufacturing costs, in order to reach a high degree of efficiency. Measures of flexibility include improved customer service, the capacity to adapt to changes in demand, and to regulate to low supplier and delivery performances (Dhaigude & Kapoor, 2017).

According to Abdallah et al., (2021), supply chain operations should be quantified in terms of the following stages: planning, sourcing, manufacturing/assembling, and customer delivery. Additionally, operational, tactical, and strategic metrics must to be used at every stage. Metrics that aid in top-level management decision-making are referred to as strategic metrics. Examples include measurements of competitiveness, financial disclosures from the company, and goals-enhancement metrics. The metrics at the tactical level, which are the second level, take into account gauging performance in relation to goals in order to accomplish the outcomes outlined at the strategic level. Tactical level metrics assist middle managers in making decisions by accounting for resource allocation. Operational metrics aim to measure personnel at the operational level so that measurements at the tactical level can be obtained if they satisfy their aims.

Effective SCPM, according to Saglam et al. (2020), consists of features including measuring all pertinent aspects, being able to compare the measurement to diverse, measurable data, and being in line with organizational strategy. In addition to capturing financial and non-financial measurements of organizational performance, effective performance measurement systems also enable decision-making and monitoring at the strategic, tactical, and operational levels. Finally, it is suggested that effective SCPMS criteria come from strategy, that measures be intelligible, that stakeholders' demands are taken into account, that the measures center on business processes that create value, and that the measures engage stakeholders in order to support the company's success.

2.1.2.2 Supply Chain Performance Measurement Framework

Tiia (2018) conducted an analysis of supply chain management systems by modifying and applying Pettigrew's methodology. The goal of this study is to use the framework that contributes to the development of the supply chain's concept, context, and process by offering a thorough examination of the chain. Three components make up the CCP framework: content, context, and process. The term "context" describes an operational setting where measurement takes place in the context of the supply chain as well as the organization. Metrics and standards are referred to as content. The frameworks and techniques used to implement performance measurement are part of the process. Given that one of the research topics examines the connection between supply chain performance assessment and organizational operations standards, this framework offers a thorough analytical tool for the study. Eunice (2015) went on to say that decisions made on inventory, transportation, facilities, and information affect a supply chain's performance, including its responsiveness and efficiency. The following are some of the variables that impact supply chain and procurement performance: quality, flexibility, supply chain relationships, technology, and environmental uncertainty. The term "environmental uncertainty" describes problems with the environment that arise throughout the production process or unforeseen shifts in rivals, suppliers, customers, and technology (Chandra et al., 2019).

2.1.3 Relationship between Supply Chain Resilience and Supply Chain Performance

Xin, Qianhui, Qiao and Markus (2023) stated an early example of supply chain resilience is the disruption of the system brought on by the widespread protests and sudden spike in the price of oil in Great Britain in September 2000. Since then, supply chain resilience experts have become interested in the occurrence of earthquakes, tsunamis, violent terror, and other disasters. The idea of supply chain resilience has progressively become more deeply understood by academics. Initially, researchers identified supply chain resilience as a type of supply chain's capacity to manage disruption risk. Consequently, predicated on based on the ability to deal with interruptions, scholars focus on the recovery function and recovery speed of resilience (Abdallah et al., 2021).

Supply chain resilience encompasses more than just disaster recovery; it also entails an active structural investigation of the supply chain's capacity to withstand and overcome unanticipated occurrences (Saglam et al. 2020). When competition stalls, supply chain resilience can act as a stimulus to advance both the main business and the supply chain as a whole. Improvements in supply chain agility, redundancy, and flexibility have all been demonstrated by enterprise practice to improve supply chain performance (Bevilacqua et al., 2020). Supply chain performance, a crucial component of supply chain management, encompasses not just product performance—such as cost, quality, and reliability—but also the supply chain's overall operational efficiency, or its capacity to adapt to shifts in demand and unanticipated disruptive occurrences (Castillo, 2023).

Supply chain management is the process of extending the concept of integration to upstream suppliers and downstream customers. Supply chain integration so naturally emerges as a crucial variable to gauge supply chain performance (Abdallah et al., 2021). The capacity to swiftly adapt to operational disturbances through flexible forecasting and contingency planning, from the procurement of raw materials through transportation and the ultimate delivery of goods and services, is known as supply chain resilience. The ability of a supply network to withstand and bounce back defines its resilience. This entails being able to minimize the majority of supply chain interruptions and significantly reduce their effects when they do occur (Chandra et al., 2019).

Several facets of the supply chain, and eventually the resilience of the organization, are vulnerable to operational risk and disruption. Global catastrophes, like the COVID-19 pandemic,

can have a profound effect on suppliers, labor markets, and supply chain logistics. Unexpected competition, abrupt market developments, or even quick shifts in consumer purchasing habits can all cause supply chain disruptions (Hamidu et al., 2023). The most adaptable and robust supply networks aren't just constructed to withstand setbacks and bounce back. They can forecast, anticipate, and react swiftly to whatever possibilities or hazards the future presents because they are constructed with procedures and cutting-edge supply chain technologies. Owing to the interconnectedness of all its connections, a minor issue in a remote area can potentially jeopardize the integrity of an entire worldwide supply chain (Taweel & Al-Hawary, 2021).

2.1.3.1 Supply Chain Agility and Supply Chain Performance

The ability of a supply chain organization to react quickly and prevent rash decisions in response to changes in consumer demand as well as the consequences of market vulnerabilities like labor or raw material shortages, natural disasters, and geopolitical crises is known as supply chain agility (Abdallah et al., 2021). Supply chain agility pertains to an organization's capacity to promptly modify its approach, specifically concerning procurement, inventory control, and delivery, in order to fulfill constantly evolving supply chain demands (Hamidu et al., 2023). A system of product distribution that prioritizes speed, economy, flexibility, responsiveness to market demands, and high productivity is known as an agile supply chain. The ability of an e-commerce and supply chain to respond swiftly and effectively to shifts in the market and consumer demand is known as supply chain agility (Xin et al., 2023).

The ability to respond swiftly to an unpredictable shift in supply and demand is known as supply chain agility (Bevilacqua et al., 2020). According to Chandra, Gunjan and Gaurav (2019), an agile supply chain has higher velocity to quickly adjust to unforeseen changes in supply or demand, and acceleration to speed up response times. It is evident that agility is necessary for flexibility in order to respond swiftly to unforeseen circumstances and preserve a different edge in a fuzzy and unfavorable situation. By maintaining a significant level of responsive suppliers, supply chains can reduce the risk associated with stock (Hamidu et al., 2023).

In today's global market, organizations need to be agile since being responsive is a talent that is becoming more and more crucial (Scholten & Schilder, 2015). Agility, which is defined as the company's capacity to swiftly modify its supply chain strategies and operations, is another

quality that is directly related to the success of strategic supply chain management (Mandal et al., 2016). Agility can also be described as "the capacity to manage unforeseen obstacles, withstand extraordinary risks in the business environment, and seize changes as chances (Xinqiu & Yenchun, 2022).

2.1.3.2 Supply Chain Visibility and Supply Chain Performance

The capacity to monitor or follow inventory as it flows through the supply chain is known as supply chain visibility (Chandra et al., 2019). An organization's entire, end-to-end view of its personnel, inventory, and warehouse management procedures in real time is known as real-time supply chain visibility (Bevilacqua et al., 2020). The capacity to track various items and/or products in transit, providing a clear picture of the inventory and activities, is known as supply chain visibility. With proactive status updates, decreased disruptions, risk reduction, and inventory management in motion; shippers can enhance customer experience and control costs (Castillo, 2023).

According to Chandra et al., (2019), supply chain visibility is the capacity of a management to see the entire chain and locate any disruptive events. An intervening tool called visibility gives managers the chance to respond quickly to disruptions or unsettling impacts in light of precise, on-going assessment. A company needs speed to react to changes more quickly and visibility to better identify changes in order to attain agility. In order for managers to respond to changes, visibility is necessary because it makes changes easier to detect (Lhoussaine, 2015). The capacity to monitor or follow inventory as it flows through the supply chain is known as supply chain visibility. An organization's entire, end-to-end view of its personnel, inventory, and warehouse management procedures in real time is known as real-time supply chain visibility (Xin et al., 2023).

An organization's entire, end-to-end view of its personnel, inventory, and warehouse management procedures in real time is known as real-time supply chain visibility (Dhaigude & Kapoor, 2017). Complete visibility into shipments and inventory on the move is made possible by sophisticated, AI-driven supply chain platforms, which cover everything from air freight and shipping cargo to the precise bin level in the warehouse. Supply chain visibility's main objectives

are to maximize inventory levels, enhance trading partner cooperation, reduce risk, and establish accountability (Chandra et al., 2019).

2.1.3.3 Supply Chain Cooperation and Supply Chain Performance

Players work together through open communication, cooperation (allowing manufacturers and suppliers to work together), and relationship-based integration. Large-scale actors (suppliers, logistics service providers, etc.) create industrial complexity; the numerous interactions among them necessitate both cooperative partnerships and robust coordination between the actors (Lhoussaine, 2015). The availability of information that is visible to the actors throughout the supply chain is crucial for the connections between supply chain members. Effective risk management and disruption anticipation are made possible by collaborative partnerships. Collaboration helps supply chain organizations stay together during a crisis (Dhaigude & Kapoor, 2017). A high degree of cross-supply chain collaboration can help mitigate a risk. The two main contributions of supply chain collaboration are incentive alignment and decision synchronization, which are essential for effective reactions to organizational-level disruption (Xinqiu & Yenchun, 2022). It is noted that coordinating the provision of goods or services by coordinating the operations of two or more supply chain organizations; this gives them a competitive edge by enhancing efficiency or providing better services. Collaboration in the supply chain refers to working together with internal divisions and outside partners to maintain an optimal flow across the chain in order to effectively fulfill demand and guarantee on-time, complete delivery (Bevilacqua et al., 2020).

2.1.3.4 Supply Chain Flexibility and Supply Chain Performance

The ability of a company to effectively adapt to changes in opportunities, market conditions, interruptions, and demand is known as supply chain flexibility. It entails having the flexibility to adjust course quickly, streamline procedures, and reallocate resources to satisfy shifting consumer expectations (Aityassine et al., 2022). A number of interrelated aspects, including as technology capabilities, inventory management techniques, production flexibility, supplier dependability, and demand fluctuation, all have an impact on supply chain flexibility (Dhaigude & Kapoor, 2017).

Compared to traditional supply chain management, the flexibility to quickly modify production levels, raw material purchases, and transportation capacity offers enormous advantages. Conventional supply chain management techniques are inflexible and do not permit quick adjustments when necessary. When demand rises or falls, or when there is a holdup in the supply chain, this is known to cause disruptions to the entire supply chain. The supply chain's flexibility enables it to adapt to the inevitable daily changes that occur (Lhoussaine, 2015). Supply chain experts need to overcome obstacles using a platform that extracts valuable information from massive volumes of high-grade data. Because of this, supply chain planning becomes more flexible and allows for the end-to-end impact of advanced applications like scenario modeling and multi-echelon inventory optimization (MEIO) (Bevilacqua et al., 2020). Organizations that possess the technology necessary to facilitate supply chain flexibility are more efficient and quick to respond since possible disruptions have been anticipated and planned for. Although incorporating flexibility into the supply chain is challenging with inflexible spreadsheet-based forecasting, artificial intelligence-based solutions make it simple (Chandra et al., 2019). Artificial intelligence underpins supply chain planning, with algorithms powering various platform features like demand forecasting, task automation, forecast method selection, and scenario modeling. Firms' supply chain planning will be more resilient when it is used an intelligence-based approach to flexible planning, surpassing both the exceptional and the unexpected (Xinqiu & Yenchun, 2022).

2.2 Empirical Literature Review

2.2.1 Supply Chain Resilience and Supply Chain Performance

Castillo (2023) sought to address the questions of whether resilience is "just another" supply chain (SC) concept or if it is a distinct theory by identifying the past, present, and future directions of research in the SCRES literature. With a 62.04% rise, the results demonstrate how resilience has emerged as one of the primary themes in SC research following the COVID-19 pandemic. There remains no overarching theory of SCRES in spite of the wealth of material. A potential obstacle to the development of this kind of theory is the diversity of definitions and models of SCRES that are already in use. This is a weakness that has to be addressed in future research, according to this study. The findings indicate that integrating SCRES with other

disciplines, such ecology and engineering, can aid in developing a comprehensive theory of SCRES.

The relationship between supply chain resilience (SCR) and supply chain performance (SCP) of manufacturing firms in Ghana was examined by Hamidu et al. (2023) to determine the moderating effect of supply chain disruptions (SCD) (supply chain – supply disruption, catastrophic disruption, and infrastructure disruption) using explanatory study. To achieve the study goals, partial least squares structural equation modeling, or PLS-SEM, was used. First, SCR significantly improves SCP, according to the study. Second, with the exception of supply chain catastrophic disruption, which had an adverse effect, the authors discovered solid evidence to support the claim that SCD significantly modifies the link between SCR and SCP in a positive way. They can deduce that the SCR and SCP nexus are affected differently by the components of SCD.

Aityassine et al., (2022) aimed to determine the impact of supply chain resilience on supply chain performance as defined by supply chain agility, flexibility, and collaboration. A sample of workers from Jordanian chemical industrial businesses was chosen, and information was gathered via an electronic questionnaire. After data was analyzed using SmartPLS 3.0, the findings demonstrated that, while supply chain flexibility had little impact on supply chain performance, supply chain agility and collaboration—two important components of supply chain resilience—had a substantial impact on it.

Maruf, Mohammed and Renu (2019) adopted the contingent resource-based view (CRBV) viewpoint, attempts to investigate the operational environment in which supply chain resilience (SCRE) is probably going to improve an organization's supply chain performance (SCP). The conditional effect of SCRE on SCP at various levels of SCRPs and NCs was also examined by the authors. Both qualitative and quantitative methods were applied in this investigation. A field research was done for the qualitative method, while 274 clothing manufacturers and their responses to a survey questionnaire were used for the quantitative investigation. The proposed research models were statistically tested by the authors using Hayes PROCESS enabled multiple regression analysis and structural equation modeling. The study's conclusions showed that the relationship between SCRE and SCP was individually regulated by SCRP and NC. Even though

the NC value was high, the interaction effect of SCRP and NC increased the relationship between SCRE and SCP.

Chandra et al., (2019) stated that customers' needs and interests are constantly shifting in the competitive and dynamic market of today, which increases the danger of a supply chain disruption. In this case, a company's supply chain needs to be robust in order to succeed. The majority of businesses understand that performance evaluation is necessary in order to have a resilient supply chain. This article aims to explore supply chain resilience and pinpoint factors that can boost efficiency and strengthen a supply chain's resilience. The published articles on this topic were gathered and arranged to extract some important data. Following the categorization and examination of the gathered literature, seventeen supply chain resilience performance indicators were identified. These metrics are used to create a supply chain resilience framework, which helps supply chain management assess and endure disruptions.

2.2.2 Factors and Effects of Supply Chain Resilience on Supply Chain Performance

2.2.2.1 Supply Chain Flexibility and Supply Chain Performance

According to Mandal et al. (2016), who tested the effects of supply chain capabilities (such as flexibility, velocity, visibility, and collaboration) on resilience, each of these skills significantly affects resilience. Adobor and McMullen (2018) examined supply chain resilience utilizing the three main kinds of resilience: engineering, ecological, and evolutionary resilience. They found that all three forms are necessary for a supply chain to recover from disruptions, or resilience. The authors claim that adaptive qualities including flexibility, adaptive capacity, and functional redundancy are what determine ecological resilience. However, supply chain performance was found to be unaffected by supply chain flexibility by Saglamet al., (2020).

2.2.2.2 Supply Chain Collaboration and Supply Chain Performance

Scholten & Schilder (2015) examined the role of collaboration in supply chain resilience using a number of case studies from the Dutch food industry. They discovered that cooperative efforts, mutually created knowledge, cooperative communication, and information sharing are important preconditions for supply chain resilience. Supply chain resilience is largely influenced by supply chain capabilities like collaboration, flexibility, velocity, and visibility, according to some

studies (e.g., Aityassine et al., 2021; Mandal et al., 2016). Supply chain resilience is largely influenced by supply chain performance. According to some research (Botes et al., 2017), supply chain collaboration affects supply chain resilience's antecedents—flexibility, rapidity, and visibility—rather than the resilience itself. This study, based on available data, postulates the following relationship between supply chain performance and collaboration.

2.2.2.3 Supply Chain Agility and Supply Chain Performance

One important attribute of supply chains is agility, which has a major impact on supply chains prior to disasters (Aityassine et al., 2021). Supply chain agility significantly mediates the relationship between supply chain performance and supply chain management quality. This outcome is predicated on the idea that supply chain performance is directly and significantly impacted by supply chain agility (Mandal et al., 2016). Supply chain flexibility and agility are both strongly and favorably correlated with supply chain performance, according to a study by Taweel and Al-Hawary (2021) on the mediating role of innovation capability on the relationship between strategic agility and performance. It is a mediating function of supply chain agility on the link between supply chain orientation and supply chain performance.

2.2.2.4 Supply Chain Visibility and Supply Chain Performance

The primary objectives of supply chain visibility (SCV) are to improve the overall performance of businesses, make decision-making easier, and strengthen the supply chain network's resilience and sustainability. Businesses can increase visibility and, consequently, SCP by establishing efficient external linkages (Taweel & Al-Hawary, 2021). Supply chain visibility (SCV) facilitates the seamless exchange of information in all directions, hence ensuring transparency throughout the supply chain. Additionally, SCV facilitates easier operations by streamlining organizational procedures (Aityassine et al., 2021). If every link in the chain has sufficient visibility, a supply chain can swiftly recover from setbacks and resume its previous level of performance (Botes et al., 2017). SCV serves as a strategic warning system, providing businesses enough time to coordinate with their supply chain partners and lessen the disruptive effect (Saglamet al., 2020). Some ways to do this include answering customer inquiries quickly, keeping an eye on and managing customer orders, and improving the quality of post-sale support (Taweel& Al-Hawary, 2021). The capacity to track parts, components, or goods as they are in transit from the maker to the final destination is known as supply chain visibility, or SCV. SCV

aims to enhance and fortify the supply chain by providing easy access to data for all parties involved, including the client (Mandal et al., 2016).

2.3 Identified Research Gap

Several scholars have emphasized the significance of supply chain resilience as critical aspects of supply chain performance. In order to answer the concerns of whether resilience is "just another" supply chain (SC) concept or if it is a unique theory, Castillo (2023) outlined the historical, contemporary, and planned paths of research in the SCRES literature. This study indicates that this is a vulnerability that needs to be addressed in further research. In order to ascertain the moderating effect of supply chain disruptions (SCD) (supply chain – supply disruption, catastrophic disruption, and infrastructure disruption), Hamidu et al. (2023) looked at the relationship between supply chain resilience (SCR) and supply chain performance (SCP) of manufacturing firms in Ghana.

Aityassine et al., (2022) aimed to determine the impact of supply chain resilience on supply chain performance as defined by supply chain agility, flexibility, and collaboration. The findings demonstrated that, while supply chain flexibility had little impact on supply chain performance, supply chain agility and collaboration—two important components of supply chain resilience—had a substantial impact on it. The contingent resource-based view (CRBV) was chosen by Maruf et al., (2019) who made an effort to look into the operational environment where supply chain resilience (SCRE) is likely to enhance an organization's supply chain performance (SCP). The results of the study demonstrated that SCRP and NC independently regulated the link between SCRE and SCP. The link between SCRE and SCP was strengthened by the interaction effect of SCRP and NC, despite the high NC value. Customers' wants and interests are always changing in today's competitive and dynamic market, according to Chandra et al. (2019), which raises the risk of a supply chain interruption. In this situation, a business's supply chain must be strong to be successful. The purposes of these studies were to examine supply chain resilience and identify elements that can increase effectiveness and fortify a chain's resilience.

In this research, the study investigated the intricate relationships between SCR on supply chain performance by concentrating on the Ethiopian plastic industry supply chain. Notably, Ethiopian plastic business has grown to be a prominent industry, accounting for a sizable portion of exports. This analysis is motivated by this backdrop, and the main focus of our research is to

examine the relationships between supply chain resilience and supply chain performance. The author specifically focused on the context of Ethiopian plastic industry in order to better understand their effects supply chain resilience on supply chain performance.

2.4 Conceptual Framework

The conceptual framework of the study investigated causal relationships between dependent and independent variables or effects supply chain resilience on supply chain performance shown below:

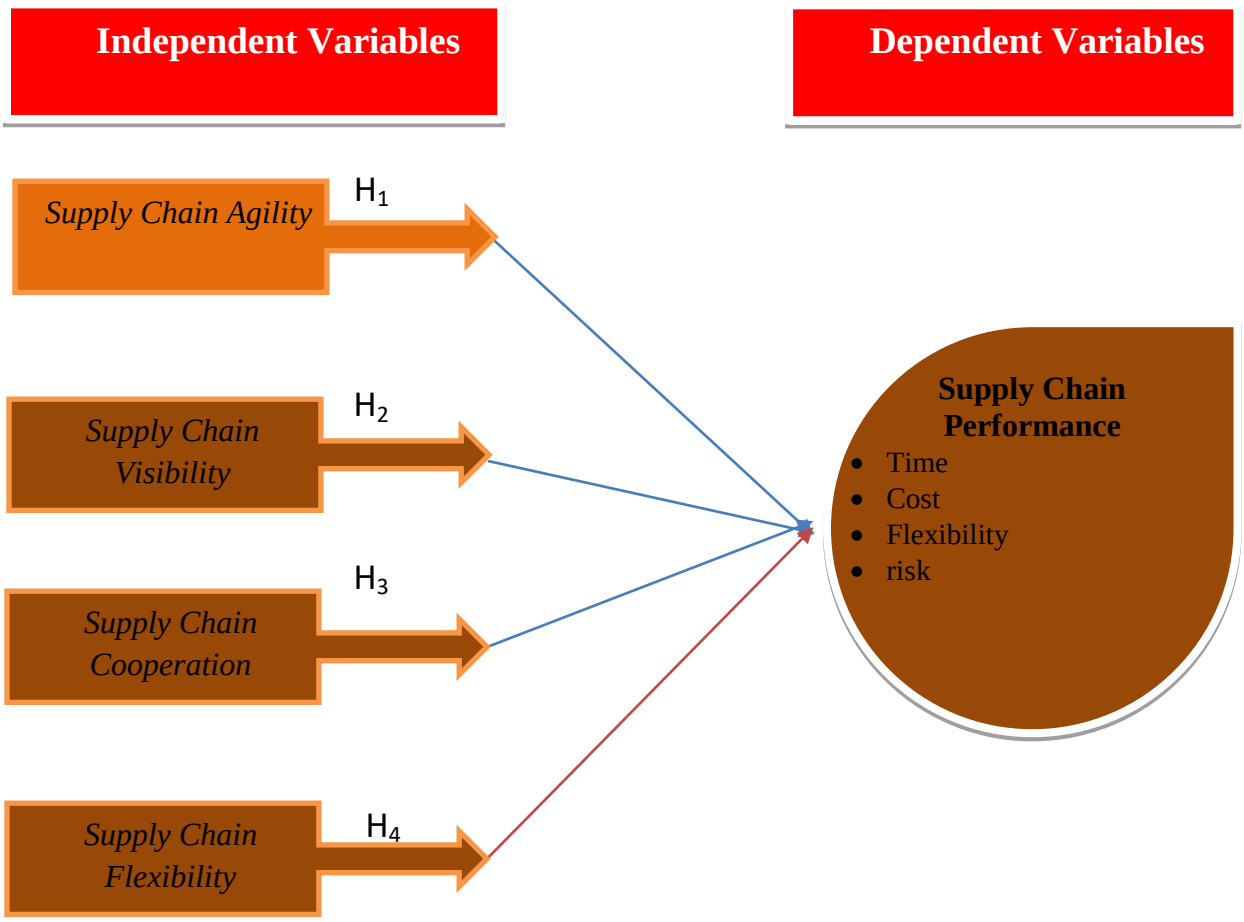


Figure 1 Conceptual Framework

Adapted from Aityassine et al., (2022)

A conceptual framework is a set of broad ideas and principles taken from relevant fields of enquiry and used to structure a subsequent presentation. Thus, Aityassine et al., (2022) make three assumptions in order to calculate the impact of supply chain resilience's three dimensions—flexibility, agility, and cooperation—on supply chain performance. The researchers determined how supply chain resilience affects supply chain performance as shown by supply chain agility, flexibility, and collaboration. These researchers lacked to the integrity of the supply chain even while it enables more affordable production and a larger range of products. For uninterrupted manufacturing and, consequently, for customer satisfaction, a disturbance-free supply chain is essential. Because of this, companies are constantly searching for methods to reduce risks and avoid disruptions. Increasing the visibility of the supply chain will help achieve this. Information sharing inside a supply chain is directly related to supply chain visibility. Supply chain visibility (SCV) is the means by which the supply chain can attain a transparent and all-encompassing perspective of its activities, from the beginning to the end (Maruf et al., 2019).

This involves efficiently sharing important and useful information with all of the supply chain's stakeholders, which improves supply chain. Thus, this study included supply chain visibility and it investigated the effect of supply chain resilience on supply chain performance in plastic industry in Ethiopia. Conceptually, this has four independent variables such as supply chain agility, flexibility, visibility and cooperation. It has one dependent variable supply chain performance and it is derived by new supply chain management theories make use of dynamic capabilities. When acquiring knowledge inside an organization or creating new capabilities, these dynamic capabilities have an impact on how well static capabilities are used. The finding of a competitive advantage follows from this.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

This section describes the general methodology uses in carrying out the study. It discusses the study design & approach, target population and sampling size, sources of data, data collection instrument, data analysis methods, reliability and validity assurance, ethical consideration - which deals with the study procedure and an important part of the study activity that helps to reach its target.

3.1 Description of the Study Area

3.1.1 Study Site Selection

The Addis Ababa City Administration was the site of this study. The administrative division of Addis Ababa into eleven (11) sub-city administrations was the study's focus. It houses the sector bureaus of the Federal Government as well as the main offices of several international organizations. Ethiopia's capital city is the subject of the investigation. Addis Ababa's residents have more access to the digital world and a plethora of companies and industrial parks.

3.1.2 Plastic Industry and Industrial Association in Ethiopia

This study was involved in plastic industry found in Addis Ababa. The only organization dedicated to advancing the expansion and development of Ethiopia's plastic and rubber sector is the Ethiopian Plastic and Rubber Association (EPR), which was founded in 2004. According to statistics, Ethiopia is home to more than 4,000 manufacturers of rubber and plastic products. As of late, over 500 of them have joined EPR, and that figure is rising quickly. In order to address job concerns in the plastic and rubber industries and develop knowledge in the field, EPR is also eager to collaborate with technical institutes, universities, and colleges. Meetings, conferences, and seminars involving government agencies and other stakeholders are regularly organized. Regular business delegations are arranged to exhibits such as PTexpo, K, China plas, Taipei plas, and others. The association requires equipment, molds, plastic raw materials, and additive manufacturers worldwide to assist our members with training, promoting new technologies, and know-how. Since it is the only association for plastic and rubber, EPR has represented its

members on government rule and regulation preparations, policy preparations, and recognition from the Ethiopian Chemical Institute, Trade and Industry Ministers, Customs Commission, and the Ethiopian government. It is also a member of the Ethiopian Chamber of Commerce. As EPRs, its responsibilities include advocating policy changes, representing our industry in government offices, gathering manufacturer data and converting it into information that is helpful to the manufacturer and other stakeholders, and so on. Gaining the best possible outcomes for our members is our primary goal (Ethiopian Plastic and Rubber Association (EPR), 2023).

3.2 Research Approach

Quantitative research, which analyzes the scope, diversity, regularity, and other aspects of events, was employed in this study to collect and analyze numerical data (Creswell, 2014). The researcher used a suitable research strategy (quantitative method) in this investigation. The information gathered from the survey was examined and evaluated using statistical models, such as percentages, to determine the mean and standard deviation for the study's whole population. Furthermore, this research used statistical methods to empirically investigate the cause and effect relationship between the variables (supply chain agility, flexibility, visibility, and cooperation). Conversely, qualitative research poses open-ended questions and gathers verbatim data from subjects or events. In a similar vein, Abdallah et al., (2021) used quantitative method in terms of the following stages: planning, sourcing, manufacturing/assembling, and customer delivery.

3.3 Research Design

Numerous factors, including the techniques of data collecting, the time dimension, the involvement of researchers, and the study's objective, can be used to characterize the research design. However, the classification that is most frequently employed is the one that is determined by the study's objectives. According to the goal of the study, there are three different kinds of research designs: exploratory, descriptive, and causal (Creswell, 2014). The exploratory study offers more information and suggestions for figuring out the true nature of the problem being studied. The descriptive research is based on previous understanding and aims to describe certain phenomena; it is more of a means than a goal because it stimulates further explanation. Causal

study elucidates the causal connections among variables. These three fundamental designs have connections, and the research can combine more than purpose (Creswell & Creswell, 2018). .

The purpose of research designs is to provide valid, objective, accurate, and cost-effective answers to research questions. Accordingly, this study characterized supply chain resilience and performance in terms of agility, flexibility, visibility, and cooperation. Furthermore, the research endeavoured to address the suggested research inquiries by examining four key components: supply chain agility, flexibility, visibility, and cooperation. The study looked at the relationships between supply chain performance and agility, flexibility, visibility, and cooperation. As a result, the research type for the study was predominantly explanatory, the level of analysis was on organization level (See Section 3.5), and the setting of the research focused on field study and its temporal aspects was mainly concentrated on cross sectional study. When conducting a cross-sectional study, the researchers gather information at one time from a large number of different participants. Researchers that use cross-sectional research observe variables without changing them (Creswell, 2014). Along the same lines, Maruf et al. (2019) used structural equation modelling and multiple regression analysis using Hayes PROCESS enabled to statistically test the suggested research models.

3.4 Unit of Analysis

Organizations from the chosen industrial sector or plastic industry enterprises or organizations served as the study unit of analysis.

3.5 Data Type and Sources

The primary and secondary data was utilized by the researcher. Employees of particular plastic sector companies were asked a questionnaire in order to provide the primary data. In addition to the questionnaire, publications, and journals were used to gather primary data from managers and experts. Primary data is thought to be the knowledge a researcher discovers on his own about a certain subject. The main advantage with this type of data was supposed to collect data with the research's purpose in mind. It suggests that the data that comes from it was better in line with the goals and research questions.

3.6 Target Population and Sampling

3.6.1 Target Population for Questionnaire

To make the study's findings more broadly applicable, the researcher determined the target population. EPR presently has 127 very engaged plastic manufacturing companies as members of ERP, and that number is rapidly increasing. Therefore, since Hamidu et al. (2023) used supply chain representatives of manufacturing businesses, the overall target group of this study consisted of 127 supply chain representatives of plastic industries or enterprises active in the plastics industry.

Table 1 Detail of the Target Population

Nature of the Plastic Industry	Target Population
Fiber Glass, Flexibility Packaging and Foam	11
Household	13
Packaging	8
PET perform and Cap	17
PIPE HDPE	18
Pipes and PP Bag	17
PVC	24
Re-treading and Recycling and Tyre	19
Total	**127**

Source: ERP, 2023/2024

The number of items chosen to represent the entire population is called a sample (Creswell, 2014). The subject on which the measurement is being made as the study unit is known as the sample size. The process of choosing which objects to observe for a particular study is known as a sample design (Kothari, 2019). Determining the proper sample size is crucial due to the huge target population, time, and cost considerations. In this sector, 127 currently operating companies or businesses were included in this analysis. This study used the census method, which is a very dependable way to collect data, to verify a greater level of accuracy than other approaches. The Census approach yields comprehensive data since every item is thoroughly examined. It is recognized that a statistical investigation in which this study’s data was collected for each and every element or unit of the population. It is also known as 'complete enumeration' or '100% enumeration' or 'complete survey' (Creswell, 2014).

The industry sector that produces a range of plastic and rubber products, or that operates in numerous places surrounding the study area, formed the base of the stratum. This is because they install multiple goods at different locations around the study area and their workplace, depending on what the needs of the industry need. The survey is open to inclusion for all targeted industries hat actively participate as partners in the Ethiopia Plastic Association

3.7 Data Collection Instruments

A questionnaire was used to gather the data, which was then sorted and tallied to explain the current condition of events. A questionnaire is used to gather data because it allows for the quick and easy collection of a large amount of information from each respondent. It mostly drawn from Maruf et al., (2019) including supply chain visibility, flexibility, cooperation and performance and Adobor and McMullen (2018), Taweel & Al-Hawary (2021), and Aityassine et al. (2022), who investigated the impact of supply chain resilience on supply chain performance of industrial businesses. Only closed-ended questions were included in the questionnaire design. Because the responses to the closed-ended questions are more time- and labour-efficient and offer a variety of options, respondents choose one. The measurement question was a five-point Likert scale because five point The Likert scale is a widely used rating system that enables respondents to rank items from best to worst or from high to low. It is often advised that this method of measuring be used because it is more appropriate and simpler for respondents to comprehend. The questionnaire includes questions that aren't entirely relevant to the goals of the study. There were three sections to the questionnaire that was attached in Appendix I. The background data of the respondents and state entities was recorded in Section A. The extent and contributing elements of supply chain resilience was documented in Section B. The agreement with the supply chain performance in the research field was the subject of Section C.

3.8 Data Collection Method

While there are many ways to administer surveys, the most common ones include mail, phone, and in-person. All these approaches have pros and cons of their own, generally speaking. Response rate versus cost is the primary consideration for the researcher when choosing the survey administration format. Geoffrey, David, and David (2005) provided a general rule of thumb that suggests that postal surveys are the best option when cost is a concern, but face-to-

face or telephone surveys are the best options if a high rate of return is the primary objective. Understanding the study's data collection methodology is made easier by the table above.

3.9 The Credibility of the Research

In this study, reliability and validity are two specific research design emphases that must be given careful consideration in order to minimize the likelihood of providing the incorrect result.

3.9.1 Validity

In order to verify the appearance, applicability, and representativeness of the survey in this study, face and content validity are supported. It is done by a variety of people, including supply chain and procurement specialists and experts in the field. Additionally, the instrument used to create the survey met the need to measure the desired issues, and it was constructed based on pertinent theories and verified by specialists.

3.9.2 Pilot Test

Simultaneously, the survey underwent a pretest with ten willing and active employees and partners, specifically those operating in the Addis Ababa those did not register in EPA. In order to determine whether the questionnaires can yield the necessary data to match the study's objectives and hypotheses, a pilot testing study was conducted. In order to verify its validity, twelve questionnaires were sent to various logisticians and supply chain specialists.

3.9.3 Reliability

The Cronbach's alpha statistics was used to assess the instrument's degree of reliability, which is determined by the consistency of the variables. According to Croswell (2012), Cronbach's alpha is a reliability metric that measures how much of the volatility in the underlying construct's real score is explained. The scales employed in this investigation have an overall Cronbach alpha of good. As a result, it suggests that the scales' reliability was quite high, showing a high degree of internal consistency among the measurement items and that the chosen instrument measures the variables chosen accurately. Values of 0.80 or above was regarded as reliable data collection instruments in this context.

Table 2 Cronbach's coefficient alpha Test Results

Variables	Reliability Statistics	
	Cronbach's Alpha	N of Items
Supply Chain Visibility	.840	6
Supply Chain Flexibility	.839	6
Supply Chain Cooperation	.812	6
Supply Chain Agility	.785	6
Supply Chain Performance	.817	7

Source: Survey Result, 2023/24

The researcher, when collecting the questionnaires, tried to make sure that it is the respondents who have complete the questionnaire through having an informal conversation where ever possible and sample test was made for representatives to check the reliability. In addition to this Cronbach's alpha coefficient is used to measure the internal consistency of the measurement items. Higher Alpha coefficients indicate higher scale reliability. Ezeet al., (2008) suggests that scales with 0.70 Alpha coefficients and above are considered acceptable. It was tested and it was found more than .75 results for all variables under study as the data collection instrument is rated as reliable instrument.

3.10 Data Management and Quality

This study checked each questionnaire before printing (for error free printing) and after data was fully filled by the respondents for consistency and completeness, and the primary investigator double-checked it. The lead investigator entered data into SPSS V.25 to clean and analyse it. Frequency analysis and range checks were performed on each entry to verify that the data is entered accurately. Data entry errors were fixed by cross-referencing the completed surveys. Several strategies were used to ensure the quality of the data, including periodic supervision and educating data collectors on the questionnaire's contents. If the respondents run into problems, the data collectors also helped them. Issues that arise during the data collection process were communicated right away, and the necessary steps were taken. A pretest was conducted before the study, and any necessary adjustments were made. We'll review the questionnaires to make sure there are no errors or missing values. Inconsistent and frequently missing values in a questionnaire resulted in its exclusion from the study and its classification as non-respondent.

3.11 Data Analysis and Interpretation

With the use of descriptive statistical tools like tables, figures, percentages, and standard deviation supported by SPSS version 25 software, the data gathered through the questionnaire was entered, revised, arranged, examined, interpreted, and presented in accordance with research goals.

3.11.1 Descriptive Analysis

The mean and standard deviation was two examples of descriptive statistics that was used to describe the properties of the variables under investigation. To help with explaining and interpreting the research's findings, it was presented in a clear and meaningful way. To characterize the socio demographic features of the participants and to provide an overview of the respondents' opinions regarding supply chain resilience and performance, descriptive statistics was generated.

3.11.2 Inferential Analysis

In addition, inferential statistics such as regression and Pearson correlation was used to determine how the independent variable affects the dependent variable. Bivariate correlation is one of the inferential statistics that was utilized to examine the relationship between the independent and dependent variables. Additionally, a multiple linear regression model was utilized to ascertain the combined influence on the relationship between supply chain performance and resilience. Correlation and linear regression was employed to test for associations. Finding the model's overall fit (variance explained) and the proportional contributions of each predictor to the total variance explained are also possible using multiple linear regressions. When someone decides to use multiple regression to evaluate their data, part of the process entails ensuring that the data the researcher wants to analyse can really be analysed using multiple regression.

Model Specification

The multiple linear regression model of the study is based on the theoretical regression model as indicated follows:

$$Y=a+ \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 \ e$$

Where:

Y= Supply Chain Performance

a= the y intercept.

X1 – Flexibility - B_1= the regression coefficient of Flexibility

X2 – Agility - B_2= the regression coefficient of Agility

X_3 – Cooperation - B_3= the regression coefficient of Cooperation

X_4 – Visibility - B_4= the regression coefficient of Visibility

e= error term

To arrive at the multiple linear regression model $Y=\alpha+\beta1x1+\beta2x2+\beta3x3+\beta4x4+\varepsilon$, several theoretical and methodological considerations are typically taken into account:

1. **Theoretical Basis:**
    - **Linear Relationship:** The model assumes a linear relationship between the dependent variable YYY and the independent variables x1,x2,x3, and x4. This assumption is fundamental in linear regression, where we posit that YYY changes by a constant amount for each unit change in x1,x2,x3 or x4x, all else being equal.
    - **Additive Effects:** The model implies that the effect of each independent variable xi on Y is additive, meaning changes in xi contribute to changes in Y independently of other variables xj (where $j\neq i$).
    - **No Perfect Multicollinearity:** There should be no perfect multicollinearity among the independent variables x1,x2,x3 and x4. This means that no independent variable can be exactly predicted from a linear combination of the others.
2. **Justification for Each Term:**
    - **Intercept (α\alphaα):** The intercept α\alphaα represents the expected mean value of YYY when all independent variables x1, x2, x3 and x4 are equal to zero. It captures the baseline value of YYY that is not explained by the predictors.
    - **Regression Coefficients (β1,β2,β3,β4):** Each regression coefficient βi (where i=1,2,3,4) represents the change in the expected value of Y corresponding to a one-unit change in the respective independent variable xi, holding all other variables

constant. These coefficients quantify the strength and direction of the relationship between Y and each xi.

- **Error Term (ε):** The error term ε accounts for the variability in Y that cannot be explained by the linear relationship with x1, x2, x3 and x4. It captures the influence of all other factors affecting YYY that are not included in the model.

3. **Methodological Considerations:**

   - **Model Selection:** The choice of a multiple linear regression model assumes that Y is influenced by multiple factors simultaneously rather than individually. This approach allows for the assessment of how each predictor contributes to explaining the variation in Y accounting for the effects of other predictors.
   - **Assumption of Independence and Normality:** Linear regression models also assume that the errors ε are independently and identically distributed (IID), with a mean of zero and constant variance (homoscedasticity). Additionally, residuals should ideally follow a normal distribution.

In summary, the theoretical basis for the multiple linear regression model rests on the assumptions of linearity, additive effects, and the absence of perfect multicollinearity among the predictors x1, x2, x3and x4. These assumptions allow researchers to estimate the relationships between the dependent variable Y and multiple independent variables, providing insights into how changes in these variables collectively influence Y.

3.12 Ethical Considerations

The Addis Ababa University School of Commerce and Post Graduate Studies Program granted ethical approval. A formal authorization or ethical letter was also acquired from the association, as well as from a few companies or industries. Following that, a full discussion of the goals and advantages of the research was held with representatives of the chosen organizations. Then, officials and personnel from the supply chain and procurement had a similar conversation. As a result, professional personnel obtained permission or approval, and if necessary, a suitable conversation regarding the goals, nature, and advantages of the study was held in the local Amharic language with data collectors.

The study considered the widely accepted and comprehensive research ethics, which serves as a reminder that it is unethical for a researcher to present a biased report or withhold the truth from us. There was strict maintenance of confidentiality during the entire study. As previously mentioned, all available scientific data and accompanying documentation was reviewed and duly recognized with regard to the research ethics.

An approved questionnaire was used by the study to gather data. Good quantitative data from the questionnaires was used to elicit further viewpoints on the assertions. Since questionnaires also provide respondents with the confidentiality needed for research, they were able to express their opinions. The study is entirely voluntary, and information confidentiality is guaranteed both during and after data collection. Participants were advised of their right to withdraw from the study at any time, as well as their right to privacy, risk, and no immediate benefits. Employees provided verbal consent to data collectors after being informed about the purpose of the study and the risks involved in participating. After explaining to workers the purpose of the study and that participation is entirely optional, data collectors got verbal consent. The questionnaire was securely destroyed upon the successful thesis defence and clearance by the Addis Ababa University Senate, Academic Commission, and School of Commerce.

3.13 Operational Definitions of Variables

Table 3 Summary of variables definition and scale of measurement

Variables incorporated	Symbol	Unit of measurement	Sign Expected
Dependent Variable			
Supply Chain Performance - cost, lead time, quality and risk elements of the performance of international organizations and its activities like warehousing, inventory (Dhaigude & Kapoor, 2017).	SCP	Likert scale	
Explanatory Variables			
Flexibility - The ability of a company to quickly modify and reorganize its supply chain procedures, assets, and tactics in reaction to internal or external changes (Adobor & McMullen, 2018).	SCF	Likert scale	+
Cooperation in the supply chain occurs when two or more companies cooperate to achieve common goals (Aityassine et al., 2022).	SCC	Likert scale	+

Agility the ability of a supply chain organization to react quickly and prevent rash decisions in response to changes in consumer demand as well as the consequences of market vulnerabilities like labor or raw material shortages, natural disasters, and geopolitical crises (Dhaigude & Kapoor, 2017).	SCA	Likert scale	+
Visibility - Improved supply chain communication, improvements in redundancy, increased input substitution capacity, and better data on supply chain structure can all help to create resilience (Hamidu et al., 2023).	SCV	Likert scale	+

Source: Survey Result, 2024

CHAPTER FOUR

RESULTS AND DISCUSSION

This chapter provides a comprehensive overview of the study's findings and offers a detailed analysis and interpretation of the collected data. It encompasses various aspects, such as the demographic profile of the respondents and their response rate, as well as the presentation and analysis of the obtained results specifically related to the chosen project.

4.1Response Rate

As mentioned in chapter three, the target population for this study consisted of 127 firms or plastic factories by means of their supply chain representative, all located in Addis Ababa.

Table 4 Response Rate

Nature of the Plastic Industry	Distributed	Returned Questionnaire	Response Rate
Fiber Glass, Flexibility Packaging and Foam	11	9	82%
Household	13	10	77%
Packaging	8	6	75%
PET perform and Cap	17	14	82%
PIPE HDPE	18	14	78%
Pipes and PP Bag	17	14	82%
PVC	24	20	83%
Re-treading and Recycling and Tyre	19	16	84%
Total	**127**	**103**	81%

Source: Survey Result, 2023/24

Out of the total of 127 questionnaires that were distributed, a noteworthy 103 questionnaires were returned, resulting in an impressive response rate of 81%. According to Tiia (2018), a response rate of 50% is considered acceptable, 60% is considered good, and anything above 70% is deemed excellent. Therefore, with a response rate of 81%, this study can be classified as exceptional and reliable, as indicated in the table above. This high rate of response suggests that the study was able to elicit strong and valuable feedback from the participants, which can be attributed to the importance of the supply chain activities, the supply chain resilience and performance of plastic industry in the country.

4.2Demographic Profile of Respondents

The survey participants' demographic profile comprises multiple elements, including their gender, age, educational attainment, and length of service in the examined firms as reported by their supply chain representative. These elements offer a thorough grasp of the study participants' demographic makeup.

Table 5 Demographic Profile of Respondents (N=103)

Variables		N	%
Gender	Male	67	65.0%
	Female	36	35.0%
Age (in years)	Ages 20 - 30	0	0.0%
	Ages 31 -39	25	24.3%
	40– 49	48	46.6%
	Age 50 Years and above	30	29.1%
Education	Diploma and below	6	5.8%
	First Degree	62	60.2%
	Master and above	35	34.0%
Work Experience	Less 1 year	0	0.0%
	1- 5 years	15	14.6%
	6-10 years	31	30.1%
	11-15 years	32	31.1%
	Above 15 years	25	24.3%

Source: Survey Result, 2023/24

Prior to performing the data analysis, the staff members' backgrounds are given in the table above at various levels. Out of the 103 supply chain respondents that participated in the research study, 35.0 % were female and 65.0 % were male. These data demonstrate that there was insufficient representation of both genders in the survey, with men accounting for almost two-thirds of all responses, a large majority compared to the proportion of female respondents. This indicates that the data shows that men dominated the workforce in manufacturing companies and the supply chain industry. This indicates that the proportion of men working in the supply chain may have increased. One reasonable explanation for this would be that women are now more able to engage in logistics-related activities because of the increasing financial and employability support they receive from various funds. It's also crucial to remember that the higher percentage of male participants in this research could have

something to do with conventional gender roles, which assign women to domestic labor and men to activities that generate cash (Xinqiu & Yenchun, 2022).

According to the above table, 24.3 percent of the 103 sampled respondents were young adults, defined as those under 39 years. Of the respondents, 46.6% were middle-aged adults, or between the ages of 40 and 49, while just 29.1% were older adults, or those 50 years of age or older. This suggests that the study's data came from knowledgeable people with expertise who have learned via their involvement in the supply chains of industrial companies. Additionally, as the above chart shows, only 5.8% of the 103 respondents held a diploma, whereas the majority (60.2%) was first-degree university graduates and 34.0 % had pursued postgraduate study at university (master's degree).

As can be seen from the above table, a considerable portion of respondents (14.6%) had been employed by their respective organizations for less than five years. This demonstrates that the respondents have greater familiarity with supply chains to reply to the questions posed in the survey. Moreover, 31.1% of the workforce had worked for 11 to 15 years, 32.3% had worked for more than 15 years, and 30.1% of the workforce had worked for six to 10 years. It is clear from this data that most respondents (55.4%, aggregating 31.1% of 11 to 15 years, with 24.3% of them having worked for more than fifteen years) had worked for more than eleven years. This indicates that the respondents are more qualified to respond to the questions posed in this survey due to their greater supply chain experience.

The report also shows that a sizable portion of respondents were well educated and had worked in supply chain for longer than six years. Participants in the research were divided into different age groups and were formed for both genders. Prolonged and extensive supply chain experience can result in increased stability, a wealth of information about managing supply chain activities, and a sense of responsibility. These factors can all have a good effect on supply chain procedures used in manufacturing. The survey was also happy to discover that most of the respondents had graduated from college, had been heavily involved in supply chain operations, and had devoted a sizable amount of their working years to the chosen plastic companies. For this reason, the researcher reasoned that the manufacturing enterprises in their representative sample would provide valuable insights about the resilience and effectiveness of the supply chain.

4.3 Responses on Supply Chain Resilience and Performance and their Analysis

This response analysis displays the respondents' perspectives about how much they agreed with four key aspects of supply chain resilience and performance. Tiia (2018) states that the following ranges or intervals of measurement scale were employed to interpret the findings: Excellent for 4.51–5.00, very good for 3.51-4.50, or good 2.51-3.50, if it falls between 1.51-2.50 and 1.00–1.50 poor, average or moderate.

4.3.1 Responses on Supply Chain Visibility

Supply chain visibility is a critical aspect of modern supply chain management, allowing organizations to track and monitor the movement of goods, materials, and information throughout the supply chain.

Table 6Respondents Responses on Supply Chain Visibility

Items	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Mean	SD
	N	%	N	%	N	%	N	%	N	%		
Demonstrated initiative in the supply chain.	11	11%	5	5%	5	5%	53	52%	29	28%	3.82	1.011
Employs information technology	12	12%	4	4%	9	9%	43	42%	35	34%	3.83	1.071
Information is shared or exchanged.	8	8%	9	9%	13	13%	40	39%	33	32%	3.79	1.010
Collects business intelligence	6	6%	8	8%	8	8%	46	45%	35	34%	3.93	1.123
Uses asset status information	9	9%	6	6%	8	8%	46	45%	34	33%	3.87	1.194
Electronic distribution has improved.	11	11%	17	17%	7	7%	42	41%	26	25%	3.53	1.020
Grand Mean 3.80												

Source: Survey Result, 2023/24

Results in the above table shows that the majority of the respondents equally agreed that these manufacturing firms had ability to track every tier of their supply chain – from the raw materials to the customer. Apply mitigation strategy in supply chain management in manufacturing practices. The grand mean (3.80) was rated as good. It means the majority of respondents agreed (mean = 3.80, with a substantial standard deviation) that supply chain visibility strengthens and

improves the supply chain by making data easily accessible to all stakeholders, according to the survey results displayed in the above table. Comparably, the standard deviation scores were smaller than two, indicating that the respondents' opinions were likely to be comparable.it means that In the supply chain, their company has shown initiative and cautious behavior. Information technology is used by their company as a visibility tactic. Within my organization, information is traded or shared in an effort to increase exposure. With proactive status updates, decreased disruptions, risk reduction, and inventory in motion; shippers can enhance customer experience and control costs (Bevilacqua et al., 2020).

4.3.2 Responses on Flexibility

Supply chain flexibility is crucial for organizations to respond quickly and effectively to changes in demand, supply disruptions, and market dynamics. This section presents the responses gathered from respondents regarding their perspectives and practices related to supply chain flexibility.

Table 7Respondents Responses on Flexibility

Items	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Mean	SD
	N	%	N	%	N	%	N	%	N	%		
It is possible to switch the products that my company purchases.	9	9%	14	14%	6	6%	41	40%	33	32%	3.80	1.285
It is possible to change the supplier's order quantity.	7	7%	9	9%	6	6%	45	44%	36	35%	3.91	1.172
Several modes of transportation are accessible to deliver items to customers.	24	23%	8	8%	5	5%	35	34%	31	30%	3.40	1.555
Sufficient to fulfil anticipated demand.	27	26%	13	13%	3	3%	36	35%	24	23%	3.18	1.566
Short-term variations in demand	20	19%	12	12%	4	4%	37	36%	30	29%	3.50	1.499
Able to produce in modest volumes.	7	7%	16	16%	5	5%	43	42%	32	31%	3.76	1.242
Grand Mean 3.59												

Source: Survey Result, 2023/24

With a grand mean of 3.59, the data shown in the above table unequivocally shows that the survey participants agreed that these manufacturing enterprises have a high degree of supply chain flexibility. Comparably, the standard deviation scores were smaller than two, indicating that the respondents' opinions were likely to be comparable. It indicates that they are fairly adaptable and consistent. High demand and risk supply chains need flexibility because it enables businesses to effortlessly and swiftly reallocate resources in response to changes. By rearranging current resources and capabilities and adapting to varying degrees of threat, this helps minimize interruptions. Flexibility in the supply chain is now essential for businesses to keep a competitive edge. Flexible supply chains allow businesses to quickly react to unforeseen setbacks, adjust to changing consumer needs, and change course when necessary (Chowdhury & Quaddus, 2017). Businesses can reduce risks, decrease downtime, and grasp new possibilities by utilizing new AI-powered solutions to create a flexible and adaptive supply chain (Hamidu et al., 2023).

4.3.3 Responses on Supply Chain Cooperation

This section presents the responses gathered from respondents regarding their perspectives and practices related to supply chain cooperation.

Table 8 Respondents Responses on Supply Chain Cooperation

Items	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Mean	SD
	N	%	N	%	N	%	N	%	N	%		
Suppliers are involved in the early phases of product design.	5	5%	4	4%	7	7%	41	40%	46	45%	4.16	1.046
Pools resources with its SC partners.	13	13%	3	3%	7	7%	33	32%	47	46%	3.95	1.039
Product development and supplier selection were coordinated.	10	10%	7	7%	7	7%	31	30%	48	47%	3.97	1.002
Arranges delivery times based on the preferences of our clients.	9	9%	11	11%	7	7%	34	33%	42	41%	3.86	1.099
Connections with its vendors.	2	2%	13	13%	8	8%	34	33%	46	45%	4.06	1.101
Coordinated demand projections	3	3%	16	16%	8	8%	37	36%	39	38%	3.90	1.059
Grand Mean 3.98												

Source: Survey Result, 2023/24

The aim of this study was to find out what participants thought about supply chain cooperation, which is a strategy used by manufacturing companies or organizations to coordinate their activities in order to supply goods or services and obtain a competitive advantage through improved services or increased efficiency. With a mean score of 3.98, the study's results showed that supply chain collaboration was viewed as having been implemented very well. Furthermore, the low standard deviation ratings indicated that the participants' viewpoints were likely to be similar. This suggests that suppliers are involved in the early stages of product design at their manufacturing companies. Their manufacturing firms aggregate its supply chain partners' resources and they were in charge of organizing supplier selection and product development. The management of interdependencies within businesses is crucial for achieving optimal performance and maintaining competitiveness, and supply chain coordination has long been recognized as such. It also involves coordinating supply chain goals and strategies with those of individual organizations (Abdallah et al., 2021).

4.3.4 Responses on Supply Chain Agility

This section presents the responses gathered from respondents regarding their perspectives and practices related to supply chain agility.

Table 9 Respondents Responses on Supply Chain Agility

Items	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Mean	SD
	N	%	N	%	N	%	N	%	N	%		
Operations can be handled	6	6%	8	8%	1	1%	26	25%	62	60%	4.26	1.080
Agility keeps expenses down	8	8%	6	6%	2	2%	38	37%	49	48%	4.11	1.096
Agility lowers risk levels	22	21%	14	14%	1	1%	13	13%	53	52%	3.59	1.089
Keeping track of risk levels	18	18%	15	15%	1	1%	10	10%	59	57%	3.75	1.043
Successfully foresees the organization's future dangers.	12	12%	14	14%	4	4%	11	11%	62	60%	3.94	1.050
Using agility methods to decide how and when to react to risks.	18	18%	18	18%	2	2%	8	8%	57	55%	3.66	1.066
Grand Mean 3.89												

Source: Survey Result, 2023/24

The study involved gathering and analyzing the responses of participants to assess the effectiveness of supply chain agility. The results indicated a mean score of 3.89, which is considered to be very good. Additionally, the standard deviation scores were found to be less

than two, indicating that there was a high level of agreement among the respondents. This suggests that their organization is capable of managing the changes to the company's operations and agility in their organization maintains operating levels while lowering costs. In addition, agility reduces risk while upholding management-set objectives in their firms and being agile at their organization entails monitoring, tracking, and responding to risk levels. Finally, it means their manufacturing firm procurement staff is able to anticipate potential threats to the organization. It is now feasible to choose how and when to respond to the level of risk by using agility strategies. The ability of a supply chain organization to react quickly and prevent rash decisions in response to changes in consumer demand as well as the consequences of market vulnerabilities like labor or raw material shortages, natural disasters, and geopolitical crises is known as supply chain agility (Chowdhury & Quaddus, 2017).

4.3.5 Responses on Supply Chain Performance

Supply chain performance refers to the efficiency and effectiveness of operations within a supply chain network. This section presents the responses gathered from respondents regarding their perspectives and practices related to supply chain performance.

Table 10 Respondents Responses on Supply Chain Performance

Items	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Mean	SD
	N	%	N	%	N	%	N	%	N	%		
Managed Order-to-delivery lead time	20	19%	12	12%	1	1%	44	43%	26	25%	3.43	1.47264
Company responds faster.	14	14%	9	9%	1	1%	53	52%	26	25%	3.66	1.3177
The SC has satisfied customers.	12	12%	9	9%	2	2%	53	52%	27	26%	3.72	1.27123
Customer requirements	16	16%	3	3%	2	2%	52	51%	30	29%	3.75	1.33371
The supply chain flexibility is maintained by its SC.	16	16%	3	3%	2	2%	29	28%	53	52%	3.97	1.43797
Supply chain plans are adapted by company's SC.	26	25%	3	3%	2	2%	23	22%	49	48%	3.64	1.66777
Lowers supply chain management expenses.	3	3%	0	0%	0	0%	57	55%	43	42%	4.33	0.75911
Grand Mean 3.79												

Source: Survey Result, 2023/24

The respondents in the survey were asked to share their perspectives and rate the supply chain performance in plastic manufacturing firms in Ethiopia. The results showed that the overall rating was very satisfactory (3.79 Grand Mean Score), indicating that these firms have extended supply chain's activities in meeting end-customer requirements, including product availability, on-time delivery, and all the necessary inventory and capacity in the supply chain to deliver that performance in a responsive manner. This means that their company's SC has done a great job of managing the order-to-delivery wait time. The supply chain at their company reacts quicker and the customers of their firm are happy with the SC. The customer requirements were identified by the SC of our organization. Finally, it means their company's supply chain remains flexible thanks to its SC. The SC of our organization adapts supply chain plans, both upward and downside and their company's SC reduces supply chain management costs. Assessing supplier performance is essential for enhancing corporate performance (Saglam et al., 2020). An activity to measure supplier performance and lower company risk is supplier performance evaluation. Researchers like Maruf et al., (2019) and Ralston and Blackhurst (2020) have given this issue a lot of attention, and it's one of the well-known supply chain issues.

4.4 Effect of Supply Chain resilience on Supply Chain Performance by Inferential Analysis

As mentioned in chapters one and three, inferential analysis was used in this study to examine the hypotheses; the effect of supply chain resilience on supply chain performance. The study employed a combination of explanatory design in order to achieve its goals. In supply chain management context, correlation analysis is an explanatory design used to determine the relationship between independent variables, or four factors of supply chain resilience, and dependent variables, or supply chain performance.

4.4.1 Relationship between Supply Chain Resilience and Performance using Correlation Analysis

The first chapter's hypotheses sought to understand how the surveyed firms' dependent variable— supply chain performance —relates to independent variables, or four factors of supply chain resilience using Pearson's Correlation.

Table 11 Correlation Test Result (N=103)

		Supply Chain Visibility	Supply Chain Flexibility	Supply Chain Cooperation	Supply Chain Agility	Supply Chain Performance
Supply Chain Visibility	Pearson Correlation	1	.470**	.422**	.449**	***.593****
	Sig. (2-tailed)		.000	.000	.000	***.000***
	N		103	103	103	***103***
Supply Chain Flexibility	Pearson Correlation		1	.412**	.374**	***.561****
	Sig. (2-tailed)			.000	.000	***.000***
	N			103	103	***103***
Supply Chain Cooperation	Pearson Correlation			1	.675**	***.588****
	Sig. (2-tailed)				.000	***.000***
	N				103	***103***
Supply Chain Agility	Pearson Correlation				1	***.577****
	Sig. (2-tailed)					***.000***
	N					***103***
Supply Chain Performance	Pearson Correlation					***1***
	Sig. (2-tailed)					
	N					***103***

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

Source: Survey result, 2023/24

The Pearson correlation approach is used to determine the relationship between the variables based on the premise that the variables have a linear relationship. One explanatory design technique called correlation analysis looks for a relationship between independent factors and the dependent variable, supply chain performance. Four independent factors and one dependent variables have a positive and substantial correlation, as the table above illustrates.

At the significance level of 0.0001, the initial correlation between supply chain performance and visibility is positive (direction), medium (strength as between 0.3 to 0.7) and significant with a value of ***r = 0.593***. This suggests that, according to Xinqiu & Yenchun's study from 2022, supply chain visibility is greatly boosting supply chain performance. Regarding supply chain performance and perceived flexibility, plastic manufacturing companies have a favorable and statistically significant association (***r=0.561,*** significance level of 0.01). This implies that supply chain performance in plastic manufacturing companies will be more effective when there is supply chain flexibility. Similar results were found by Abdallah et al. in 2021.

In plastic manufacturing companies, supply chain performance and cooperation have a positive, medium and significant correlation (***r=0.588*** at 0.0001 significance level). This suggests that

supply chain performance in the plastic manufacturing industry is greatly improved by earlier supply chain cooperation. Aityassine et al.'s findings from 2022 corroborate this.

With a significance level of 0.01 and a correlation value of ***r = 0.577***, the relationship between supply chain performance and perceived supply chain agility in plastic manufacturing companies is positive, medium and significant. This implies that effective supply chain performance occurs at high levels of supply chain agility. Similar results were observed by Bevilacqua et al. in 2020.

4.4.2 The Effect of Supply Chain Resilience on Performance using Multiple Regression Analysis

The impact of supply chain resilience on supply chain performance in Ethiopian plastic manufacturing enterprises was determined through this investigation. This analysis is used to test hypotheses. Using the regression method, the researcher was able to identify both general and specific objects. Regression analysis is performed using the multivariate linear regression approach. Every choice is taken at the significance level of 0.05. Modified R squared is used to summarize the model. F-statistics is used to do ANOVA analysis. Both p-value and t-statistics are used to determine the significance of independent variables in explaining the dependent variable. The assumptions of the classical model were verified before the regression analysis was conducted.

4.4.2.1 Analysis of Assumptions Result

This part of the study has the diagnostic test and assumptions adjacent to the questionnaire. It also includes the average value of the error term, which is zero (E (ut) = 0), as well as tests for multicollinearity, autocorrelation, and normality. Testing revealed that all of the linear regression's underlying assumptions held true.

I. **Test to see if the error term's average value is zero (E (ut) = 0);** this necessitates first assuming that the average value of the mistakes is zero. If there is a constant term in the regression equation, then this assumption will never be violated. Because the constant component, or α, was included in the regression equation, the average value of the error term in this study is expected to be zero.

II. Normality Test

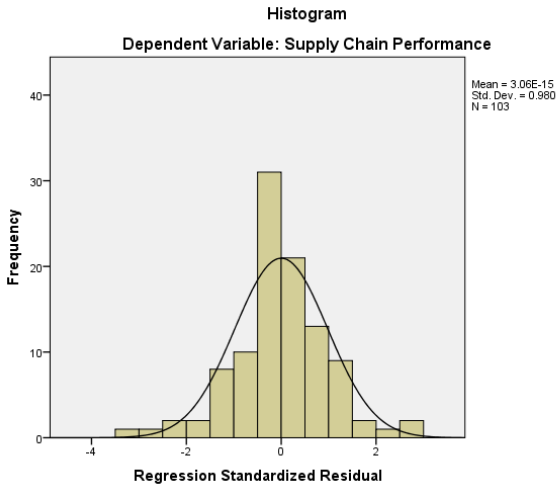


Figure 2 Normality Test Result (N=103)

Source: Survey result, 2023/24

The residuals appear to be regularly distributed based on the bell-shaped curve that covers the histogram bars. This suggests that the normality assumptions of the regression model are satisfied. The residuals have a mean of about 3.06E-15, or practically nothing.

This suggests that, on average, the model's predictions are objective. The residuals' standard deviation is 0.980, which suggests that while they are dispersed around the mean, the majority of them fall inside the typical range for a normal distribution. With 103 sample sizes (N), there is enough data to evaluate the performance of the model. The histogram indicates that the regression model, with residuals that are normally distributed and centered around zero, is well-fitted for forecasting supply chain performance based on supply chain resilience in Ethiopia's plastic industry. This suggests that the dependent variable "supply chain performance" is not consistently overestimated or underestimated by the model.

III. Test for multicollinearity

When two or more of the input variables have an exact (or nearly exact) linear relationship, this is referred to as multicollinearity. Each term in the model has a VIF (Variance Inflation Factor) that represents the total effect of the regressors' dependence on that term's variance.

Table 12 Multicollinearity Test Result

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Supply Chain Visibility	.685	1.460
	Supply Chain Flexibility	.721	1.387
	Supply Chain Cooperation	.509	1.964
	Supply Chain Agility	.510	1.962

Source: Survey result, 2023/24

The tolerance limit and VIF value of supply chain visibility is .685 and 1.460 respectively, for supply chain flexibility tolerance limit .721 and VIF1.387; supply chain cooperation tolerance limit as .509 and VIF 1.964 and for supply chain agility .510 and 1.962 tolerance limit and VIF respectively. This implies that the other variables do not significantly exhibit multicollinearity. One or more large VIFs specify multicollinearity. Experience in the actual world indicates that any VIF result more than 5 or 10 indicates that the corresponding regression coefficients have been under-estimated due to multicollinearity. The analysis's conclusion shows that the variables don't have a strong degree of connection or multicollinearity. As the above table shows, the VIF value of four components was found to be less than five or ten. One could argue that there was no collinearity in these data.

IV. Test for Autocorrelation

When considering the disturbance components of multiple linear regressions, it is assumed that the covariance between the error terms throughout time (or cross-sectionally, depending on the kind of data) is zero.

Table 13 Autocorrelation Test: Durbin Watson

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.750[a]	.563	.545	.552	1.732

a. Predictors: (Constant), Supply Chain Agility , Supply Chain Flexibility , Supply Chain Visibility , Supply Chain Cooperation

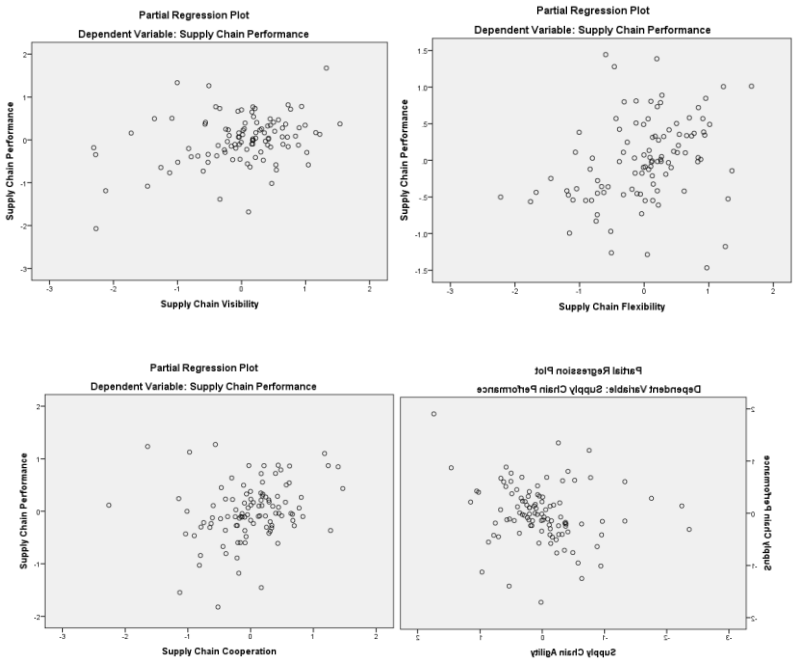
b. Dependent Variable: Supply Chain Performance

Source: Survey result, 2023/24

In this study, the popular Durbin-Watson Test (discovered at 1.732) was used to test for the presence of autocorrelation. Stated otherwise, it is presumed that there is no correlation between the errors. It would be said that the errors are "auto correlated" or "serially correlated" if they are not uncorrelated with one another. Therefore, this assumption has to be tested.

V. Heteroscadacity

A diagnostic plot called the standardized residual plot is used to assess the linear regression model's homoscedasticity assumption. By dividing the residuals by their standard deviation, one may determine the standardized residuals.



Source: Survey result, 2023/24

Figure 3 Scatter plot

A scatter plot is a type of graphic used to show how two numerical variables are related. Using a graph with two axes—a horizontal (x axis) and a vertical (y axis)—data are visually represented. A single observation is represented by each point in the graphic. Plotting all of the observations results in a graphic that shows the strength and direction of the relationship between the two variables (x and y). The scattered dots demonstrate that the data satisfy the

normal distribution assumptions for the errors and the constant variances of the residuals. The process of minimizing the vertical deviations of plotted points surrounding a straight line, known as the least squares approach, allows it to create the best-fitting straight line for the scatter diagram.

4.4.2.2 Multiple Regression Result Analysis

Table 14 Regression Test Results Model Summary

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.750[a]	.563	.545	.552

a. Predictors: (Constant), Supply Chain Agility , Supply Chain Flexibility , Supply Chain Visibility , Supply Chain Cooperation
b. Dependent Variable: Supply Chain Performance

Source: Survey result, 2023/24

Model Summary

In order to calculate this measurement, the value of R2 is inferred, which helps to explain how much the independent variable affects the dependent variable, supply chain performance. The linear regression of four independent variables and one dependent variable is shown and discussed below. The dependent variable (supply chain performance n) was explained by the total bundle of determinant factors of the four independent variables, as indicated in the above table (R2 =.563). This implies that the independent variables account for 56.3% of supply chain performance, with other unaccounted-for factors accounting for 43.7% of the total.

ANOVA

Table 15 Regression Test Results ANOVA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	38.512	4	9.628	31.561	.000[b]
	Residual	29.896	98	.305		
	Total	68.408	102			

a. Dependent Variable: Supply Chain Performance
b. Predictors: (Constant), Supply Chain Agility , Supply Chain Flexibility , Supply Chain Visibility , Supply Chain Cooperation

Source: Survey result, 2023/24

Given that the second table displays the result F= 31.561, it is possible to draw the statistically significant conclusion that the combination of determinant factors affects supply chain performance. The null hypothesis is thus rejected by this investigation.

Regression Test Results

Table 16 Regression Test Results

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.358	.312		1.149	.253
	Supply Chain Visibility	.255	.072	.287	3.556	.001
	Supply Chain Flexibility	.249	.076	.258	3.282	.001
	Supply Chain Cooperation	.219	.090	.227	2.431	.017
	Supply Chain Agility	.178	.084	.198	2.117	.037

a. Dependent Variable: Supply Chain Performance

Source: Survey result, 2023/24

By calculating the beta value under the unstandardized coefficients, we can quickly examine the relative contributions of each of the several factors from the multiple regression table above. Its contribution gets stronger the higher the beta value. As a result, the study discovered that the most significant unique contribution to the explanation of supply chain performance or the dependent variable is supply chain visibility (***B=.255; Sig. =.001***). The outcome showed that a 0.255 unit rise in the level would result from a one unit increase in effort or a favorable change in supply chain performance. Standardized Coefficients of tis variable (Beta= ***.287***) has been the highest among others variables; that we understand that supply chain visibility is the highest magnitude of effects of supply chain performance among others variables followed by supply chain flexibility (Beta = .258). When variables are stated in multiple units or scales, standardized coefficients, sometimes referred to as beta coefficients, provide a means of determining the direction and strength of the link between them (Tila, 2018). In a similar vein, supply chain performance will be impacted by supply chain visibility, according to Hamidu et al. (2023).

Each variable in the following coefficients table shows statistically significant positive effects of supply chain flexibility on supply chain performance in plastic manufacturing companies

(***B=.249 and Sig =.001***). Chowdhury & Quaddus (2017) discovered that supply chain flexibility has a beneficial impact on supply chain performance.

Additionally, the study examines the degree to which supply chain performance is positively and significantly impacted by supply chain cooperation (B=.219 and Sig =.017). In a similar vein, Hamidu et al. (2023) discovered that supply chain performance in plastic manufacturing companies is impacted by effective supply chain cooperation.

Finally, there is a positive correlation between supply chain agility and performance in plastic manufacturing companies (B=.178 and Sig =.037). According to research conducted by Singh et al. (2020), Abdallah et al. (2021) and Dhaigude & Kapoor (2017), supply chain agility significantly and favourably affects supply chain performance in manufacturing companies.

4.5Discussion

4.5.1 Supply Chain Flexibility and Supply Chain Performance

This study tested the relationship between supply chain performance and supply chain flexibility using correlation analysis. In plastic manufacturing enterprises, it was discovered that they have a positive and statistically significant connection (r=0.561, significance level of 0.01). Regression analysis is then used to demonstrate the statistically significant positive effects of supply chain flexibility on supply chain performance in plastic manufacturing organizations (B=.249 and Sig =.001). Supply chain performance benefits from supply chain flexibility, as found by Chowdhury and Quaddus (2017). This suggests that supply chain flexibility will increase supply chain performance in plastic manufacturing enterprises. According to Mandal et al. (2016), who investigated the relationship between resilience and supply chain capabilities (such as flexibility). Adobor and McMullen (2018) also discovered that for a supply chain to be resilient—that is, to bounce back from setbacks—all three kinds are required. However, Saglamet al. (2020) observed that supply chain flexibility has little effect on supply chain performance. This may be wrong as supply chain flexibility has enormous advantages —the potential to quickly and easily modify production levels, procurement of raw materials, and transportation capacity when compared to traditional supply chain management.

4.5.2 Supply Chain Cooperation and Supply Chain Performance

This study used correlation analysis and found that cooperation and supply chain performance are positively correlated in plastic manufacturing organizations (r=0.588 at 0.0001 significance level). The study also looks at how much supply chain cooperation influences performance in a positive and meaningful way (B=.219 and Sig =.017). Similarly, Hamidu et al. (2023) found that efficient supply chain collaboration affects supply chain performance in plastic manufacturing firms. According to Aityassine et al. (2022), researchers, this shows that supply chain performance in the plastic manufacturing business is considerably enhanced by earlier supply chain cooperation. According to certain research (e.g., Aityassine et al., 2021; Mandal et al., 2016), supply chain cooperation have a significant impact on supply chain performance. Supply chain performance has a big impact on supply chain resilience. Some research (Botes et al., 2017) suggests that rather than affecting supply chain resilience directly, supply chain collaboration impacts its antecedents, which include flexibility, rapidity, and visibility.

4.5.3 Supply Chain Agility and Supply Chain Performance

Correlation analysis reveals a positive and significant association between supply chain performance and perceived supply chain agility in plastic manufacturing enterprises, with a significance level of 0.01 and a correlation value of r = 0.577. Regression analysis finally reveals a positive association (B=.178 and Sig =.037) between supply chain agility and performance in plastic manufacturing enterprises. This suggests that high levels of supply chain agility lead to effective supply chain performance. Bevilacqua et al. noted comparable outcomes in 2020. Research by Singh et al. (2020), Abdallah et al. (2021), and Dhaigude & Kapoor (2017) indicates that supply chain performance in manufacturing organizations is positively and significantly impacted by supply chain agility. Agility is a key component of supply networks and affects them significantly before disasters (Aityassine et al., 2021). Taweel & Al-Hawary (2021) found that supply chain performance is highly and favourably correlated with both supply chain flexibility and agility.

4.5.4 Supply Chain Visibility and Supply Chain Performance

This study first used correlation analysis and the first value of r = 0.593 indicates a positive connection between supply chain performance and visibility at the significance level of 0.0001.

The analysis then found that supply chain visibility (B=.255; Sig. =.001) makes the most unique contribution to the explanation of supply chain performance by means of regression analysis. This implies that supply chain visibility is significantly improving supply chain performance, citing Xinqiu and Yenchun's 2022 study. The main goals of supply chain visibility (SCV) are to increase the resilience and sustainability of the supply chain network, facilitate decision-making, and enhance the general performance of enterprises. By creating effective external links, businesses can raise their visibility and, in turn, SCP (Taweel and Al-Hawary, 2021). Supply chain visibility (SCV) ensures transparency throughout the supply chain by facilitating the smooth exchange of information in all directions. Furthermore, by simplifying organizational processes, SCV makes operations easier (Aityassine et al., 2021). A supply chain can quickly bounce back from setbacks and return to its prior level of performance if all links in the chain have adequate visibility (Botes et al., 2017). Using SCV as a strategic warning system, companies can limit the disruptive effect by coordinating with their supply chain partners in advance (Saglamet al., 2020). Quickly responding to consumer questions, monitoring and controlling customer orders, and enhancing the caliber of after-sale service are a few strategies to do this (Taweel and Al-Hawary, 2021). Supply chain visibility, or SCV, is the ability to monitor parts, components, or items while they are being transported from the manufacturer to the final destination (Mandal et al., 2016).

Table 17 Summary of Hypothesis Testing

Variables incorporated	Expected	Found - β	Sig	Decision
• H_1– Supply chain visibility has a positive and significant effect on supply chain performance	+ and Significant	.255	.001	***Supported***
• H_2– Supply chain flexibility has a positive and significant effect on supply chain performance	+ and Significant	.249	.001	***Supported***
• H_3 – Supply chain cooperation has a positive and significant effect on supply chain performance	+ and Significant	.219	.017	***Supported***
• H_4– Supply chain agility has a positive and significant effect on supply chain performance	+ and Significant	.178	.037	***Supported***

Source: Survey result, 2023/24

CHAPTER FIVE

SUMMARY OF MAJOR FINDINGS, CONCLUSION AND RECOMMENDATIONS

In this chapter, an extensive summary of the study's conclusions is given. The summary explores the key conclusions drawn from the investigation and provides a thorough presentation of them. Furthermore, the investigator presents prospective suggestions and deduces findings from the condensed and completed research investigation.

5.1 Summary of Major Findings

This thesis's overall goal was to assess how supply chain resilience affected supply chain performance in Addis Abeba's plastics manufacturing companies through the use of explanatory and descriptive research designs. The study discovered that

- The initial value of r = 0.593, obtained using correlation analysis in this study, shows that supply chain performance and supply chain visibility are positively correlated at the significance level of 0.0001. Regression analysis was subsequently used to determine which factor, supply chain visibility (B=.255; Sig. =.001), contributes most distinctively to the explanation of supply chain performance.

- This study used correlation analysis to examine the relationship between supply chain flexibility and performance. They were found to be positively and statistically significantly correlated in plastic manufacturing companies (r=0.561). Regression analysis is then utilized to illustrate the statistically significant positive effects of supply chain flexibility on supply chain performance in plastic manufacturing enterprises (B=.249 and Sig =.001).

- Using correlation analysis, this study discovered a favorable association between supply chain performance and cooperation in plastic manufacturing companies (r=0.588 at 0.0001 significance level). The study also examines the extent to which supply chain cooperation positively and significantly affects performance (B=.219 and Sig =.017).

- With a significance level of 0.01 and a correlation value of r = 0.577, correlation analysis

shows a positive and significant relationship between supply chain performance and perceived supply chain agility in plastic manufacturing businesses. In the end, regression analysis shows that supply chain agility and performance in plastic manufacturing companies are positively correlated (B=.178 and Sig =.037).

5.2 Conclusions

As part of supply chain performance, uncertainty of manufacturing supply chain activities result in resource limitation, high uncertainties and acute urgency, thereby making it difficult to assess the spontaneous and uncoordinated commitments of stakeholders. Thus, this study concluded that supply chain visibility affects supply chain performance in plastic manufacturing firms.

Supply chain management encompasses the deliberate and organized coordination of various business functions and strategies within a specific company, as well as across multiple businesses involved in the supply chain. The primary objective of this coordination is to enhance the overall performance and effectiveness of individual companies and the entire supply chain in the long run. Thus, this study concluded that supply chain flexibility will improve supply chain performance in plastic manufacturing firms.

The integration of supply chains plays a crucial role in improving sustainable performance. In larger companies, the relationship between supply chain management practices and competitive ability has a major impact on performance enhancement. The level of internal collaboration within a company directly affects its overall performance, with higher levels of integration typically leading to better results. Based on this study, it can be inferred that supply chain cooperation can help to improve supply chain performance in plastic manufacturing firms.

The supply network is enormous and convoluted with numerous players that are various organizations and it is hard to coordinate all of them along with all the items that need to be delivered. Supply chain integration, information sharing, customer service management, geographic proximity, and just in time capability as the key aspects of supply chain management practice using factor analysis. As a result, it has been determined that realizing supply chain agility can effectively enhance supply chain performance in plastic manufacturing firms.

5.3 Recommendations

This study recommends the following measure to ensure continuous improvement in supply chain performance in plastic manufacturing firms using supply chain resilience.

- Given that supply chain visibility has an impact on supply chain performance; this study recommends that plastic manufacturing firms that make plastics first map out all of their suppliers. Next, examine the methods used by each to supply its resources or goods to its clients or consumers. It will be easier for them to provide customers with visibility into their supply chain once they understand how their items are manufactured and delivered.
- This study discovered that supply chain flexibility has a positive impact on supply chain performance in plastic manufacturing companies. As a result, these companies should improve their ability to quickly adjust production levels, purchases of raw materials, and transportation capacity. This approach has significant advantages over traditional supply chain management. Through diversifying their sourcing, production, and distribution operations across several suppliers, regions, and channels, enterprises may reduce the likelihood of disruptions and enhance their ability to adapt to fluctuations in the market.
- This study discovered that supply chain cooperation has a favorable impact on supply chain performance in plastic manufacturing companies. As a result, the study recommends that these plastic manufacturing companies enhance their supply chain resilience and collaboration by promote openness across the supply chain and be proactive rather than reactive. They should have regular meetings with their procurement/sourcing staff and suppliers, as well as they should develop unique an online communication channel via their association.
- Based on the study's findings regarding the beneficial effects of supply chain agility on plastic manufacturing companies' supply chains, it is recommended that these companies develop synergies to boost supply chain performance, optimize distribution networks, cut delivery costs, increase inventory accuracy, decrease shrinkage, and enhance picking. Development and improvement of IT supply chain capabilities are necessary as IT unifies distinct supply chain procedures performed by various companies.

5.4 Implications

The findings of this study could advance mangers, experts and executives understanding of supply chain management in a number of ways. By determining the relationship between supply chain management performance and its flexibility, visibility, cooperation, and agility, this study aimed to advance our understanding of supply chain management**.**

5.5 Future Studies

Future researchers, this study indicates, should locate a sizable population of additional manufacturing enterprises, individual beneficiaries, local and foreign suppliers, as well as private and public firms in order to ascertain whether the findings can be applied to a broader context. The study suggests that, in order to establish benchmarks and further research goals, a comparable study be conducted in all manufacturing supply chain companies in Ethiopia. This would enable the study's conclusions to be broadly used. Subsequent investigations may disclose the significant impact of these decisions on the manufacturing sector's overall well-being.

REFERENCE

Abdallah A. B. Alfar N. A. and Alhyari S., 2021, The effect of supply chain quality management on supply chain performance: the indirect roles of supply chain agility and innovation. International Journal of Physical Distribution & Logistics Management, 51(7), 785-912

Adobor H., & McMullen R. S., 2018, Supply chain resilience: a dynamic and multidimensional approach. The International Journal of Logistics Management, 29(4), 1451-1471

Aityassine F., Soumadi M., Aldiaba, B., Al-Shorman H., Akour I. Alshurideh, M & Al-Hawary S., 2022, The effect of supply chain resilience on supply chain performance of chemical industrial companies. Uncertain Supply Chain Management, 10(4), 1271-1278

Bevilacqua M., Ciarapica F. E., Marcucci G. and Mazzuto G., 2020, Fuzzy cognitive maps approach for analyzing the domino effect of factors affecting supply chain resilience: A fashion industry case study. International Journal of Production Research, 58(20), 6370-6398

Botes A., Niemann W., & Kotzé T., 2017, Buyer-supplier collaboration and supply chain resilience: A case study in the petrochemical industry. South African Journal of Industrial Engineering, 28(4), 183-199

Castillo C., 2023, Is there a theory of supply chain resilience? A bibliometric analysis of the literature, International Journal of Operations & Production Management, Vol. 43 No. 1, pp. 22-47

Chandra Shekhar Singh, Gunjan Soni, and Gaurav Kumar Badhotiya, 2019, Performance indicators for supply chain resilience: review and conceptual framework, Journal of Industrial Engineering International, Vol 20

Chowdhury M.M.H. and Quaddus M.A., 2017, Supply chain resilience: conceptualization and scale development using dynamic capability theory, International Journal of Production Economics, Vol. 188, pp. 85-204.

Creswell John W. and J. David Creswell, 2018, Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. 5th edition. Thousand Oaks, CA: Sage

Creswell, J. W., 2014, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches.* Thousand Oaks: Sage Publications, Inc.

Dhaigude A., & Kapoor R., 2017, The mediation role of supply chain agility on supply chain orientation-supply chain performance link. Journal of Decision Systems, 26(3), 275-293

Eunice Muthoni Kiromo, 2015, Factors Affecting Procurement and Supply Chain Performance In Building Construction Firms In Nairobi, The Degree Of Master Of Business Administration, University Of Nairobi

Geoffrey Marczyk, David DeMatteo and David Festinger, 2005, Essentials of Research Design and Methodology, John Wiley & Sons, Inc., Hoboken, New Jersey.

Hamidu Z., Boachie-Mensah F.O. and Issau K., 2023, Supply chain resilience and performance of manufacturing firms: role of supply chain disruption", Journal of Manufacturing Technology Management, Vol. 34 No. 3, pp. 361-382

Hamidu Z., Boachie-Mensah F.O. and Issau K., 2023. Supply chain resilience and performance of manufacturing firms: role of supply chain disruption, Journal of Manufacturing Technology Management, Vol. 34 No. 3, pp. 361-382

Kothari C.R, 2014, Research Methodology, Methods and Techniques, Fifth Revised Edition New Age International (P) Ltd., Publishers, New Delhi

Lhoussaine Ouabouch, 2015, Supply Chain Resilience, Research Gate, https://www.researchgate.net/publication/27759787

Mandal S. Sarathy R. Korasiga V. R., Bhattacharya S. & Dastidar S. G., 2016, Achieving supply chain resilience: The contribution of logistics and supply chain capabilities. International Journal of Disaster Resilience in the Built Environment, 7(5), 544-562

Maruf Hossan Chowdhury, Mohammed Quaddus and Renu Agarwal, 2019, Supply chain resilience for performance: role of relational practices and network complexities, Emerald Publishing Limited [ISSN 1359-8546]

Ralston P. and Blackhurst, Industry J., 2020, 4.0 and resilience in the supply chain: a driver of capability enhancement or capability loss? Int J Prod Res 58(16) (2020), 5006–5019. https://doi.org/10.1080/00207543.2020.1736724

Saglam Y. C., Çankaya S. Y., & Sezen B., 2020, Proactive risk mitigation strategies and supply chain risk management performance: an empirical analysis for manufacturing firms in Turkey. Journal of Manufacturing Technology Management, 32(6), 1124-1244.

Scholten K. & Schilder S., 2015, The role of collaboration in supply chain resilience. Supply Chain Management: An International Journal, 20(4), 471-484

Taweel I. R., & Al-Hawary S. I., 2021, The Mediating Role of Innovation Capability on the Relationship between Strategic Agility and Organizational Performance. Sustainability, 13(14), 7564

Tiia, Reunanen, 2018, Performance measurement systems in manufacturing supply chain, Case Study: Fida International. MA thesis, Helsinki

Xin Shen, Qianhui Xu, Qiao Liu and Markus Leibercht, 2023, The relationship between supply chain resilience, supply chain integration, and supply chain performance: A MASEM analysis, Journal of Intelligent & Fuzzy Systems 45 (2023) 3361–3377

Xinqiu Zhu and Yenchun Jim Wu, 2022, How Does Supply Chain Resilience Affect Supply Chain Performance? The Mediating Effect of Sustainability, Sustainability 2022, 14(21), 14626; https://doi.org/10.3390/su142114626

Yuan Yao and Beatrice Meurier, 2012, Understanding the supply chain resilience:a Dynamic Capabilities approach, 9es Rencontres Internationales de la Recherche en Logistique

ANNEX

Annex I Questionnaire in English

THE EFFECT OF SUPPLY CHAIN RESILIENCE ON SUPPLY CHAIN PERFORMANCE OF PLASTIC INDUSTRY IN ETHIOPIA

Plastic Industry Survey

Dear Respondents:

My Zewdu Gidey, I and a postgraduate student of Addis Ababa University School of Commerce in Addis Ababa. I would like to express my intense appreciation for your plentiful time, honest and quick response. This thesis entitled "The Effect of Supply Chain Resilience on Supply Chain Performance of Plastic Industry in Ethiopia''. This questionnaire is intended to gather primary data on this research study and its purpose of the study is to fulfill a thesis requirement for the partial fulfillments of Master of Arts in Logistics and Supply Chain Management at Addis Ababa University in Addis Ababa.

Your forthright responses for the questions are very significant for the achievement of affecting this study. All information collected through the questionnaire will be applied only for the purpose of the study and will be kept private. And thus, I would like to thank you in advance for your kindhearted collaboration. Please, note that participation in this research is entirely voluntary.

For further information, please contact zewdugidey03@gmail.com or via 09 04 16 87 52

Best Regards,

Zewdu Gidey

Part-I: Questions Related to Demographic Factors (General information)

Instruction – please tick appropriate answer you choose.

Gender	Male	[ ]
	Female	[ ]
Age	Ages 20 -30	[ ]
	Ages 31 -39	[ ]
	40– 49	[ ]
	Age 50 Years and above	[ ]
Education	Certificate	[ ]
	Diploma	[ ]
	First Degree	[ ]
	Master and above	[ ]
Your work experience	Less 1 year	[ ]
	1- 5 years	[ ]
	6-10 years	[ ]
	11-15 years above 15 years	[ ]

Part-II: Core Queries associated to the Study

Directions: The purpose of this section of the questionnaire is to ascertain your opinion regarding how supply chain resilience affects supply chain performance in the context of Ethiopia's plastics sector. Please mark (1) for strongly disagree, 2 for disagree, 3 for neutral, 4 for agree, and 5 for strongly agree when answering the questions below. Mark each box (√) as you have completed it.

Note *– SC- Supply Chain SCV – Supply Chain Visibility SCF- Supply Chain Flexibility SCC- Supply Chain Cooperation SCA - Supply Chain Agility – SCP- Supply Chain Performance*

Code	Statements - Items	Measuring Scale				
		1	2	3	4	5
SCV1	My organization has demonstrated initiative and careful behavior in the supply chain.					
SCV2	My company employs information technology as a visibility strategy.					
SCV3	Information is shared or exchanged inside my company in an effort to enhance visibility.					
SCV4	My company collects business intelligence as part of metrics related to supply chain visibility.					
SCV5	My organization uses asset status information to implement supply chain visibility.					
SCV6	My company's electronic distribution has improved.					
SCF1	It is possible to switch the products that my company purchases from one supplier to another.					
SCF2	It is possible to change the supplier's order quantity.					
SCF3	Several modes of transportation are accessible to deliver items to customers.					
SCF4	The capacity for production is sufficient to fulfill anticipated demand.					
SCF5	Short-term variations in demand can be managed by recruiting temporary or overtime staff.					
SCF6	Most vendors are able to produce in modest volumes due to their low startup costs.					
SCC1	In my company, suppliers are involved in the early phases of product design.					
SCC2	Our organization pools resources with its supply chain partners.					
SCC3	Product development and supplier selection were coordinated by our organization.					
SCC4	Our organization arranges delivery times based on the preferences of our clients.					
SCC5	Our business cherishes its connections with its vendors.					

SCC6	We coordinated demand projections with our external partners.					
SCA1	The modifications in the company's operations can be handled by my organization.					
SCA2	In my organization, agility keeps expenses down by maintaining operational levels.					
SCA3	In my organization, agility lowers risk levels while maintaining management-established goals.					
SCA4	In my organization, being agile means keeping track of risk levels, responding to them, and recording them.					
SCA5	Our procurement team successfully foresees the organization's future dangers.					
SCA6	Using agility methods has made it possible to decide how and when to react to the degree of risk.					
Supply Chain Performance						
SCP1	Our company's supply chain effectively manages order-to-delivery lead times.					
SCP2	Our supply chain demonstrates agility in response times.					
SCP3	Our supply chain strives to enhance customer satisfaction through its operations.					
SCP4	Our company's supply chain identifies and addresses customer requirements.					
SCP5	Our supply chain maintains a high degree of controllability.					
SCP6	Our supply chain integrates both upside and downside scenarios effectively.					
SCP7	Our supply chain effectively reduces overall supply chain management costs.					

Thank You!