

THE EFFECT OF SUPPLY CHAIN AGILITY AND SUPPLY CHAIN
RESILIENCE ON FIRM PERFORMANCE: A STUDY OF THE MARMARA
ORGANIZED INDUSTRIAL ZONES



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YEDITEPE UNIVERSITY
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PLAGIARISM

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

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ÖZET

Günümüzde tedarik zinciri çevikliği ve dayanıklılığı, şirketlerin mevcut kaynaklarıyla yatırım yapmaya çalıştığı iki önemli kavramdır. Hızla değişen ve karmaşıklaşan küresel dünyada firmaların ayakta kalmaları ve dayanıklı bir şekilde rakipleriyle başa çıkmaları kaynaklarını en verimli şekilde kullanmalarına bağlıdır.

Başarılı olan işletmelerin müşteri isteklerini önemseyen ve hızlıca müşterilerine yanıt verebilen firmalar olduğu bilinmektedir. Bu firmaların değişken taleplere ve değişen müşteri profiline uyum sağlayarak pozisyon alabilmeleri için çevik tedarik zinciri operasyonları yürütmeleri gerekmektedir. Çevik firmalar kazandıkları dayanıklılıkla karşılaştıkları risklere karşı hızlıca çözüm üretme özelliği kazanabilirler ve bunu da firma performansı çıktılarına yansıtabilirler.

Ayrıca bu şirketler dijital teknolojileri operasyonlarına entegre ederse müşteri beklentilerine hızlı cevap verebilir ve günümüzde kilit rol oynayan müşterilerinin memnuniyetini artırabilirler.

Bu çalışmanın ilk amacı, tedarik zinciri çevikliği, tedarik zinciri esnekliği ve algılanan müşteri memnuniyetinin firma performansı üzerindeki etkilerini araştırmaktır.

Diğer bir amaç ise dijital dönüşümün tedarik zinciri çevikliği ile algılanan müşteri memnuniyeti arasındaki moderatör etkisini araştırmaktır.

Son olarak tedarik zinciri esnekliği ve algılanan müşteri memnuniyetinin tedarik zinciri çevikliği ile firma performansı arasındaki aracılık rolleri ayrı ayrı ve birlikte modele dahil edilerek incelenmiştir.

Bildiğimiz kadarıyla bu çalışma, algılanan müşteri memnuniyetinin tedarik zinciri çevikliği ile firma performansı arasındaki aracı rolünü ve dijital dönüşümün tedarik zinciri çevikliği ile algılanan müşteri memnuniyeti arasındaki düzenleyici etkisini gösteren ilk çalışmalardan biridir. Böylece hem bu ilişkilerin incelenmesinin hem de modelin araştırmacı tarafından oluşturulmasının literatüre katkı sağlaması ve mevcut boşluğu doldurması beklenmektedir.

Araştırmanın evrenini Marmara Bölgesi'nde faaliyet gösteren OSBÜK'e (Organize Sanayi Bölgeleri Üst Kuruluşu) kayıtlı imalatçı firmalar oluşturmaktadır. Örneklem grubu bu şirketlerde görev yapan üst düzey yöneticiler ve orta düzey yöneticiler (genel müdürler-müdürler-CEO ve planlama-lojistik-satınalma müdürleri) arasından seçilmiş ve anketler OSBÜK'e üye olan şirketlere gönderilmiştir.

Anketler firmalara gönderilmiş ve firmalardan elde edilen veriler SmartPLS 4 programı yapısal eşitlik modellemesi (YEM) ile analiz edilmiştir. Son olarak araştırmanın sonuçları tartışılmış, çalışmanın önemi ve katkıları açıklanmıştır. Ayrıca, gelecekteki araştırmalar için öneriler, yönetsel çıkarımlar ve araştırmanın sınırlılıkları açıklanmıştır.

Sonuçta çalışmanın hem literatüre hem de yönetsel çıkarımlarıyla sektördeki uygulayıcılara katkı sağlaması beklenmektedir.

Anahtar Kelimeler: Tedarik zinciri çevikliği, tedarik zinciri dayanıklılığı, dijital dönüşüm, müşteri memnuniyeti, firma performansı, kaynak temelli teori



ABSTRACT

Today, supply chain agility and supply chain resilience are two important concepts that companies try to invest in with their existing resources. In the rapidly changing and complex global world, the survival of companies and the ability to cope with their competitors resiliently depend on using their resources most efficiently. It is known that successful businesses are companies that pay attention to customers' requests, needs, and wants and they can respond quickly to their customers. It is needed for these companies to conduct an agile supply chain so that they can take positions by adapting to the changing demands and changing customer profiles.

Agile companies can gain the ability to quickly produce solutions against the risks they encounter with the resilience they have, and they can reflect this in their company performance outputs.

In addition, if these companies integrate digital technologies into their operations so they can quickly respond to customer expectations and increase the satisfaction of their customers who play a key role today.

The first aim of this study is to investigate the effects of supply chain agility, supply chain resilience, and perceived customer satisfaction on firm performance.

Another aim is to investigate the moderator effect of digital transformation between supply chain agility and perceived customer satisfaction.

Lastly, the mediation roles of supply chain resilience and perceived customer satisfaction between supply chain agility and firm performance were examined separately and together by including them in the model.

To our knowledge, this is one of the first studies that indicate the mediator role of perceived customer satisfaction between supply chain agility and firm performance and the moderator effect of digital transformation between supply chain agility and perceived customer satisfaction. Thus, it is expected that both the examination of these relations and the creation of the model by the researcher will contribute to the literature and fill the existing gap.

The population of the research consists of manufacturing companies registered with OSBUK (Organized Industrial Zones Senior Organization) operating in the Marmara Region. The sample group was selected from top managers and middle managers (general managers-directors- CEO and planning-logistics-purchasing managers) working in these companies and the questionnaires were sent to these

member companies of OSBUK. The data obtained from the companies were analyzed by using SmartPLS 4 program structural equation modeling (SEM). Finally, the results of the research were discussed, the importance and contributions of the study were explained. In addition, the limitations of the research, recommendations for future research, and implications related to management are discussed.

In conclusion, it is expected that the study contributes to both the literature and the practitioners with its managerial implications.

Keywords: Supply chain agility, supply chain resilience, digital transformation, customer satisfaction, firm performance, resource-based theory



To my lovely daughter Deniz Liya...



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ABBREVIATIONS

AGI:	Agility
COVID-19:	Coronavirus Disease 2019
CR:	Cronbach Alpha
DGT:	Digital Transformation
EO:	Entrepreneurial Orientation
IT:	Information Technology
OSBUK:	Organized Industrial Zones Senior Organization
PCUS:	Perceived Customer Satisfaction
PERF:	Performance
RBV:	Resource-Based View
RES:	Resilience
ROA:	Return on assets
RQ:	Research Question
SEM:	Structural Equation Model
SC:	Supply Chain
SCM:	Supply Chain Management
SPSS:	Statistical Package for the Social Sciences

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1. INTRODUCTION AND OVERVIEW OF THE RESEARCH

1.1. Introduction

Today, the world has become a global market thus it has become inevitable for companies to focus on competition and increase their options that will provide a competitive advantage (Guner, 2018). Therefore, businesses are looking for new factors to overcome market conditions that become more complex and competitive every day (Hopkinson et al., 2018).

Two basic paradigms in strategic management science explain the creation of unique values for businesses and the creation of sustainable competitive advantage. These are; “industrial organization theory” and “resource-based theory”. The theory of industrial organization is a competitive strategy that focuses on the external analysis of businesses in creating strategies that will provide competitive superiority. This theory starts from the idea that the determinant of superiority is the industrial structure and businesses operating in the same industry are homogeneous (Öztürk, 2003). However, the widely accepted view of homogeneous companies of the 1980s was replaced by the resource-based theory arguing that companies are heterogeneous in the 1990s.

However, the widely accepted "industrial organization theory" of homogeneous companies of the 1980s became more important in the 1990s, instead of the "resource-based theory", it was argued that companies were heterogeneous. (Güleş and Özilhan, 2010). The main dynamic of the theory is the view that converting the unique resources of businesses into distinctive capabilities will positively affect business performance (Brandon-Jones et al., 2014).

It should also be known that the performance of businesses today depends not only on their capabilities. Increasing commercial competition and customers' expectations for the products they purchase to reach them more quickly have increased the dependence of companies on outsourcing and suppliers in addition to their own resources today. Nowadays, where the key factor in the growth and development of businesses is the customer, the effort to increase customer satisfaction and loyalty has become very important for competition. Therefore, today, supply chains should blend the service they offer with technology, and should take into

account customer satisfaction and competition. They should be aware that this effort will increase customer satisfaction and therefore the company's performance also (Yıldız & Cetintas, 2019).

The process of integration into the supply chain involves the planning, coordination, and control of the flow of raw materials, parts, and finished products from suppliers to customers at the strategic, tactical, and operational levels. Thus, agile, resilient, customer satisfaction-oriented companies achieve high performance in the supply chain. Consequently, the performance of suppliers on issues such as quality, distribution, cost, and service directly affects the performance and success of businesses.

Supply chain resources were identified as the most significant factors in improving performance (Yilmaz et al., 2020). Firms that are aware of their resources and try to be resilient and agile realize the importance of issues such as planning, forecasting, and strategic decision-making, and they can survive more easily in difficult times. However, some companies that fail to grasp the importance of the supply chain continue to keep firm performance low. They have very serious problems in terms of supply since they do not even have emergency plans for situations such as a sudden epidemic like Covid-19. Thus, companies with high foresight attach great importance to technology and agility, which also play important roles in marketing and supply chain management, in order to provide the most precise solutions for market and consumer needs while keeping costs in balance. The concepts of digital transformation, supply chain agility, and resilience are very important factors for increasing the competitiveness of companies and creating customer satisfaction.

The operation of creating an agile supply chain stands out as one of the important competitive power factors for both supplier businesses and industrial businesses making purchases. The primary goal of any supply chain is to provide the appropriate product at the right time and in the right place, and agility helps companies with this process (Calvo et al., 2020). Thereby, agility is the primary quality of a supply chain required for survival in turbulent and volatile markets, which are increasingly the norm as product life cycles shorten and environmental influences contribute to unpredictability, resulting in higher risk in supply chain management.

Businesses need to use technology very effectively as well as to create an agile

supply chain. Businesses need to adapt to the digital age to respond to changing and evolving needs and requirements. In particular, the coexistence of technology and life makes digitalization and digital transformation, not an alternative way that we can take advantage of anymore, but also the key to the system that will shape the future.

Digitalization is reflected not only in the sales of businesses but also in all areas of life. Every part of life, product development process, and various sectors such as education, health, trade, and art are also affected by digitalization. Thus, it is vital to adapt to the digital age to respond to changing and evolving needs and requirements. With all these important factors, understanding the sources of competitive advantage in challenging conditions has long been among the most important research areas of strategic management. Ensuring sustainability starts with getting out of these difficult conditions and recognizing what internal resources are.

Important and extraordinary resources contribute to the value creation of companies and thus customer satisfaction is achieved. Therefore, this study also will be identified the lack of empirical research studying the relationships between agility and digital transformation, as well as their combined interactions with customer satisfaction from the standpoint of company performance.

In this context, the importance and questions of the study will be introduced then the important concepts of supply chain agility, Supply chain resilience, digital transformation, customer satisfaction, and firm performance and their relationships with each other in the literature will be explained.

1.2. Importance and the Research Questions of the Study

Today, it is obvious that businesses competing in a continuously changing and dynamic supply chain adopted “the big fish who eat the small fish” motto, instead of the ‘it's the fast fish who eat the slow fish’ motto (Çalışkan et al., 2016).

In general, manufacturing companies aim to sustain their long-term existence. However, epidemics such as COVID-19, wars, and natural disasters showed that companies should use their resources more efficiently. In this sense, they need to build agile and resilient supply chains to survive and increase their performance.

In addition, they are expected to use the contribution of information technologies to create customer satisfaction by complying with the requirements of the age.

Therefore, to make their operational performance superior, companies have to create and maintain a competitive advantage.

As for the contribution of the subject to the literature, very few studies have discussed the relationships between sc agility, sc resilience, customer satisfaction, and firm performance together.

To our knowledge, also the mediating effect of customer satisfaction between sc agility and firm performance and the moderator effect of digital transformation on the relation between sc agility and customer satisfaction for the first time were analyzed. Therefore, the study is expected to fill an important gap in the literature.

Thus, the purpose of this research is to see how supply chain agility, supply chain resilience, and perceived customer satisfaction affect firm performance. The research also looks into the function of digital transformation as a moderating effect between supply chain agility and perceived customer satisfaction.

In light of these theoretical syntheses, the creation of the conceptual model of study by the researcher will also contribute to the literature.

In a summary, the conclusion to be obtained as a result of the research will provide administrative implications to the supply chain managers and senior executives of the companies in supply chain management about how they should approach the concept of agility from the supply chain applications in the uncertainties that may arise.

In addition, the study is supported by the resource-based theory.

Consequently, the research questions were:

- a) Do supply chain agility and supply chain resilience affect firm performance?
- b) Is there a mediating role of perceived customer satisfaction between supply chain agility and firm performance?
- c) Is there a mediating role of supply chain resilience between supply chain agility and firm performance?
- d) Does supply agility affect supply chain resilience and perceived customer satisfaction?
- e) Does perceived customer satisfaction affect firm performance?
- f) What is the moderating effect of digital transformation between supply chain agility and perceived customer satisfaction?

1.3. Study Outline

After the literature review hypotheses have been formulated, the conceptual framework was explained. Survey questionnaires were designed and conducted for data collection purposes. The simple random sampling technique, which is one of the probabilistic sampling methods was preferred.

Generally, simple random sampling is used in quantitative research designs and surveys. It is suitable for studies where the population is homogeneous and uniformly distributed. Also, individuals have equal opportunities to participate in research (Altay et al., 2018). In the application, all units are listed and random units are selected from the list.

In the study companies' middle and upper-level managers from OSBUK members in the Marmara Region of Türkiye were selected, and the surveys were conducted through e-mail. The sampling group was selected from the list of companies that are members of OSBUK.

Data were collected from the 1st of June 2022 to the 20th of November 2022.

Thereafter, a structural equation model (SEM) was used to find relationships among structures (factors) via the SmartPLS program. The demographic characteristics of respondents were examined. In this context, firm characteristics such as working years in business, employee numbers, annual turnover, and executives' profiles were investigated and the findings were presented and discussed. Finally, depending on the findings, conclusions, and evaluations were presented.

1.4. Conceptual Model

The resource-based perspective is used as a foundation for developing a conceptual model for this investigation.

The model has been developed by the researcher and the conceptual model is presented below:

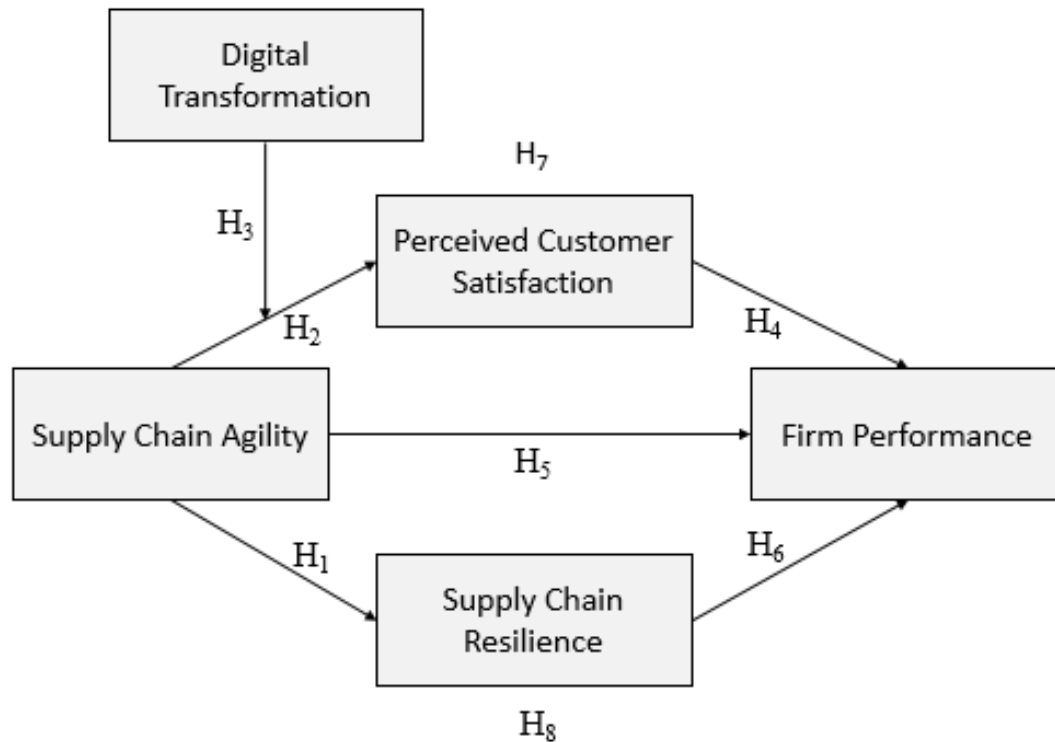


Figure 1 Conceptual model of the study

2. CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

In this section, the literature on theoretical concepts related to the purpose of the study is presented in detail to elaborate on the model and hypothesis of the study. To make theoretical concepts more clear, firstly, the concepts of supply chain agility, the resilience of the supply chain, firm performance, digital transformation, and perceived customer satisfaction were discussed separately.

2.1. The Factors that bring out the requirement to be Agile and Resilient

In this context, the concepts of globalization, globalization of production, globalization in markets, the importance of information technology for companies, and productivity are explained.

2.1.1. Globalization

The rapid development of technology, reduction of transportation costs, and the free movement of production factors have led to the coalescence of different societies. This mutual interaction process has revealed the concept of "globalization", which is defined by expressions such as "the world becoming a global village" (Turan, 2007).

Globalization reflects the widespread view that "economic and technological forces are rapidly shaping the world and that developments in one part of the world will have lasting and profound consequences for the lives of individuals and communities on the other side of the world" (Castells, 2014). Similarly, Giddens (2006) defines globalization as "the shaping of local formations by events miles away or, conversely, the intensification of worldwide social relations that connect distant localities".

These definitions of globalization, which are articulated with international relations, refer to the views that societies are increasingly similar to each other as a result of the dissolution of the national borders of different countries and the increase in their social, political, cultural, and economic relations and dependencies.

2.1.2. Globalization of Production

The production strategy aims to determine the criteria that will bring orders to the business in different markets thus they can perform better than the competitors (Güleş and Bülbül, 2004). Globalization of production means that businesses produce certain or all of their products through other businesses outside the borders of the country (Küçükahmetoğlu et al., 2005). At this point, a production system that provides a competitive advantage should have competing priorities. Competition priorities have been classified in different ways by different scientists over time, and today they are examined in six dimensions: cost, quality, delivery speed and reliability, flexibility, and innovation (Güleş and Bülbül, 2004).

In other words, globalization in production is the expansion of companies' production of goods and services outside their own countries through cross-border fixed capital investment, cross-border participation, contract manufacturing agreements, and other methods. Companies in developed countries have traditionally invested outside the country of origin, particularly in primary commodity sectors (Şişman, 2015).

Thanks to developing communication, transportation, and automation technologies, businesses reduce costs by producing in countries where product differentiation, quality standards, low stocks, and labor are cheap, thereby intensifying competition. Global production, which develops in the form of multinational companies using advanced production technologies, producing in underdeveloped or

developing countries where production costs, especially labor costs, are cheap, also enables technology transfer to the country in question (Güleş and Özilhan, 2010).

2.1.3. Globalization of Markets

The responsibility and influence of governments in the process of creating new value are greater than what narrow and old economic theories assume and suggest. New economies have ceased to be market economies and have become organizational economies. In this type of economy, firms are the architects of value creation and the development of economic activities (Kangas, 2003). Thus, the growth of the firm is based on quality managerial capabilities, not economic ones, and the most important theory that deals with these capabilities is the resource-based theory.

The concept of globalization of markets was first used in 1983 in Levitt's article entitled "The Globalization of Markets". In this article, Levitt bases globalization on the distinction between "global" and "multinational" companies. The main feature of the global market is to allow world brands to emerge in world showcases by following the wishes and likings of all world consumers (Levitt, 2002).

Digitalization, virtualization, and the increase in mobility of analog transactions move competition in many sectors from local to global. Globalization pushes businesses to internationalize, bringing them face-to-face with other rapidly increasing players in the global competition game (Aydemir, 1998).

In other words, the globalization of production and markets has emerged as a result of technological globalization, which is another pillar of globalization. With modern communication technology, companies have started to operate in more than one country with different organization and control methods. Through these technologies, global companies can establish seamless connections with their customers, suppliers, and partners around the world (Aydemir, 1998).

The globalization of markets can be explained as the integration of national markets operating separately from each other and becoming a single large market. The dynamic behind the globalization of markets is the development of information and communication technologies. The development of information and communication technologies changed the rules of the classical economy and led to the start of a new process called the "knowledge economy" or "new economy" (Tekin, Güleş, and Öğüt, 2003).

Globalization has a very wide range from politics to culture, from economy to technology. Therefore, globalization causes radical changes in the competitive structure of companies. Companies have to find new solutions to keep up with changing market and competition structures (Aydemir, 1998).

Today, even if businesses operate only for the domestic market, they also compete with businesses operating in international markets in these markets. In addition, to be successful in global competition, mergers and advanced collaborations between businesses are emerging.

2.1.4. Information Technologies

Information technologies (IT) have become one of the important factors of production that increase labor productivity after the 1990s (Oliner and Sichel, 2003). This technologies development has differentiated the basic foundations of success for companies to exist in a competitive environment. Accordingly, although the internal functioning of businesses, such as the business world's ways of doing business, organizational styles, and production styles, has not changed, the development of information technologies has led businesses and markets to undergo a radical structural transformation (Ekinici, 2006).

The effects of information technologies on economic and social outputs such as firm productivity, firm profitability, excess customer revenue, product quality, and output levels have been continuously investigated (Thatcher and Pingry, 2004). All studies generally indicate that the development of information technologies leads to better customer service, increases product quality, and reduces product prices (Mitra, 2005). It is also stated that investments in information technologies increase productivity and positively affect profitability and the income structure of the customer (Thatcher and Pingry, 2004).

Today, the competitive conditions of countries and thus the competitiveness of companies are measured by the high-tech goods they produce or export. The increase in the amount of capital of the companies generally manifests itself in the form of an increase in information technology investments in recent years (Oliner and Sichel, 2003). Also, it has been discovered that one of the major characteristics that set successful organizations apart is the managerial capacity to coordinate the diverse operations connected with the successful implementation of IT systems.

“Strong human IT resources allow companies to:

- integrate IT and business planning processes more successfully;
- conceive and develop dependable and cost-effective applications that support the company's business needs faster than the competition;
- communicate and work with business units more effectively;
- anticipate the company's future business needs and innovate valuable new product features before competitors ” (Bharadwaj, 2000).

2.1.5. Productivity

Productivity is generally known as getting the most output with the least input. Productivity, with its broad definition, is defined as the relationship between the output of a production or service system produces and the input it uses to create it. In other words, productivity is the effective use of various production inputs in the production of goods and services (Prokopenko, 1987).

Productivity is the best way to stop inflation and increase real income at the national level, while it is the best way to reduce costs and increase profits at the enterprise level (Ross, 1977). In today's industry, nothing is more important than productivity (Blake and Mouton, 1981). One of the reasons is that productivity means better wages and salaries. This means a better standard of living. Secondly, productivity means that nations continue to be competitive and operate effectively in an internationally competitive environment.

In a narrow sense, productivity determines the relationship between the amount of production (output) and the number of factors of production (input). This relationship can be shown with the ratio between a single factor of production and the amount of production, or it can be stated with the ratio between all factors of production and the amount of production. In this sense, productivity is not a static measure, but a dynamic measure (Maja et al., 2022).

Today, attention has been turned to the supply side and productivity problems have gained economic importance. Today, being able to compete in international markets and competitive power has become an important requirement. Efficiency is the most important factor for the survival of enterprises in the long run, for countries to gain economic, political, and military power, and for increasing the quality of life in the world (Shetty and Buehler, 1988). Efficiency is key to being competitive and successful in today's rapidly developing and globalizing world. Productivity provides

opportunities such as profits, new jobs, higher incomes, better education, and it determines a country's level of prosperity.

While the increase in productivity leads to an increase in production, on the other hand, making the labor more qualified at the end of the education process contributes to the increase in exports and therefore to economic development by providing a competitive advantage in the international market by producing better quality goods and services (Dahlin, 2002).

Productivity, which is to provide the most output with the least input, is of course necessary for businesses, but it is not enough. At the same time, agility has become a competitive element for companies. Profitability, productivity, stock market profitability, and growth of the business are indicators that can be used to evaluate performance multidimensionally so it can be said that productivity is related to company performance (Çolakoğlu, 2019).

Rahman & Bullock, (2005) measured performance with subjective criteria such as customer satisfaction, employee morale, productivity, defect rate, just-in-time delivery to the customer, demand-cost ratio, and quality-cost ratio in their performance studies.

Productivity, resilience capacity, and strategic agility underline a firm's need for deliberate and positive action in the face of changing circumstances. Therefore, there is a strong relationship between these three organizational characteristics.

2.2. The Resource-Based Theory

The concepts of resources, the resource-based theory, and resource management concepts are explained. This study adopted a resource-based theory perspective to comprehend the relationships between company resources (such as information technology) and company performance in terms of supply chain resilience and agility.

2.2.1. Concept of Resource

Resources are not the capacity of a company to produce but the commodities it owns and can use, and these are primarily classified as physical assets, human assets, and organizational assets. Also, resources can be tangible such as infrastructure, or intangible like information. Then, this classification was expanded to include financial, technological, and reputation capital. (Brandon-Jones et al., 2014). All resources present in economically viable, technologically accessible, and culturally

sustainable environment sources are broadly classified into two main categories: renewable and non-renewable (Yigit, 2016).

Resources should not be limited to equipment and stock only, because human resources are also very significant. While some researchers find external factors more important within the scope of resources, some draw attention to the importance of internal factors based on secondary resources. Internal factors mean a company's core capabilities (Hunt, 2014). It consists of tangible formations such as resources, production systems, technology, machines, and intangible concepts such as brand or property rights (Mathews, 2002). Firm resources are generally examined in four categories (Collis and Montgomery, 1997):

- ✓ *Tangible Resources:* Resources that can be seen on the firm's balance sheet and easily converted into value.
- ✓ *Intangible Resources:* Intangible resources such as company reputation, brand name, technical information, patents, and experiences.
- ✓ *Organizational Capabilities:* It is a complex combination of people and processes that organizations use to transform inputs into outputs, without input factors such as intangible or tangible resources.
- ✓ *Financial Resources:* Consists of tangible resources such as money, reserves, and debts.

2.2.2. Resource Management and Resource-Based Theory

The new world order, which has been shaped as a result of the integration of national economies with global markets and the increase in the economic, political, and cultural relations of people from different cultures living in different countries, has witnessed the transformation of managerial paradigms at the business level. The change in the management paradigm and the increasing importance of the concept of strategy have brought the science of strategic management to us today.

Businesses that want to achieve a sustainable competitive advantage in the global competitive environment should determine their strengths and weaknesses depending on the resources they have, and create strategic action plans in line with the opportunities and threats in the sector in which they operate. Therefore, they implement a strategy-based management model. The resource-based theory argues that sustainable competitive advantage is based on the resources that companies own.

Resource-based theory suggests that companies can obtain competitive advantages once they have worthy, unique, and unreplaceable resources (Brandon-Jones et al., 2014).

The resource-based approach was introduced by Birger Wernerfelt in 1984. The theory argues that worthy, unique (Bharadwaj, 2000), and difficult-to-imitate company resources ensure a sustainable competitive advantage.

The first contributions to this approach were made by Edith Penrose (1959). Penrose argues that companies are more than the sum of managerial units, they are a whole consisting of production resources spanning various users and time. Further contributions to the approach were made by Ansoff (1965), Andrews (1971), Selznick (1975), and Wernerfelt (1984). In 1984, Wernerfelt proposed the resource-based theory, building on the work of Penrose and other researchers in 1959, which provided the first consistent expression of the theory (Bal, 2010).

The nature of resources and how they are used is very important for companies, especially in supply chain management. The resource-based approach argues that companies should know their existing resources well, determine the resources and capabilities specific to the business, and compete by using resources that their competitors do not have to be competitive, survive, and constantly renew themselves. (Edwards et al., 2014). Therefore, a significant part of the studies in the literature is based on resource-based theory. Accordingly, the resource-based theory was deployed for small-to-medium companies in the areas such as distribution logistics, sustainable supply chain management, alliances in supply chain networks, blockchain, supply chain, network design, and supply chain risk management (El-Baz & Ruel, 2021). The main goal of supply chain management is the optimization of companies' resources and performance.

According to the resource-based theory, for companies to earn above-normal profits in a competitive industry, they should have superior resources than their competitors and have the necessary protection mechanisms to prevent these resources from being copied in the industry in which the company is located. With the effect of the new economic structuring brought about by the information economy, the intangible assets of the enterprises have gained importance as much as their tangible assets. Intangible assets are partially shown as the most important source of the long-term success of companies in the resource-based theory literature due to their invisible

characteristics and superiority over tangible assets in terms of imitation (Michalis et al, 2000).

2.2.3. Importance of Resource-Based Theory for Companies

Increasing global competition, the impact of technology on products and services, and the rapid change in consumer markets and customer profiles have led businesses to resource-based practices in strategic marketing to achieve sustainable competitive advantage. The traditional teachings of marketing in the early 1900s, from mass production with an understanding of "whatever I produce", which was based on producing and selling the same type of product in large numbers during times of war famine, to personalized mass production and marketing strategies, which is the last point reached today, and the most important point of information and human enterprise in the digital economy has changed towards a direction positioning it among the sources (Güleş and Özilhan, 2010).

The resource-based view (RBV) helps businesses grow their supply chain management agility, adaptation, and alignment. The establishment of distinct capabilities to improve corporate performance stands out as utilizing the resources of “ heterogeneity, allocation, independence, utilization, and imitability ” (Filho & Moori, 2020).

The firm's resource-based view is owned by each firm and takes into account physical, financial, and intangible assets, organizational characteristics, and human resources (Kayabaşı, 2007). The supply chain brings together the raw materials, auxiliary materials, and production tools (labor, natural resources, capital, technology) to be used in production so that the resources needed are supplied to the production points at the most appropriate cost and conditions, and then finished products and services delivered to the end customers at the best conditions and costs (Timur et al., 2013).

The resource-based view (RBV) helps businesses become more agile, adaptable, and aligned. The establishment of distinct capabilities to improve corporate performance stands out as utilizing the resources of heterogeneity, allocation, independence, utilization, and imitability. In case utilized accurately supply chain improvement can be a vital factor that can decide how effectively and efficiently the firm uses its resources (Larsson, 2005).

This study, with a resource-based perspective, is focused on how companies use their resources in the supply chain and how they provide agility and resilience in difficult and unexpected situations. While doing this, the study also measures the effective role of companies' digital resources in providing customer satisfaction. The purpose of this paper also is to determine the impact of a firm's resources as digital technologies and competencies (agility and resilience) on firm performance by using the resource-based view (RBV) of the firm as a theoretical background.

2.3. Supply Chain

Under this title, the concepts of the supply chain, the importance of supply chain for companies, supply chain management, the historical development of supply chain management, stages of supply chain management, purposes of supply chain management, supply chain key areas, and supply chain participants are explained.

2.3.1. Supply Chain Concept

The supply chain is a global network used to produce products and services to deliver from the origin point to the end customers (Wisner et al., 2005). In business terms, a supply chain is a system of all institutions, individuals, actions, knowledge, and resources that provide a product or service for the customer. Natural resources, production components, and raw materials are turned into a final product and delivered to the ultimate user as part of the supply chain operations (*Supply Chain*, n.d.).

The supply chain of any company consists of raw material producers, the people converting raw materials and semi-finished products into finished products. In other words, those who deal with procurement during the manufacturing processes-, and all elements that create value during the delivery of the finished products to the ultimate user in the distribution channels. Although the concept of supply chain management is popular both in academic circles and in practice, it is seen that it is quite confusing about the true meaning of the term (Chen & Paulraj, 2004).

Van der Vorst et al., (2007) define a supply chain (SC) as the set of processes (decision-making and execution) and flows (materials, information, and money) between different departments, from production to consumption, to meet the needs of end customers. Supply chains include manufacturers, warehouses, suppliers, shippers, retailers, and consumers. In a broader sense, the supply chain includes marketing,

distribution, new product development, finance, and customer service, transactions (Van der Vorst et al., 2007).

The supply chain consists of many independent units/departments or organizations and their facilities, functions, and activities that are involved in the production and delivery of products or services. In the supply chain, products and services gain value (Timur et al., 2013) during the journey that starts with the raw material and ends with the end consumer or customer, so the supply chain can also be called the value chain (Uslu et al., 2015). That's why research in this context is full of terminologies such as also support chains, demand pipelines, supply chains, and value streams (Chen & Paulraj, 2004).

2.3.2. Importance of Supply Chain for Companies

The supply chain provides communication between business partners, suppliers, manufacturers, retailers, and customers, to follow and manage projects over a common area, to ensure that customers' requests are met most effectively and efficiently, to use resources most effectively, to increase efficiency, to reduce costs, and to reveal and realize a planned, fast, and flexible production and distribution chain (Gokhan & Müge, 2022).

The supply chain of any company consists of raw material producers, the people converting raw materials and semi-finished products into finished products in other words, those who deal with procurement during the manufacturing processes, and all elements that create value during the delivery of the finished products to the ultimate user in the distribution channels. Rather than a multitude of businesses with raw material suppliers at the starting point and consumers at the endpoint, a supply chain is a system-level approach that looks like a single firm that represents all of them (Zeynep, 2009). The supply chain also called the value chain, is important as it can help achieve various business objectives in global competition. Controlling manufacturing processes can improve product quality, help build a strong consumer brand, reduce risks, and reverse logistics activities (Gokhan & Müge, 2022).

Manufacturers, who do not want to lose their market share in an intensely competitive environment, have started to attach importance to the establishment of marketing, regional distribution, and service center networks in order to increase efficiency and reduce costs outside their production centers. So, companies can manage projects through a common area, ensure that customer requests are met most

effectively, and use resources most efficiently. Thus, the product delivery and service times of the enterprises have been shortened, and they have also started to control their distribution and service centers (Yörük, 2007; Gokhan, 2022). There is a basic supply chain figure below:

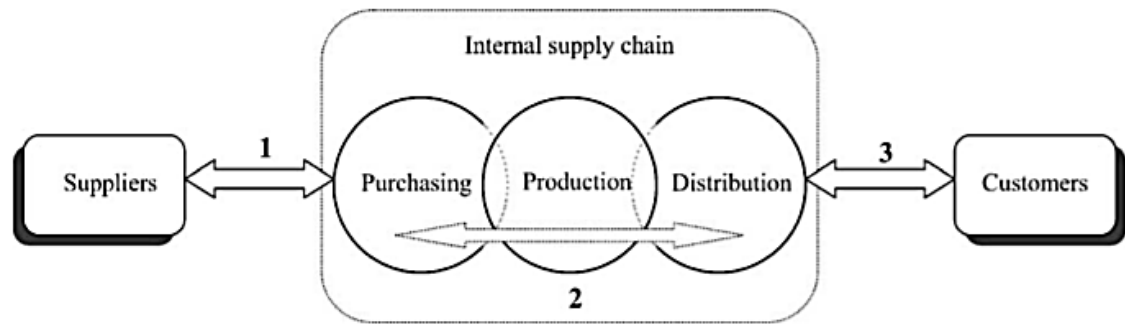


Figure 2 An illustration of a company's supply chain (Chen & Paulraj, 2004).

2.3.3. Supply Chain Management

SC management can be defined as the harmony of traditional functions of the business with a firm or between firms strategically and systematically. The main purpose of the management of the supply chain is to enhance the long-term performance of each company in the chain (Mentzer et al., 2001).

In other words, “supply chain management is explained as the integrated management of material, information, and money flow that provides the right product reaches the customer at the right time, at the right place, at the right price at the lowest possible cost for the entire supply chain”. In addition, it is the creation of strategies and business models that will increase customer satisfaction by integrating the basic business processes in the chain (Fıçıl, 2006).

On the other hand, supply chain management is a very broad concept. Therefore, various definitions based on personal experiences often emerge in the explanation of the concept. Some view supply chain management as specifying outsourced products, managing suppliers, and handling relationships with other stakeholders. Others consider costs and see the supply chain as an efficient way to

move goods from one place to another. Some of them see it as integrating information systems and inventory management practices into other firms' distribution channels or value chains. Others regard it as the effective management of fixed and variable assets required to run the firm's operations (Lu & Swaminathan, 2015).

A supply chain that can respond quickly to ever-changing conditions and customer demands can be effective and efficient. To achieve this; supply chains have turned into systems that integrate suppliers, manufacturers, distributors, and customers into an integrated structure by using information technologies as a tool to meet the customers' expectations of productively and efficiently. The supply chain includes functions such as managing supply and demand, sourcing raw materials, manufacturing and assembling, storing, inventorying, managing orders, and distributing products to customers. It encompasses the operations and information systems required to sustain all of these operations (Aytac, 2008).

Ultimately, the supply chain is to manage the flow of an enterprise through information management, and information technologies, again over the technology infrastructure (Yörük, 2007).

In some sources, supply chain and other activities may be seen as the same concept, but there are some variations. The distinction between supply chain management and conventional materials handling and production control can be listed as follows:

- ✓ The supply chain is considered a monolithic mechanism. The responsibility of various departments in the chain is not divided. Responsibilities are not delegated functionally (such as purchasing, distribution, production, and sales).
- ✓ Supply chain management requires strategic decision-making. Because it has a big impact on the market share as well as the overall costs, and therefore it is very important from a strategic point of view.
- ✓ Supply chain management entails a disparate paradigm on stocks considered as a stabilizer mechanism that is used as a last resort rather than a first resort.
- ✓ A brand new mindset towards systems is required, which prioritizes integration over the interface (Houlihan, 1988).
- ✓

2.3.4. Historical Development of Supply Chain Management

The principal goal of supply chain management is to satisfy the different demands and needs of each client. During this period, it was realized that the shift in customer profile would result in shifts in the structure of the supply chain, and research was conducted in this regard (Öztürk, 2016).

The 1960s are when supply chain management first emerged. Businesses used a number of management techniques before the idea of SC management caught their attention. Supply chain management is a progression of logistical management. In 1963, with “the formation of the National Council of Physical Distribution Management (NCPDM)”, the industry discovered the link between warehousing and the function of transportation.

Bowersox (1969) was the first to emphasize that the physical distribution stage is the first stage of supply chain management. Bowersox argued that with related trends in physical distribution thinking, the distribution function would provide a competitive advantage through in-channel integration outside the company.

With the introduction of the Materials Requirements Planning (MRP) system in the seventies, executives recognized the significance of in-process research, manufacturing expenses, quality, and delivery times in the development and distribution of new goods. During this era, companies created a centralized physical distribution department to handle distribution activities associated with marketing, manufacturing, and financing, and they realized the need to unify the logistics management of the entire system, rather than optimizing the logistics of each operation.

In addition, in 1982 K. Oliver established the idea of the supply chain. Oliver created a vision to differentiate the production, marketing, and distribution operations using the idea of the supply chain. Houlihan invented and presented the idea of supply chain management as a means of “knowledge-sharing activity”. Houlihan addressed the supply chain as a singular phenomenon and merged the company's strategic decisions with a focus on logistics (Houlihan, 1988).

In the late 1990s, both the academic and business world focused on the issue of the supply chain. In the 2000s, supply chain management turned into a dynamic field where many studies are conducted (Öztürk, 2016).

With the rise of the Internet and new emerging IT technologies from the 2000s onward, supply chain management has been expanded to include facilitating

applications such as e-commerce, e-procurement, e-logistics, Internet-based chain monitoring, and demand prediction inventory management with the use of real-time data. In this era, the 5th and final phase of supply chain management is called the e-supply chain management phase (Lancioni, 2000).

The Logistics Management Council has renamed the Supply Chain Management Professionals Council in 2005 and in his book 'The World is Flat, T L. Friedman described this expansion of the sc revolution. Supply chain management was so important, and according to him, this concept is the main element of the revolution in information technologies and changes in the economy (Leamer, 2007).

2.3.5. Stages of Supply Chain Management

First, physical distribution management integrates the functions of providing inventory, reducing the benefits gained through the use of reliable transportation. Thanks to the integration of these two functions, warehouse management, and shipping, as well as quick response time to the order, reduce the duration of the forecast period and thus increase the accuracy of the forecasts (Metz, 1998).

The second phase in supply chain management is the logistics step. It appears as an assistant to the production, purchasing, and order management functions.

Currently, the third step is integrated supply chain management; suppliers and customers are associated to increase the functions of the integrated chain.

“Super Supply Chain Management” is the next phase in the supply chain. Many functions such as development, marketing, and customer service will be integrated with this phase. With advanced computer decision support systems, an advanced level of communication will be available. In super SC management, designers will develop the production mode of the product. In this way, the product will be easier to use. All supply chain participants will receive pre-order and in-order information. This allows participants to respond more quickly and precisely (Metz, 1998). The simultaneous (consecutive) relationships between the supply chain and the businesses in the chain have had a fundamental place in business management in linking production, marketing, and sales strategies with manufacturing, stock, and service execution. In this context, it can be said that supply chain management has passed through five stages and reached its current state (Timur et al., 2013).

As seen in Table 1 below these stages are as follows:

- ✓ “Storage and Transportation
- ✓ Total Cost Management
- ✓ Integrated Logistics Management
- ✓ Supply Chain Management
- ✓ E-supply Chain Management”

Table 1 Supply chain management development stages (Timur et al., 2013).

<i>SCM Stage</i>	<i>Management Focus</i>	<i>Organizational Design</i>
<i>Stage 1 to 1960s</i> Decentralized Logistics Management	• Operations performance • Support for sales/marketing • Warehousing • Inventory control • Transportation efficiencies • Physical Distribution Management concept	• Decentralized logistics functions • Weak internal linkages between logistics functions • Little logistics management authority
<i>Stage 2 to 1980</i> Total Cost Management	• Logistics centralization • Total cost management • Optimizing operations • Customer service • Logistics as a competitive advantage	• Centralized logistics functions • Growing power of logistics management authority • Application of computer
<i>Stage 3 to 1990</i> Integrated Logistics Management	• Logistics concept founded • Support for JIT, quality, and continuous improvement • Use of logistics partners for competency acquisition	• Closer integration of logistics and other departments • Closer integration of logistics with supply partners • Logistics channel planning • Logistics as a strategy
<i>Stage 4 to 2000</i> Supply Chain Management	• Concept of SCM • Use of extranet technologies • Growth of coevolutionary channel alliances • Collaboration to leverage channel competencies	• Trading partner networking • Virtual organizations • Market coevolution • Benchmarking and reengineering • Integration with ERP
<i>Stage 5 2000 +</i> Technology-Enabled Supply Chain Management	• Application of the Internet to the SCM concept • Low-cost networking of channel databases • e-Business • SCM synchronization	• Networked, multi-enterprise supply chain • .coms, e-tailers, and market exchanges • Organizational agility and scalability

2.3.6. Purposes of Supply Chain Management

Companies no longer compete with each other in the new world. Instead, they are competing among the supply chains in which they are integrated (Karadelioğlu, 2006). Companies need to have better communication and information exchange with their suppliers and clients throughout the supply chain in order to realize these targets. By exchanging information and plans with both suppliers and clients, the effectiveness and competitive advantage of the chain can be improved (Sevinç, 2008).

The forces known as the strategic 3C (customer, competition, corporation) play an important role in determining the marketing strategy. The interplay of the strategic 3C provides the basis for decisions about where, how, and when the competition will take place. As a result of determining and developing the market-based resources and capabilities of the business and ensuring the customer value and competitive advantage brought by “differentiation” are well positioned in the market, the business will provide superior performance (Papatya, 2003).

When the supply chain management is designed and managed effectively, it is aimed for the business to achieve the following objectives (Sevinç, 2008):

- ✓ To realize the uninterrupted flow of materials, services, and information that will carry out the production regularly,
- ✓ Keeping inventory costs and losses at the lowest level,
- ✓ To maintain the quality of the product,
- ✓ Finding and maintaining reliable suppliers,
- ✓ To standardize the obtained raw materials, auxiliary materials, parts, and services,
- ✓ To provide the necessary raw materials, auxiliary materials, parts, and services at the lowest cost,
- ✓ To increase the bargaining and competitive power of the enterprise,
- ✓ Establishing good relations with other groups within the business,
- ✓ Working with the lowest administrative expenses.

From the perspective of the top management, the most important goal of SCM is to achieve the highest level of customer satisfaction. In this way, all units in the chain try to improve themselves. Business and supply chain rings enable them to

customize their products and services according to individual customer requests and needs (Civaroğlu, 2006).

2.3.7. Supply Chain Key Areas

Businesses in the supply chain have to make individual or collective decisions for their activities in five basic areas. These five key areas cover the following topics:

- a) Production, b) Location, c) Inventory, d) Transportation, e) Information, and
- f) Warehousing

2.3.7.1. Production. One of the most important business processes of the companies is the right planning of the materials in production, the accurate evaluation of the demand, and the production of high quality and with the lowest wastage. The questions that should be answered are: What product does the market demand? In what quantity and when should these products be produced? This initiative includes the creation of a master production plan that takes into account production capacity, workload balance, quality control, and equipment maintenance (Timur et al., 2013).

2.3.7.2. Inventory. Inventory refers to the total stocks of goods held for various purposes to support the manufacturing or assembly processes as well as for resale to others. Logistics managers must simultaneously consider all three relevant costs—the cost of transporting, the cost of holding, and the cost of keeping stock when managing inventory. Thus, they can carry out logistics operations more effectively (Demirci, 2019).

2.3.7.3. Location. Where should warehouse facilities for production and stocks be located? What are the most cost-effective production and stock warehouse locations? Is it better to build new facilities or use current ones? These are the questions that should be answered. Decisions taken within the scope of these questions will determine the appropriate route for product flow along with distribution to the ultimate user (Timur et al., 2013).

2.3.7.4. Transportation. It deals with the delivery and distribution of finished products from the warehouse to the customer, wholesaler, or retailer. Transportation is defined as the entirety of material flows in the supply chain. Speed and efficiency are the paramount factors in determining the mode of transport.

2. 3.7.5. Information. Information, together with other performance components, forms the basis for decision-making. It enables the establishment of

relationships between all activities and operations within the supply chain (Yiğit & Ismail, 2019).

2.3.7.6. *Warehousing.* It has emerged intending to protect basic items or necessities from environmental and climatic conditions. In addition to the purpose of warehousing stocking of manufactured products and semi-finished products, it is also widely used to ensure uninterrupted flow of raw materials used in the production process, thus eliminating loss of time in production and the damages that may arise from it (Özyörük & Ak, 2012).

2.3.8. Participants in Supply Chain

A cluster of three or more assets that are directly connected to the financial, service, product, and/or information input and output to the client is referred to as the SC (Mentzer et al., 2001).

In its most plain terms, a supply chain consists of a firm, suppliers, and consumers. Different combinations of these form an elementary supply chain. Enlarged supply chains include an extra organization defined as a service provider (as shown below).

2. 3.8.1. *Producers:* Producers or manufacturers are businesses that produce raw materials, intermediate items, or finished goods. Producers of finished goods employ raw materials and subassemblies from other manufacturers to generate their goods, which can also be served.

2.3.8.2. *Distributors:* Distributors purchase wholesale inventory from manufacturers and deliver it to customers in a bundle of related product lines. Wholesalers and distributors are two terms for the same thing. They commonly sell things in larger amounts than a single consumer would normally purchase sell things in larger amounts which a single consumer would normally purchases (Dzambas et al., 2014).

2. 3.8.3. *Retailers:* Retailers stockpile inventory and sell smaller quantities to the public (customers) so they have to closely monitor their customers' preferences and demands. They advertise to their clients and use concepts such as product, price, service, selection, and convenience to attract customers. Discount stores attract customers with low prices and a wide range of products. Luxury stores offer a unique range of products and a high level of service. Retailers provide items and services to

fulfill the needs of single customers who purchase in small amounts (Four Participants in Every Supply Chain | SCM Globe, 2021).

2.3.8.4. Customers: Customers are the individuals or firms that buy and use any product or service. Customers can also be vendors, manufacturers, or distributors who sell a product to their customers (end customers) by incorporating one product into another. They depend heavily on wholesalers, manufacturers, and retailers to meet their needs.

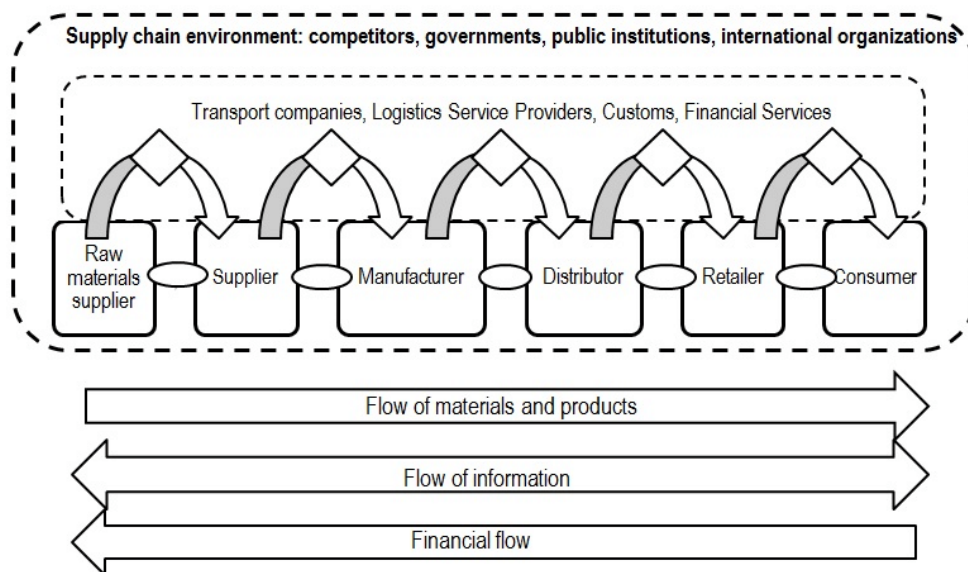


Figure 3 Basic and extended supply chain of participants (Hugos, 2011).

Vertically structured firms that serve mass markets once sought to own most of the supply chains. But today's fast-moving markets, which were once slow-moving, need more elastic and susceptible supply chains (Hugos, 2011).

2. 3.8.5. Logistics Service Providers: Logistics service providers are the members of the supply chain that produce services to the members of the supply chain and sell these services for a certain price.

Logistics service providers eliminate the fixed investment requirements that supply chain members have to make to fulfill their logistics activities, and determine logistics activities such as transportation, storage, distribution as their main areas, and also contribute to the logistics activities by reducing logistics costs as much as possible (Nalbantcilar, 2012).

There are many reasons why businesses use logistics service providers as outsourcing companies, the main reasons are; saving resources, becoming lean, being able to concentrate on the work that the business knows best, adapting to changes,

being less affected by fluctuations, being able to benefit from current and latest technologies and knowledge quickly (Aydin, 2016).

The figure is shown a simple and extended supply chain.

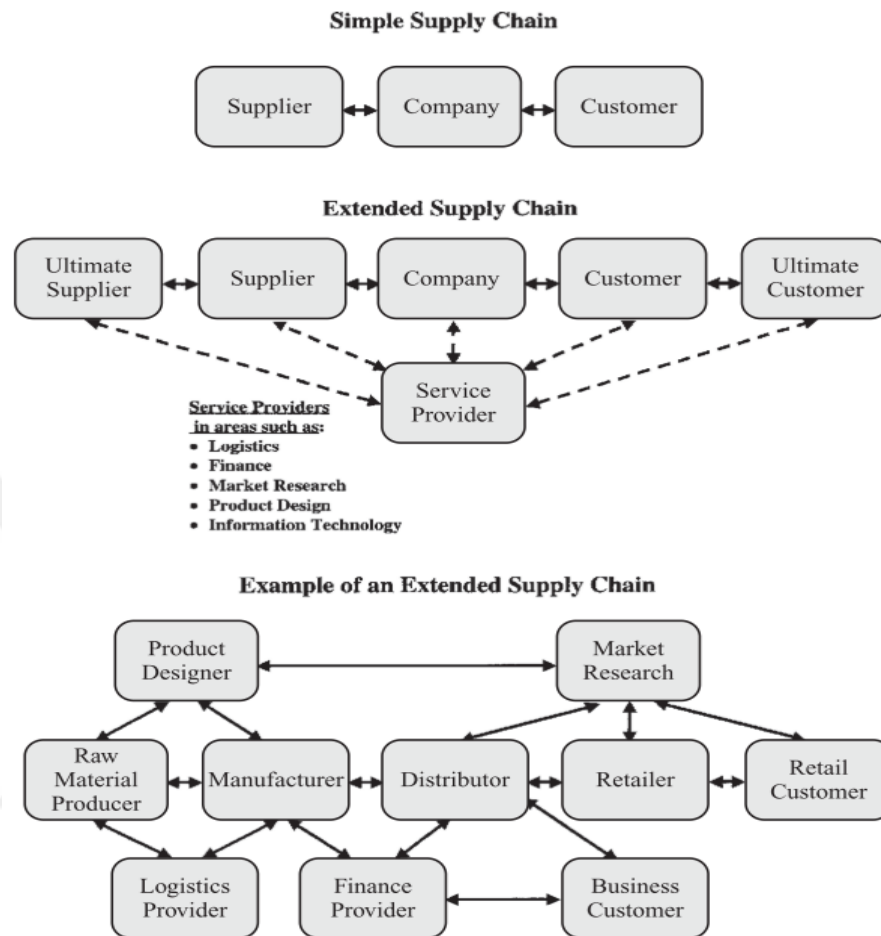


Figure 4 Simple and extended supply chain with example (Hugos, 2011)

2.4. Supply Chain Agility

Under this title, information about the concept of supply chain agility, the importance of supply chain agility for companies, and how firms increase supply chain agility are presented.

2.4.1. The Concept and Importance of Supply Chain Agility

The resource-based theory is accepted as one of the important views of employees who hold the sustainability of total competitive advantage. This theory is consumed not only by the strategic management business type but also by the

businesses and disciplines such as marketing management, production management, and human resources management that are under its influence.

Without defining supply chain agility, it is important to focus on the concept of the system. The system concept can be defined as a whole consisting of certain parts (sub-units and systems), which have certain relations between these parts, and these parts also have relations with the external environment. System approach in management; considers the organization as a whole, consisting of various parts, processes, and objectives. The interactive model between the parts that make up the organizational system, the process consisting of interrelationships within the organization and the interdependent systems and the goals to be achieved is depicted in the figure :

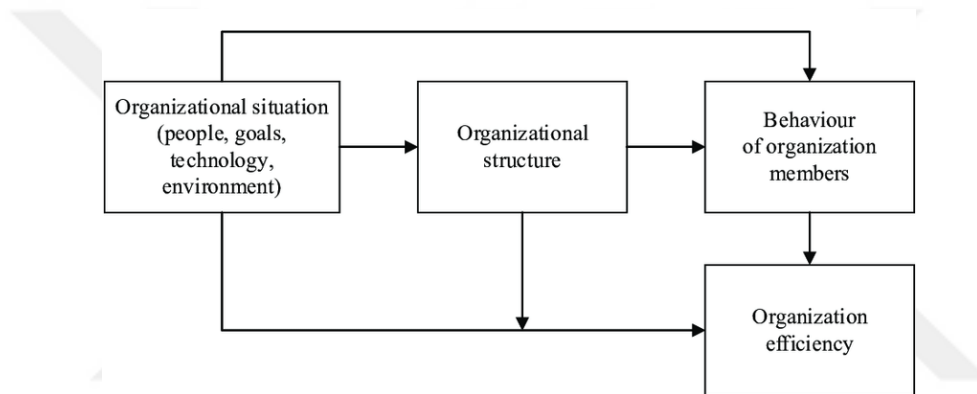


Figure 5 Organizational structure and organization efficiency (Hopej-Kamińska et al 2015)

Agility is the most in-depth answer to the problems that arise in a business environment where rapid change and uncertainty are dominantly evident. It also challenges established organization, management, manufacturing, and competition paradigms. It is of a strategic rather than tactical nature and does not accept existing practices as they are (Goldman Steven L., Nagel, 1995). The agility concept is an institution's capacity to succeed in an ever-changing and unpredictable environment (Prater et al., 2001).

An agile supply chain approach has emerged to meet rapidly changing customer needs in the fastest and most accurate way under the conditions of fierce competition. This is a strategy devised by the American manufacturing industry, which aims to regain the production capability superiority they lost to their Far Eastern competitors. The agile supply chain, which is based on innovation and data management, always adopts the philosophy of 'being ahead of the competitors' and aims to harmonize and coordinate people, technology, and organization (Bilal et al., 2020).

The agile nature of the supply chain is vital for any company to manufacture according to changing customer needs. It is inevitable for the supply chain to be agile, in other words, to respond quickly to variable demand and short product life cycles, for a company to produce according to the needs of its customers (Tarafdar and QRunfleh, 2017).

The agile nature of the supply chain is crucial to quickly introduce new products to meet the ever-changing needs of consumers and respond effectively to quantity/time changes for delivery (Sivayoganathan et al., 2004).

Klaus Schwab, the founder, and chairman of the board of the World Economic Forum argues that today's transformations are not only a continuation of the third industrial revolution, but rather herald the coming of a fourth revolution, and there are three reasons behind this: speed, scope, and systemic effect. Furthermore, changes upend virtually every industry, and the width and depth of the change declare the transformation of systems of manufacturing, administration, and governance as a whole (Schneider et al., 2017).

Fundamentally, an agile company designs its structure, procedures, and products to respond to changes on time. Although agility is beneficial, companies operating in complex environments confront difficulties in taking the necessary precautions to be more agile. These difficulties can be the costs of complex operations and management structures in support of desired features (Prater et al., 2001).

It has been argued that as a business characteristic, simplicity and agility should not be confused with each other. Christopher emphasizes that some companies that rely on simplicity in their practices are not agile at all in their supply chains. That is why the concept of agility is considered to be comprehensive rather than functional and strategic rather than tactical (Barve, n.d.).

An agile approach to supply chain management continues to be adopted by many companies. Agility is the ability to respond quickly to change and to manage outside disruptions. To achieve the most effective outcomes, supply chains should seek to identify economic, market, and other structural changes. Before these changes occur, executives should gather the correct information, remove the noise, and follow the key patterns. Seven-Eleven Japan is a very good example in this respect. Following the 1995 earthquake in Kobe, Seven-Eleven Japan re-established its supply chain operations by deploying seven helicopters and one hundred and twenty-five

motorbikes to avoid traffic and highway blockages and deliver 64,000 rice balls to the population of the stricken city (Calvo et al., 2020).

2.4.3. How Do Firms Increase Supply Chain Agility?

By enhancing daily operations and customer service, businesses may stand out from the competition and boost their profitability. To increase supply chain agility, the product development cycle and production and delivery lead times must be shortened. Additionally, production customization levels also should be increased, and customer service, delivery dependability, and market response must all be improved (Swafford et al., 2008).

In the literature, several suggestions have been developed to build agile supply chain systems. Some of the methods that show how successful businesses reach agile supply chains are listed below:

- ✓ Companies that deliver better, faster, more reliable information about new products and orders into their supply chains thrive.
- ✓ They help the members of the chain to achieve shorter business processes.
- ✓ These companies ensure a coordinated flow of work by synchronizing production and capacities throughout the chain.
- ✓ They benefit from decision support systems.
- ✓ They make an effort to reorganize the flow of material and information.
- ✓ They take care to integrate operation information throughout the chain.
- ✓ Successful companies ensure the elimination of unnecessary processes.
- ✓ They try to have a flexible capacity to meet real customer demand.
- ✓ These companies focus on preserving the existence of capacity instead of material.
- ✓ They try to develop more new products.
- ✓ They try to coordinate/integrate the use of IT in purchasing processes.
- ✓ They develop distribution skills (Boyacıoğlu, 2018).

In this context, according to the study of (Malakouti et al., 2017), the qualities that a business must have to make supply chain management operations agile are as follows:

Entrepreneurial Orientation (EO): It is associated with increasing interest in the relationship between supply chain management and entrepreneurship. It is a strategic stance that includes innovation, proactivity, and risk-taking dimensions of businesses. Entrepreneurship orientation contributes to both the sustainability and success of businesses. This approach is one of the main approaches to linking entrepreneurial processes and business strategies.

Supplier Relations: The concept of supplier relations draws attention to the relationship between the business and its suppliers for an efficient agile supply chain management success. Supplier selection is very important in the procurement and supply management process. Because suppliers affect critical topics such as quantity, quality, lead time and product, service, and price.

Resource Management: The management of resources such as workforce, materials, and capital is essential to create a strong agile supply chain management. Managers need to coordinate the necessary resources and have them available in the right quantity and quality, at the right time, and in the right place.

Just in Time (JIT) Methodology: JIT provides companies with opportunities to improve their operations. JIT methodology assists companies in reducing costs, reducing stocks, and minimizing variability.

Use of Technology: Technology continues to evolve tremendously, and technology is very useful for creating an agile supply chain.

Participative Management Style: The participatory management style emphasizes the correct management of the agile supply chain and the effect of this style on the success of agile supply chain management (Malakouti et al., 2017).

2.4.4. Supply Chain Agility and Perceived Customer Satisfaction Relationship

Perceived customer satisfaction and market knowledge are important elements in the process of creating a new supply chain strategy (Agarwal et al. 2006). In this context, it can be said that customer satisfaction is the primary goal of the supply chain. For this purpose, companies in the supply chain need to work together to solve complex optimization problems based on resilience, responsiveness, and reliability, not just cost, quality, and time (Carvalho et al., 2012).

Supply chain agility is the most effective way to get more benefits from service level in businesses such as meeting customer demands, producing customized products, and providing quality customer service. Supply chain agility makes it possible to make flexible supplier agreements that make it possible to increase or decrease customer orders and change the place of delivery of orders. According to Mason-Jones and Towill (1999) and Carvalho et al (2012), the agility roadmap taken from successful businesses should include the followings: Successful businesses,

- ✓ provide better and timely information to every firm in the supply chain about orders, new products, and special needs.
- ✓ assist members in the supply chain to achieve shorter business cycles.
- ✓ synchronize their production capacities with the entire supply chain, ensuring a coordinated flow of work.
- ✓ benefit from decision support systems to be more agile.
- ✓ strive to reorganize the flow of material and information.
- ✓ care about integrating operational knowledge across the supply chain.
- ✓ ensure that unnecessary processes are eliminated.
- ✓ try to have a flexible capacity to meet real customer demand.
- ✓ focus on preserving the availability of capacity, not material.
- ✓ try to develop more new products.
- ✓ try to coordinate/integrate the use of technology in their purchasing processes.
- ✓ develop their distribution skills.

When the statements given above are analyzed, it is seen that the topics such as cooperation in the supply chain, information and process integration, and monitoring of customer demand come to the fore to boost customer satisfaction.

2.4.5. Supply Chain Agility and Supply Chain Resilience Relationship

Supply chain agility is about how the physical components of businesses (such as supply, production, and distribution) can be combined with speed and resilience. Increased speed and, more importantly, resilience increases the agility of the supply chain (Agarwal, 2006). Resilience, one of the most important antecedents of the concept of agility, is the ability to react quickly to sudden changes in the competitive environment (Conboy, 2009). However, it is imperative that today's businesses design

and manage a flexible and resilient supply chain that is not only efficient but also operationally capable and consistently meets demand despite severe disruptions.

Agility and resilience are two concepts that have become critical in recent years. Carvalho et al. (2012) argue that both agile and resilience concepts are the ultimate for supply chain performance and competitiveness. However, it did not take into account the drivers of supply chain disruptions on supply chain flows. If the supply chain is disrupted, companies cannot maintain their performance limits and competitiveness. Events such as the “terrorist attack in New York in 2001, the Dockers’ strike in California in 2002, and the SARS epidemic in Asia ” in 2003 have disrupted the supply chains of many companies. At this point, Carvalho et al (2012) presented the importance of an integrated framework of agility and resilience on supply chain performance and competitiveness.

Supply chains can bounce back more quickly from such sudden setbacks with agility and resilience. An earthquake in Taiwan in September 1999 delayed shipments of computer parts to the United States for weeks, and in some instances months. Most computer makers were unable to ship their goods to customers on schedule and faced significant losses. Because of the actions it took, however, Dell was an exception. Not surprisingly, Dell increased its market share in the wake of the earthquake (Lee, 2004).

Being agile and resilient is no longer simply about the capacity to address risks. Agile and resilient supply chains require the capacity to manage risks to be in a stronger position than competitors to withstand and even capitalize on disruptions. The key to improving agility and resilience is to build resilience into the system to the supply chain structure, processes, and management (Sheffi, 2005).

2.4.6 Supply Chain Agility and Firm Performance Relationship

Supply chain agility is about the speed with which companies anticipate and respond to customer demand changes. Thanks to the economies of scale of large firms, the idea that firms perform better with fewer costs seems to have lost its certainty. Businesses now understand that it is more about agility than size (Rajaguru and Matanda, 2011). Therefore, companies have started to give importance to designing their supply chains in a more agile structure. The effect of supply chain

agility, which is also the subject of many scientific studies, on firm performance has been examined and it has been stated that the effect of supply chain agility on firm performance is positive (Tallon and Pinsonneault, 2011; Swafford et al. 2008; Yusuf and Adeleye, 2002). Therefore, it has been proven that companies that respond more quickly to changes in the market perform better.

The agility of the supply chain is considered to be a key factor in the competitive strategy of companies. It is developed through the systematic acquisition of capabilities that can enable the supply chain to mobilize in the face of rapid and varied environmental and competitive shifts (Khan and Pillania, 2008). Rather than just rules and procedures that are simple to adopt or copy, the idea of supply chain agility reflects a sophisticated mindset regarding coordination and integration amongst various channel members along the supply chain. (Liu et al., 2013).

The internal supply chain functions within a company are responsible for ensuring that the company can respond effectively when market uncertainties arise. Supply chain agility can be realized in a variety of ways, as businesses achieve competitive advantage through the use of various strategies (Nayyar and Bantel, 1994; Goldman et al. 1995; Teece et al. 1997).

2.4.7. Supply Chain Agility, Digital Transformation, and Supply Chain Resilience Relationships

Firms have to be more flexible to compete with other firms and to give the necessary reactions to the market in a timely manner. In a changing environment, supply chain agility is one of the important points for a business to be able to respond quickly to constantly and unexpectedly changing markets and to be constantly present in a competitive environment to evaluate its services on a customer basis (Yusuf et al., 1999).

Lou et al. (2004), to be a competitive company and optimize supply chain management, there is a need for an agile supply chain management with complete integration and automation and reducing costs in the chain. Therefore, the use of technological systems that accelerate and facilitate the flow of information within and between businesses and increase the level of sharing is very important in providing supply chain agility and resilience (Agarwal et al., 2007).

In this way, providing information sharing and coordination between institutions also increases the performance of supply chain resilience. Supply chain agility helps companies achieve high success in increasing their performance in terms of the uncertain demand structure occurring in the variable market structure and responsiveness to the customer in this structure, through the use of information systems and the integration of these systems among all the actors on the chain (Hoek et al., 2001; Cao and Zhang, 2011).

With information systems, sales reports, inventory records, and product planning can be made, applications based on supply chain collaboration, goods flow and activities that may require a sudden change can be monitored, and real-time monitoring of the supply chain process can be done more effectively (Brusset, 2016; Eckstein et al., 2015). In addition, with supply chain agility, planning and sharing business processes between actors through information systems helps to reduce conflicts and some opportunistic behaviors that may occur between actors on the chain (Liu et al. 2013).

2.5. Perceived Customer Satisfaction

Under this title, the importance of customer satisfaction and the relationship between the supply chain and customer satisfaction were introduced.

2.5.1. The importance of Customer Satisfaction

Satisfaction is expressed as the feeling of joy or disappointment a person feels after comparing the performance or results of a product with their expectations (Kotler and Keller 2009). Customer value plays a very important role in creating effective customer satisfaction (Gökhan, 2019). Kotler and Keller (2009) also defined customer satisfaction as feelings of pleasure or disappointment that occur after a person compares the results of the product he is considering with the expected performance.

One of the most important goals of supply chain management is to be customer-oriented. In this context, businesses in the supply chain need to harmonize their products, business processes, and cultures with customer demands (Demirdogen & Polater, 2016).

Adoption of best practices for supply chain management is vital for small and medium-sized firms to ensure high-quality products and services besides customer

satisfaction (Omoruyi & Mafini, 2016). If the consumer is satisfied, the probability of becoming loyal increases which leads to progress in organizational performance (Terpstra & Verbeeten, 2014).

Consumer satisfaction is determined by the results of consumers' perceptions and expectations. Each individual's point of view and evaluation is different from the others. Therefore, the level of satisfaction of each person is different from the other. Customer satisfaction is becoming more and more important for sustainable growth in this competitive environment, which is getting harder (Cetin et al., 2016). Kotler (2011) stated that the key to retaining customers is customer satisfaction. The indicators of customer satisfaction are:

1. The customer makes a re-purchase from the same company.
2. Customers say good things about the company to other people.
3. Customers who are satisfied with the company will pay less attention to other brands and advertisements of competing products.

If a product is not available when and where it should be, that product no longer has any value for the customer. Therefore, a company should attach importance to the supply chain system, especially in terms of gaining customers or not losing existing customers. This feature is available in some special products; for example, a customer who wants a Rolls-Royce can afford to wait a while for this product to be ready according to their wishes but, no one considers waiting forever for any product. That is why the customer-oriented perspective is very important in the supply chain system (Burcu, 2011).

It is seen that satisfying customers has become more difficult compared to the past. Customers are now smarter, more price-conscious, and less forgiving. Because more competitors are trying to reach customers with the same or better offers (Kinik, 2010). Because maintaining customer satisfaction requires doing this from both a short-term, daily perspective and a longer-term, more global perspective (Ellinger et al., 1999).

Maintaining existing customers and making them loyal customers play an important role in the success of a business, but generally many companies focus on selling rather than focusing on long-term customer relationships. The cost of acquiring a new customer is greater than the cost of retaining an old customer. For example; Orange, an operator in the telecommunications industry, loses 20% of its customers each year and has incurred an average cost of £256 (for 1996) to acquire

each new customer. So, if Orange lost 10% of its 1 million customers a year, not 20%, its annual savings would be over £25 million (Öztürk, 2016). Firms are required to understand consumer needs and want in order to create strategies that will enable them to meet or exceed the service levels offered by competitive vendors (Ellinger et al., 1999).

Customers come from all over the world today, therefore the supply chain strategy should be centered on meeting their needs. Applying the supply chain strategy could be expensive and pointless if customers are not satisfied. Metrics for the supply chain must be connected to customer satisfaction in order to improve performance.

Companies have to find different ways of meeting the needs of their consumers under all circumstances. Otherwise just as any firm reacts to a supplier that is not performing well, the customer also moves to another company and begins to make years-long purchases from the new firm (Wisner, 2005).

Decisions made strategically in terms of the supply chain have a huge effect on competitiveness, profit, market share, and influence on the consumer's specific needs (Song et al., 2014). Figuring out what satisfies the customers and what they expect is essential for their satisfaction. Satisfying them completely is vital for customer loyalty, which is closely related to a company's profitability. Selling to new consumers is much more costly than selling to existing customers.

A customer is considered satisfied when its expectations for a supplier's performance are met or exceeded. However, on the contrary, a customer is considered dissatisfied if the perceived performance is lower than expected. Today, the majority of companies have gone further in satisfying their customers by outperforming their expectations (Bowersox, 1969).

2.5.2. Perceived Customer Satisfaction, Supply Chain Agility, and Company Performance Relationships

Supply chain agility not only enables companies to perform their daily activities faster but also improves customer service and increases company performance. Thus, agile businesses process customer orders faster, launch new products faster, and form alliances with strategic partners faster (Gligor and Holcomb, 2012). This shows that agility can increase customer satisfaction and company

performance. Tse et al. (2016) proved this in their study and found that agile businesses show high performance.

Agarwal et al. (2006) included environmental uncertainty in the relationship between agility and performance and showed that agility improves performance more in more uncertain markets. De Groote and Marx (2013), who dimension supply chain agility as perceiving and responding to change, found that both dimensions improve firm performance. Contrary to these studies, some studies did not find an effect of agility on firm performance. Gligor et al., (2015) examined the effect of supply chain agility on financial performance and stated that agility is only positively related to cost and customer effectiveness. Yang (2014) similarly found that supply chain agility only affects cost-effectiveness, but has no effect on firm performance.

Yusuf and Adeleye (2002) classified firms as agile and lean and found that agile firms performed higher. Çalışkan, Karacasulu, and Öztürkoğlu (2016) examined the effect of supply chain agility (responsiveness to changes, speed of customer service, and speed of introducing new products to the market) on firm performance (sales performance, customer satisfaction, product and service quality and profitability performance) in fast fashion brands. The results of the study show that supply chain agility affects sales performance, customer satisfaction, product and service quality, and profitability performance. In addition, he stated that customer service speed, which is one of the dimensions of supply chain agility, has a positive effect on sales performance, customer satisfaction performance, product, and service quality performance. Also, it has been revealed that the speed of new product delivery has a positive effect on customer satisfaction performance, product and service quality performance, and profitability performance.

The results of the research conducted by Salvador et al. (2001) on 164 companies show that these companies are integrated with suppliers and customers in quality management and flow management. Thus, they observed that these companies made their deliveries on time and the operation speed of the companies was better. Muntaka et al (2017) found that each of the dimensions of supply chain integration, integration between suppliers, customers, and units, is related to supply chain resilience.

Supply chain management meets the two most important components of customer satisfaction, which are affordable prices and fast supply. Effective and efficient supply chain management means that a company can increase its profitability while at the same time being competitive because the prices of goods and services are affordable (Wisner et al., 2013).

Having a fast and agile supply chain also means that the company can meet its customers' expectations for the on-time delivery of its products and services. Providing customers with the right product, at the right time and place, and at the most affordable prices is the most important key to keeping customer satisfaction high. Effective and agile supply chain management enables the company to achieve all these (Wisner et al., 2013).

Creating an agile and resilient supply chain means applying the right supply chain approaches and systems. In doing so, companies provide their clients with the transparency, service excellence, and end-to-end visibility they demand. With the appropriate supply chain systems and approaches in place, the business has a complete mechanism for tracking its products from the point of origin to the point of delivery. It can also implement systems and new tweaks aimed at reducing errors in the supply chain and increasing the efficiency of inventory.

2.6. Supply Chain Resilience

2.6.1. The Concept of Supply Chain Resilience

Resilience is a concept discussed in different disciplines such as economics, ecology, and psychology. Resilience is even more intensely discussed in interdisciplinary fields such as sustainable development, disaster management, and supply chain management. Resilience is a relatively new concept in terms of supply chain and has been reconsidered with a different understanding in recent years.

That is why first, definitions of resilient supply chain concepts are explained below. The resilience of the supply chain is defined as 'the adaptive capacity of the supply chain to be prepared for unexpected events, the speed and ability to respond to supply chain disruptions and the continuation of the supply chain's activities following supply chain disruptions, maintaining the desired level of connectivity and realization with the maintenance of structural and functional control (Cinar, 2019).

According to Vagal, (2019), resilience can also be defined as the capacity to prevent negative events from occurring or getting worse, or it is the ability to recover from something bad once it has happened. Another definition states that supply chain resilience is the ability of the chain and its elements to return to their pre-crisis form or transform into a more suitable form in case of crisis and stress (Yao & Fabbe-Costes, 2018).

2.6.2. The Importance of Supply Chain Resilience for Companies

A company's ability to control the deterioration produced by an abrupt environmental shift is limited. Only the company's own decisions can respond to such abrupt external developments. Resilience is defined as the ability to adapt to adversity in order to survive and thrive also (Siagian et al., 2021). Therefore, the resilience of the supply chain has recently attracted the attention of analysts and academics in an environment where the number of disruptions and disasters increases (Mandal, 2017).

Supply chain resilience reduces the negative effects of risks and ensures that damages are eliminated by intervening as soon as possible. As follows, since the 2000s, several crises have occurred around the world, for example, severe acute respiratory syndrome (SARS), terrorist attacks, natural disasters such as the Asian tsunami and Hurricane Irene in the USA, tsunami in Japan, volcanic eruption in Iceland, Thailand Floods... With such events, problems arise in the flow of materials, facilities, and infrastructures and it is turned into supply chain problems. This is one of the reasons why the concept of resilience became an important subject in supply chain management (Yao & Fabbe-Costes, 2018).

In addition, thanks to resilience, businesses can quickly and cost-effectively recover from disruptions in the supply chain caused by natural disasters, social factors, medical emergencies, economic downturns, or technological failures. These situations include earthquakes, strikes, epidemics including COVID-19, the bankruptcy of a critical participant in the chain, or a software crisis (Spekman & Sandor, 2010).

A resilient supply chain has three important advantages.

- ✓ Greater resilience often helps minimize risk, leading to the ability to invest more in innovation and growth, resulting in more efficient operations.
- ✓ Resilient supply chain technologies contribute to an overall increase in system-wide efficiency.

- ✓ Its technologies provide visibility into all transactions across the network, reduce risk, and enable businesses to optimize and adapt their processes and logistics in real time (*What is a resilient supply chain?*, n.d.).

2.6.3. How Do Firms Increase Supply Chain Resilience?

The issue of designing various supply chain capabilities that can enable any company to proactively respond to potential disasters has gained momentum. Such an environment has enabled the development of supply chain resilience, which helps a company restore its supply chain activities to their previous state when experiencing an outage (Mandal, 2017).

Furthermore, (Sheffi & Rice, 2005) the different stages of a supply chain crisis and their impact on performance as a function of time are described in more detail. As shown in Figure 6 those stages are:

The suggestions for how to increase the supply chain flexibility of companies are given below:

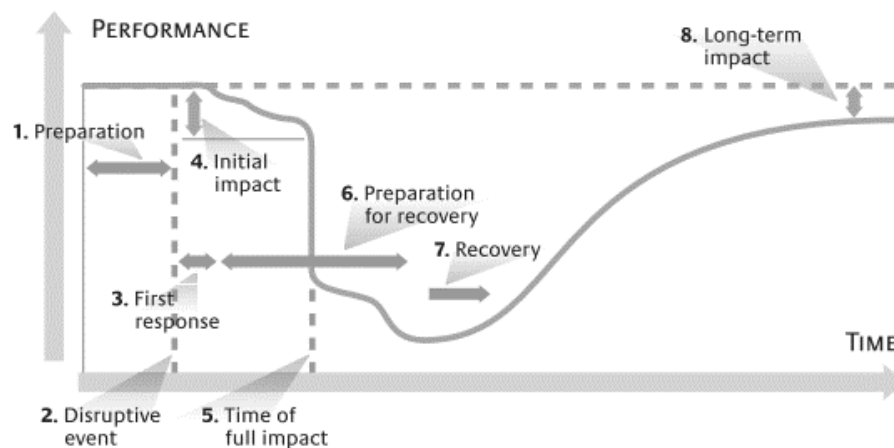


Figure 6 Phases of a crisis in the supply chain (Sheffi & Rice, 2005)

- ✓ *Preparation and alertness:* In some cases, a company can impact foresee and prepare for disruption, minimizing recovery of its effects.
- ✓ *Disruptive event:* Disruptive is defined as tearing apart, causing chaos, or destroying. "events" unfold over a longer time frame. Existing things are destroyed or disintegrated by disruptive occurrences, and new ones are created in their place (Leo et al., 2014).

- ✓ *First response:* Whether it is a physical disruption, business action, or an information technology outage, the situation should be checked first, actions should be taken to protect lives, affected systems should be shut down and further damage should be prevented.
- ✓ *Delayed impact:* The effects of some disruptions are felt instantly. In some cases, there is a certain period between the disruptive event and the full impact, during which performance begins to deteriorate.
- ✓ *Full impact:* Once the full effect, whether immediate or delayed, has occurred, performance often drops abruptly.
- ✓ *Preparation for recovery:* Preparations for recovery typically begin as in the first response and sometimes even before an interruption if foreseen. Identifying alternative modes of transport can be given as an example.
- ✓ *Recovery:* To return to normal operating levels, many companies make up for lost production by working harder than usual.
- ✓ *Long-term impact:* Getting through outages often takes time, but if customer relationships suffer, the impact can be particularly long-lasting and difficult to fix (Sheffi & Rice, 2005).

In the literature, there are also many studies to show how to make supply chains resilient. According to Sheffie (2005), the supply chain of any company starts with the flow of material from the supplier. It then continues with a transformation process through distribution channels. This process is controlled by various systems operating in the context of the corporate culture.

Each of these five elements (which are material flow from the supplier, conversion process, distribution process, and various control systems affecting the processes and corporate culture) leads to flexibility, thereby achieving organizational

resilience. A report in 2014 proposes a five-step procedure to improve supply chain resilience. These steps start with a risk audit and then analyze the effects of these risks on the supply chain. Then, 'continuity strategies' are designed. Continuity strategies are designed to deal with negative events. Finally, all these strategies are implemented and regularly reviewed, and updated with the continuity plan. This framework applies to both companies and government agencies. Figure 7 below shows these processes.

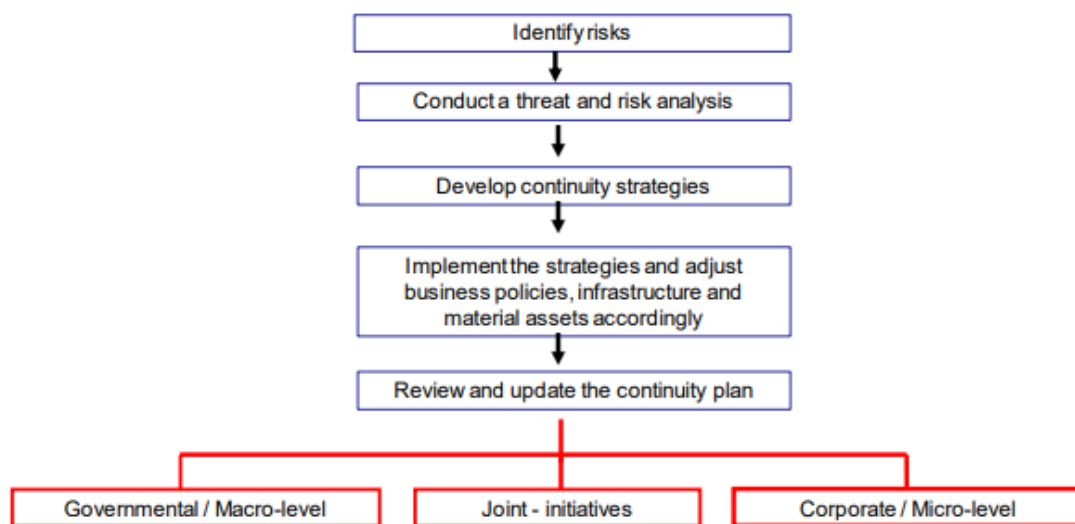


Figure 7 Procedures for improving resilient supply chain (Mckinnon, 2014)

2.6.4. Supply Chain Resilience and Company Performance Relationship

Another issue pointed out by scientific findings is the effect of supply chain resilience on company performance. When resilience organizations experience misfortune or are faced with change, they do not bounce back. They absorb shocks and turn them into opportunities for sustainable, inclusive growth. When challenges arise, leaders and teams in resilience organizations quickly assess the situation and move on.

Merschmann and Thonemann (2011) from studies addressing this issue have proven that firms with high supply chain resilience outperform their operations in

uncertain environments, compared with those with low supply chain resilience operating in less uncertain environments.

Supply chain resilience is an important measure of firms' productivity and supply chain performance (Vickery et al. 1999). Companies that develop corporate resilience, not only through crises but also through opportunities, can gain a significant and lasting advantage over their competitors. In order to examine the effects of supply chain resilience on the entire system, it is necessary to examine the relationships between resilience and firms (Ngai et al., 2011).

Resilience is one of the most important natural characteristics for an organization to survive and thrive in a changing, complex, and uncertain business world (Britt et al. 2016). With the war in Ukraine and the global pandemic, it is difficult to build corporate resilience these days as business leaders, frontline workers, and business units grapple with multiple disruptions at the same time. Therefore, supply chain resilience directly affects a firm's customers. Because the resilience of the supply chain covers both internal (marketing, production) and external (suppliers, channel members) factors. There will always be more uncertainty, more change, and constant pressure for teams to deliver results faster. Thus, companies can instantly and strategically reverse their actions through supply chain flexibility. There is a positive relationship between resilience and firm performance, and therefore between firm performance and firm competitiveness (Sanchez and Perez, 2005).

It has been observed that performance increases as supply chain resilience increases in areas other than the production dimension. As activities are distributed upwards and downwards within the supply chain, it has emerged that resilience needs to be addressed within the entire chain rather than just one firm's resilience (Duclos et al., 2003).

2.7. Firm Performance

2.7.1. Performance and Types of Company Performance

Performance is the quantitative (quantity) and qualitative (quality) expression of what an individual, a group, or an undertaking can achieve and what it can achieve in terms of the intended goal.

According to another definition firm performance is the development of firms in terms of quality and quantity in their planned and intended organizational activities and, in parallel with these developments, the positive effects of direct or indirect financial effects on firms (Kalender, 2013). There are two kinds of performance: These are organizational and managerial performance. Organizational performance is the general performance of the organization, and managerial performance is the concept that explains the general performance of the managers. The main purpose of enterprises is to increase organizational and managerial performance.

This situation has revealed the need to find new criteria for performance evaluation. The concept of stakeholder, which has been put forward recently, argues that businesses should consider all interest groups that are affected by their activities, benefit or harm, in addition to their traditional functions. Since business strategies are related to the short- and long-term strategic goals of the business, the performance measurements to be realized by considering the stakeholders will also be related to the strategic goals of the business. It is concerned with the long-term value added or total wealth to be created with stakeholders rather than short-term profits. The best indicator that measures the performance of businesses is the value added (Riahi-Belkaoui, 2003).

Lebans and Euske provided a set of definitions in 2006 to better explain organizational performance:

- ✓ It is several financial and non-financial indicators that provide information on the extent to which targets and results have been achieved.
- ✓ It is dynamic and requires interpretation and judgment.
- ✓ It can be characterized using a causal model that explains how current actions may affect future outcomes.
- ✓ It can be understood in different ways, depending on the person evaluating the company's performance.
- ✓ It is essential to be aware of the primary features in each area of responsibility to describe the notion of performance.
- ✓ Being able to quantify the results is essential to revealing the performance level of a company.

2.7.2. How Do Companies Increase Their Performance?

Considering today's dynamic environmental conditions, the contribution of financial performance measures that provide information about the past remains limited, since businesses need to receive quick feedback. As industries develop and take on a more complex structure, organizations have concluded that these traditional financial measurement tools are insufficient to answer several critical issues (Ghalayini, et al., 1996).

Company performance was seen as identical to organizational efficiency in the 1950s. However, later in the 1960s and 1970s, performance came to be referred to as an organization's capacity to use its environment to reach and use rare resources. The defining factors of performance were productivity, flexibility, adaptability, and effort between the 1970s and 1980s. After the 1980s, the determining factors became the concepts of value creation, performance quality, and satisfying the demands of its stakeholders. Performance measurement has been handled historically before and after the 1980s. In the 1970s-1980s, performance measurement started at the unit level. In the first phase, while financial criteria such as profit, return on investments, and efficiency were at the forefront, efforts to meet customer needs and demands with new emerging technologies that contributed to production in the 1980s began to come to the fore (Muaz, 2019).

The business environment of the new age we live in has created more and more complexity and uncertainty and it has witnessed a wide variety of changes. Companies face serious competitive pressure to perform their activities better, faster, and at more reasonable prices in this volatile environment that best defines today's global economy. It has become imperative for them to overcome the increasing number of challenges posed by their environment and also to improve their adaptability. Showing constant high performance has become the main goal of any company today.

The average inventory level obtained in the supply chain, the frequency of inventory rotation in the SC, the ability of SC to adapt to customer needs as a whole and the degree of mutual trust in the relationships in the SC are important points to be taken into account in the design of performance measurement systems for the supply chain.

Flexibility is an important factor in the efficiency of the supply chain because high uncertainties in the supply chain and rapid changes in the quantity of demand and production conditions require both quick response and efficient use of resources; companies achieve this through flexibility. Therefore, the concept of flexibility should not be ignored when evaluating supply chain performance (Chan, 2017).

The level of participation and support in solving problems occurring in the supply chain among supply chain members can be evaluated as an indicator of the level of trust between supply chain members. The level of trust between the supply chain members can be assessed decisively. A company that is a manufacturer in the supply chain trusts its suppliers in terms of raw materials, and end users trust that they will provide products to distributors on time. Therefore, a delay at any point in the supply chain negatively affects the performance of the entire supply chain (Yüksel, 2002).

Magutu et al., (2015) determined the performance indexes of the companies below in Table 2. Table 2 shows financial indicators, customer satisfaction values, internal operations, and employee development as the determining factors of company performance.

Table 2 Firm Performance Determinants

A- Financial & Stewardship	Pre-tax Profits Debt —Equity Ratio Return on Investment Development Index Payback on investments Time
B. Customers Perspective	Customer satisfaction Customer price margin Resolution of customer complaints
C. Internal Business Operations	Cost efficiency Automation Warranty' quality Safety Measures Research & Development Work Environment Capacity Utilization ISO Certification
D. Employee and Organization Innovation	Employee satisfaction Employee Retention Employee productivity' Competency Development

Resource: Firm Performance index- Firm Performance Determinants (Magutu et al., 2015)

According to another study the characteristics of the performance criteria are listed as follows:

- ✓ It should be an implementer following strategic plans,
- ✓ It should be easy to apply, calculate and interpret,
- ✓ It should not be complicated, difficult,
- ✓ It should be under the organizational hierarchy,
- ✓ It should be suitable for the external environment,
- ✓ It should encourage cooperation horizontally and vertically,
- ✓ It should be guided in line with the requirements of the customer,
- ✓ A consensus must be reached,
- ✓ It should be responsible for performance measurement results,
- ✓ It should be realistic,

- ✓ It should focus on critical factors,
- ✓ It should be able to establish a cause-and-effect relationship,
- ✓ It should focus on both cost and resources and inputs.
- ✓ It should be understandable,
- ✓ Provide communication within the institution,
- ✓ Functional units should be integrated,
- ✓ Feedback should be timely,
- ✓ Feedback should be stimulating,
- ✓ It should be able to measure itself,
- ✓ They must have a purpose,
- ✓ There should be limits,
- ✓ They should not conflict with each other.
- ✓ Must be able to produce data to predict the future,
- ✓ It should generate data for external comparisons,
- ✓ It should encourage continuous development and progress,
- ✓ Should support individual and organizational learning,
- ✓ Should be consistent with the organization's purpose, people, culture, and key success factors.
- ✓ It should be supportive.
- ✓ It should give meaningful information directly related to the mission, purpose, and objectives,
- ✓ It should be used in making policy and budget decisions within the institution,
- ✓ It should include different types of measures to be able to determine the performance precisely,

- ✓ The data on which it is based must be accurate and believable,
- ✓ It should be suitable for all comparisons such as internal and external years.
- ✓ The processes related to data collection and production should be clearly stated and must be documented,
- ✓ Costs of data collection and processing should be acceptable,
- ✓ It should not encourage negative, undesirable, or unhelpful tendencies (Gilanli, 2018).

2.7.3. Difficulties in Measuring the Performance of Companies

A good performance measurement system should be compatible with the business strategies of the organizations and should be able to establish a relationship between the employees and the objectives of the activities (Garengo et al., 2005). However, there is no consensus in the literature about the performance measurement metrics of firms. In one study, “performance elements were gathered in four groups: market, product, financial, and employee performance, while in another study, service quality, customer satisfaction, efficient internal processes, efficient resource use, fast service, growth rate, profitability, and productivity were discussed as performance elements” (Caliskan et al., 2016).

Çemberci (2011) concluded that firm performance is measured by quantitative methods in many studies today. However, this causes some problems and uncertainties about what performance means. Therefore, it is necessary to interpret the concept of performance with qualitative methods rather than only explaining it with quantitative methods (Basar E).

The fact that the relationship and balance between performance measurement strategies and business strategies have not been established is the most important obstacle to not achieving the expected results (Garengo et al., 2005). There are some problems in measuring the performance of companies. Lack of system thinking to evaluate the supply chain holistically, the inadequacy of the current reporting system in providing information on the holistic view of the supply chain, and in making an analysis that will evaluate the supply chain holistically causes problems in measuring

the performance of supply chains. Some of the other important problems encountered in the performance measurement of the supply chain are:

- ✓ Inadequacy of information technologies;
- ✓ Low level of communication between those who collect the information and those who use it;
- ✓ The difficulty of combining financial and non-financial measures;
- ✓ The difficulty is in linking measures with strategies.

Organizations should constantly check, update and adapt their performance appraisal systems to innovations. An effective performance appraisal system should be clear and simple (Garengo et al., 2005).

2.8. Digital Transformation

2.8.1. Digitalization and the Internet-Based Technologies

Today, with the rapid development of information technologies and modern management techniques, the internet has started to be used more widely in every part of life. The new economy has emerged thanks to the changes triggered by the computer, internet, and communication technologies (Ural & Balikcioğlu, 2020). Digital technologies combine production systems vertically and horizontally as well as based on highly resilient production processes that make real-time data access and customized production easier (Jabbour, 2014).

The combination of different internet-based technologies has encouraged the notion of digital technologies (Ghobakhloo, 2020). These technologies consist of several smart technologies such as the Internet of Things (IoT), Cloud Computing, Big Data Analytics (BDA), and Cyber-Physical Systems (CPS). Smart solutions, social media, and mobile platforms are the locomotives of innovations that reshape business patterns (Khin & Ho, 2019) and reinvest in the way companies run their businesses (Scholz, 2021).

Some of these technologies are defined as:

Big data analytics: Big data analytics refers to the large volumes of data and types of technologies collected from different sources, enabling a business to gain an advantage over its competitors through improved business performance. Big data analytics provides global feedback and coordination (Shabbir & Gardezi, 2020).

Cloud Computing: “ With cloud computing technology, the server network can be virtualized as a resource pool that can provide scalable computing ability and storage space on demand for big data analytics ” (Wang et al., 2016).

Social media platforms: A group of Internet-based applications, social media referred to as "social media sites" or a set of information technologies that facilitate interactions and networking (Shabbir & Gardezi, 2020).

2.8.2. Digitalization and Digital Transformation

Digitalization is the digitization of information. Digitization is the converting of analog processes into a digitized format by storing them in a computer environment (Ersöz & Özmen, 2020). With another definition, digitalization is to benefit from digital technologies to replace a business pattern and create new revenues and value-generating opportunities. It is the operation of transitioning to a digital structure (Ince, 2019).

Digitalization, which is the result of industrial evolution, raises awareness of rapid technological developments, robots, and production systems technologies with reduced manpower, sustainability, and competitiveness. The change in the industry was first launched in the USA in 2010 as "Smart Manufacturing" and in Germany in 2011 as Industry 4.0 (Arslan, 2021).

Digital transformation is defined as a transformation of the business in Edmead, (2016)'study. However, other researchers also use the term digital business transformation, which is more in line with the business-oriented way in which this transformation takes place. Digital business transformation is influenced by such factors as technological innovation, customer behavior and demands, and factors in the external environment.

Activities carried out while performing digital transformation bring numerous benefits, from performance to safety, from the dissemination of cooperative working culture to cost benefits (Yahya, 2018).

2.8.3. Digital Transformation in Supply Chain

Globalization has not only changed the spatial and temporal horizons of competition forms, dynamics, and strategies but also differentiated the dominant form of company organization depending on technological, organizational, and other transformations (Dicken et al. 2005). The most important change in company

structures is that companies go beyond being local companies, national companies, or international companies over time and become transnational companies.

According to Duming, multinational enterprises are one of the actors that both accelerate the globalization process and shape this process by interfering with the factors affecting globalization; “Enterprises that invest directly abroad and carry out value-added activities in more than one country or have the right to control these activities” (Bolat & Seymen, 2005).

Westerman et al. (2004) argue that companies that successfully implement digital transformation are superior in creating revenue by exploiting their available resources. That is why companies that have adopted digital transformation can effectively use widespread digital connections and communication between key stakeholders in the value chain (Westerman et al., 2015).

As for supply chain management, the advanced data processing capacity of digital technologies opens up new deals and chances for these operations. In supply chain operations, the embracement of digital technologies brings about interfaces between producing companies and their vendors. Thus, they increase the standard and amount of information flow from the procurement of raw materials to ultimate product delivery (Scholz, 2021).

In today's digital economy, organizational learning has gained importance and it has been possible to examine this effectively only with dynamic firm approaches. Resource-Based Theory is the theory that helps us to realize all these and examines firm activities, efficient use of resources, and competitive advantage in today's conditions (Kangas, 2003).

Kraus et al., (2021) summarize the literature in figure 8 below. The study sees technology as the main driver of digital transformation and according to it, companies can gain different advantages by incorporating technology into their strategies and ways of working.

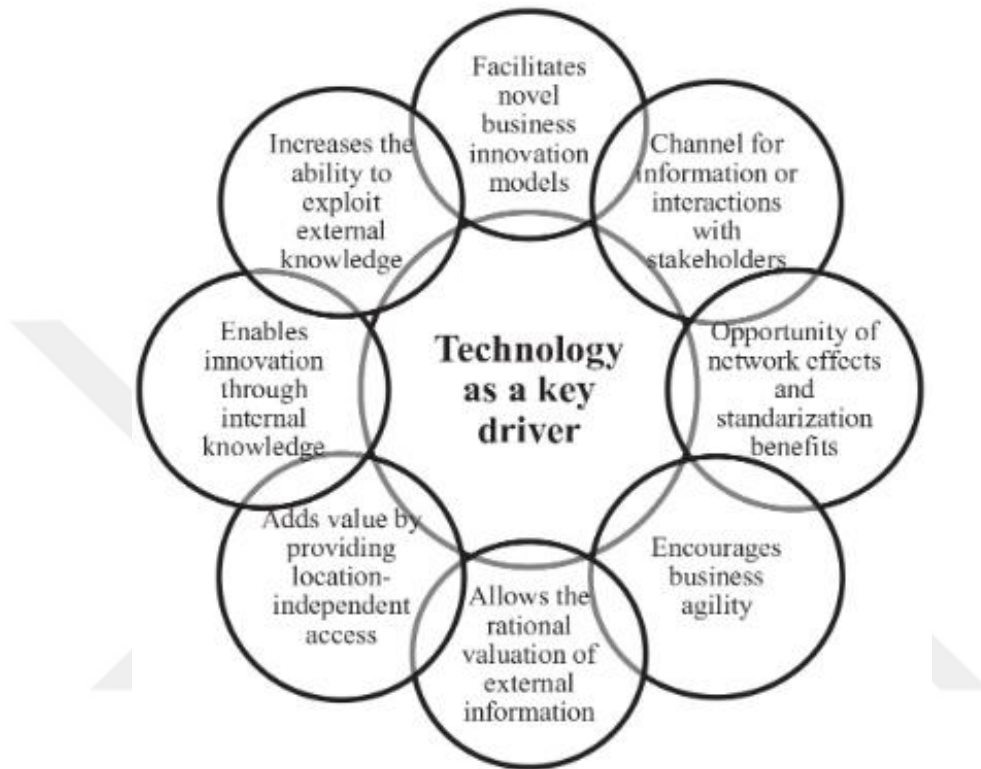


Figure 8 Advantages of introducing technology into business strategies. Source: (Kraus et al., 2021)

2.8.4. Digital Transformation and Customer Satisfaction Relationship

In today's changing world, there is an understanding that the fast wins, rather than the big business defeating the small business, for the businesses in the supply chain. Therefore, businesses can respond quickly to customer expectations, take more accurate and strategic decisions by anticipating risky situations that may arise in the market, and keep the current market potential in balance.

Information technologies are used to further strengthen the communication of supply chain members with each other. Sharing information is extremely important in the supply chain. Businesses use appropriate software both within and between supply

chain members to respond to customer demands and expectations in a timely, accurate, and fast manner (Chopra and Meindl, 2007).

Ensuring supply chain agility and information systems integration helps companies not only to improve their daily activities but also to increase the performance of companies in terms of responsiveness to the customer in this structure, reducing the cost of companies and increasing their profitability (Hoek et al., 2001; Zhang et al., 2011; Swafford et al., 2006). With this understanding, information sharing among all actors, especially customers on the supply chain, and minimizing the process and information flow times at all stages of the chain can occur (Başkol, 2011).

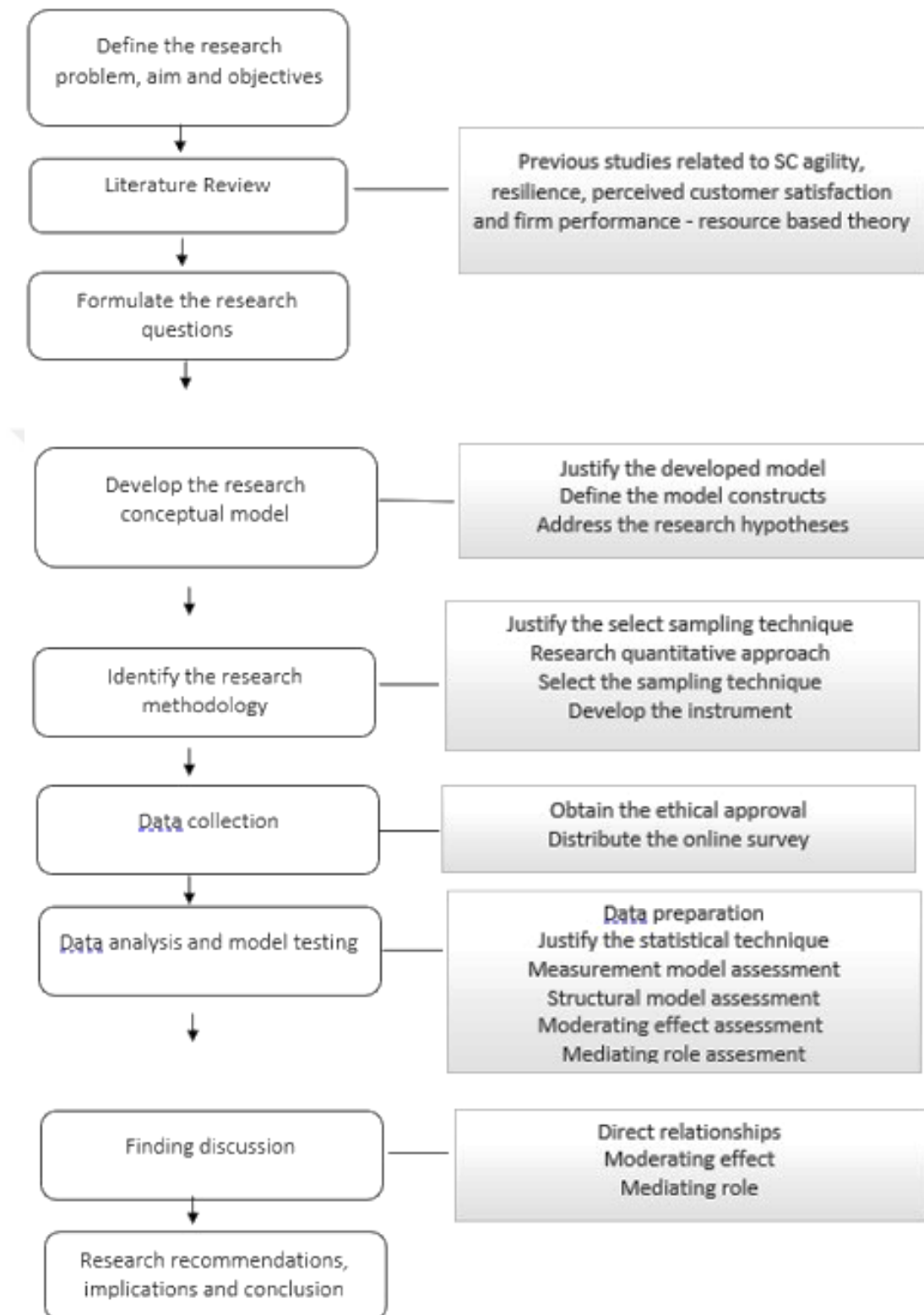
Particularly, supply chain agility can assist a company in responding to customer and market shifts by integrating information. Such integration improves supply chain visibility and allows the firm to identify market changes in real-time, thereby mitigating the costs of demand instability. Supply chain agility not only allows the company to improve its daily operations but also reduces the company's costs and increases its revenues (Liu et al., 2013).

In addition, with this software, businesses gain a competitive advantage against their competitors to satisfy their customers in the market in which they exist, increase their sales and earn more profit. The use of information technologies in the supply chain allows the supply process cycle to accelerate, the product to reach the customer faster, and the quality and resilience to increase and respond to customer requests and expectations faster (Xu, 2013).

3. RESEARCH METHODOLOGY

In terms of research methodology, the study is divided into two parts: In the first part of the study, the aim of the research, the theoretical model, the sampling process, the data collection method used in the research, and the preparation of the questionnaire form was explained. In the second part, the data analysis was conducted. After the pilot study, the structural model was examined to evaluate model fitness and developed research hypotheses. Data analysis was made using SmartPLS 4 program structural equation modeling (SEM). In the final part, the research was discussed and the result was evaluated.

The research steps are shown in Table 3 below:

Table 3 Research steps of the study

3.1. Objectives of the Research

In an environment where global trade and competition are increasing day by day, companies focus on different strategies. To compete, survive and maintain this level of competition, in the long run, companies have to take many managerial and operational steps. Especially in our age where the customer is the key factor, the importance of customer-oriented operations cannot be denied. For this reason, gaining and retaining customers is possible by performing supply chain operations most effectively and efficiently.

Firms have to access emerging markets and quickly implement their strategies for potential customers. One of the golden rules of customer satisfaction is to respond to risks, rapidly changing consumer demands, and unexpected situations in the most flexible way. They also attach importance to issues such as agility, digital transformation, and resilience all of which are vital in supply chain management, to provide the most accurate solutions for the current market and customer needs and to keep their costs in balance.

It is expected that these strategic successes and transformations in the supply chain will contribute positively to the performance of the company.

Companies are expected to know what their resources are and to continue all these operations with the right resources and features that will provide them with an advantage. First of all, company resources that are valuable, unique, and difficult to imitate provide a sustainable competitive advantage.

In the study, the effect of supply chain agility, perceived customer satisfaction, and supply chain resilience on company performance was examined. In addition, it examined whether the digital transformation has a moderator effect, and it aimed to contribute to the literature and managers by examining the mediating roles of perceived customer satisfaction and SC resilience between agility and firm performance. For this purpose, the model was investigated in the conceptual framework section evaluated by applying surveys containing questions about supply chain agility, supply chain resilience, digital transformation, perceived customer satisfaction, and firm performance to manufacturers who are members of OSBUK in the Marmara region of Türkiye.

3.2 Hypotheses Development of the Study

The concept of 'agility' in the supply chain can be explained as rapid reorganization and re-adaptation. Agility in the supply chain includes factors such as the speed of launching new products to the market, the ability to reduce product development cycle times, the speed of reducing production times, the speed of improving customer service levels, and the speed of responding to changing market needs. It is underlined in the literature that the ability to adapt to shifting market circumstances and consumer needs is the key component of agility.

Agility entails rapid reaction to unpredictable changes. The higher the agility of a supply chain, the shorter its response to changes, and therefore the organization can be more resilient. It enables businesses to respond quickly to a disastrous situation caused by an unforeseen disruption.

According to a study conducted by Kumar & Anbanandam, (2020) 'Impact of risk management culture on supply chain resilience' which is applied to producers in India, has shown that supply chain agility is positively related to supply chain resilience and also an organization's supply chain resilience is a reflection of interdependencies between risk management culture and agility.

Jüttner & Maklan (2011) in the research which investigated empirically, 'how the resilience of extended supply chains can be strengthened' 'applied to three international companies, it has shown that agile supply chains provide support in detecting and overcoming disruptions. Thus, the network can provide an agile response to potential disruptions, enhancing supply chain resilience with enhanced entirely visibility throughout supply chain operations.

These findings give way to hypothesis H₁:

H₁: Supply chain agility has a positive significant effect on supply chain resilience.

'Customer satisfaction is a key factor in determining how long a customer's relationship or relationship with a brand will last. It is a measure of how well a company's products and services meet or surpass customer expectations.

In a study conducted by Roy et al., (2017) in India, they tried to measure the effect of e-retailer agility on customer satisfaction with 222 completed responses. As a result, perceived E-retailers' agility has a positive influence on customer satisfaction.

They suggested that there may be benefits to making a website that will enable online shoppers to perceive that the firm is agile. According to them, such a website

can meet consumer needs and enable them to adapt to emergencies. The results, therefore, showed that agility in e-retail will lead to increased customer satisfaction.

Supply chains have faced many market dynamics in recent years, and therefore the importance of dynamic capabilities such as agility has increased exponentially. Companies focus on developing such capabilities that can help them respond quickly to customer demands.

Improving service and promoting agility means following the right success strategies to increase customer numbers, revenues, and working capital.

According to Weni, (2018), every organization should target and promote agility within its customer service framework. Otherwise, it will have to face dire consequences such as operational regression, loss of customers, employee indifference, and general management failure. All elements are directly related to each other, and a bad result in one will create a domino effect: if one falls, the others follow.

Also, Caliskan et al (2016) examined the effect of supply chain agility, examined in three dimensions (speed of responsiveness to change, speed of customer service, and speed of new product to market) in fast fashion brands, on four-dimensional firm performance (sales performance, customer satisfaction, product, and service quality, and profitability performance). They found that supply chain agility affects all performance dimensions. In addition, it has been found that the speed of customer service, one of the dimensions of supply chain agility, has a positive impact on sales performance, customer satisfaction performance, product, and service quality performance, while new product delivery speed has a positive impact on customer satisfaction performance, product, service quality performance, and profitability performance.

In addition to all these, studies with opposite results have also been carried out.

For example; the aim of Barve's study (2011) was to represent the effect of agility in supply chains on customer satisfaction. According to the emerging hierarchical structure, agility indicators such as organizational integration and desire for improvement, and cooperative relations among partners have more driving force, while variables such as customer satisfaction are found to be a weaker factor, not negative.

All these findings lead to the following hypothesis:

H₂: Supply chain agility has a positive significant effect on perceived customer satisfaction.

Digital transformation is a concept that describes the integration of digital technologies, the process of finding solutions to social and sectoral needs, and the development of business processes.

The positive impact can be amplified by the benefits of using digital technologies to gather and interpret supply chain data in real-time. In this way, an agile reaction in the sense of rapidly adapting the supply chain to disruptions has a favorable impact on the provision of supply chain agility. Because SC agility entails visibility throughout the supply chain and rapid response to disruptions to provide resilience (Christopher & Peck, 2004).

As the digital transformation of companies increases, they can both offer more personalized services and reduce their sales costs, thereby increasing customer satisfaction (Nwankpa & Roumani, 2016).

In this study, since it is thought that the relationship between sc agility and customer satisfaction will increase when digital transformation is increased by the companies, the moderator effect of DT is also wanted to be examined. The moderator variable means that when included in the relationship between an independent variable and a dependent variable, it strengthens, weakens, or reverses the existing relationship.

To examine this relationship the hypothesis is formed as follows:

H₃: Digital Transformation plays a significant moderating effect in the relationship between supply chain agility and perceived customer satisfaction.

Supply chain strategies implemented around the world today need to focus on satisfying customers. In an environment where customers are dissatisfied, implementing a supply chain strategy can be costly and futile. Supply chain measures should be associated with customer satisfaction to improve performance.

Customer satisfaction is most properly portrayed as a mediation of the impacts of certain marketing strategy variables on company performance outcomes. In the literature, customer satisfaction has been interpreted as a market-based entity related

to the efficient and effective organization of company resources and increasing company performance (Otto et al., 2020).

In addition, in a study conducted by Willie (2021) on a company called Multinum in Africa with 150 employee surveys, it was determined that customer satisfaction has an important role in improving organizational performance. So the fourth hypothesis formed as follows:

H₄: Perceived customer satisfaction has a significant effect on firm performance.

In Turkiye, a study examined the effects of the concepts of supply chain capability, firm performance, and supply chain agility on each other. Answered surveys were collected from 104 companies. The study's findings showed that agility boosts the positive impact that supply chain capability has on firm performance. It also demonstrated that the association between supply chain capability and firm performance is moderated by supply chain agility (Ezgi, 2017).

Similarly, in a study conducted by Guner, (2018) the effect of the concept of agility on firm performance was examined and a questionnaire was applied to 97 firms in Turkiye. The research showed the positive effect of SC agility on firm performance. The study concluded that supply chain agility is one of the most important factors affecting firm performance in situations where complex market competition is experienced, and presented it as a managerial implication that will enable firms to gain a competitive advantage by providing the firm with maneuverability against its competitors.

Ying et al., (2016) conducted a study on the electronics industry in China. Among the research, objectives were to examine the SC metrics of agility and to investigate the impact of supply chain agility on firm performance. For this, a conceptual model was created. The study showed the value of supply chain agility in terms of turnover, net profit, market share, customer loyalty, and performance compared to competitors. As a result, supply chain agility affects firm performance both directly and also through cost-effectiveness.

Yusuf et al, (2004) surveyed 600 in the UK, and Xiao, Wang, and Liu, (2018) surveyed 112 Taiwanese liner shipping companies, and both studies have shown that supply chain agility has a significant positive influence on company performance.

Degroote & Marx, (2013) on the other hand, discussed supply chain agility in two dimensions perceiving change and reacting to change, and found that both dimensions improve firm performance.

Swafford et al., (2006) also reported that supply chain agility can improve the performance of businesses; higher supply chain agility means higher competitive company performance.

It has been seen that there are other studies in the literature claiming the opposite. Yang, (2014), on the other hand, reported that supply chain agility has a significant positive effect on cost-effectiveness, but has no effect on firm performance. However, considering all the studies in the literature, this study proposes the following hypothesis.

H₅: Supply chain agility has a significant direct effect on firm performance.

Resilience, after all, is the firm's strength of continuity. The resilient firm resists crises in the market and is minimally affected by these unexpected changes.

In the study, Lotfi & Saghiri, applied in 2018 to 151 automotive parts supplier companies in Iran, tried to understand how resilience along with witness and agility affects performance outcomes. The results indicated that a higher level of resilience will lead to better performance.

In the liner shipping industry Liu and others 2018, who have studied, firm performance, sc resilience, and management policies, argued that supply chain resilience can improve the performance of Taiwan's shipping industry by improving the agility of organizations and performing supply chain restructuring.

Thus another hypothesis is determined as below:

H₆: Supply chain resilience has a significant effect on firm performance.

The term firm agility also encompasses the level of service. Quality improvements are inevitable in order to be successful in a competitive international market. An improvement in the supply chain process results in sourcing improvements and process efficiency improvements. So that customer needs can be quickly responded to (Pantouvakis & Dimas, 2013). Therefore, supply chain agility affects perceived customer satisfaction which in turn impacts firm performance.

As far as the researcher could investigate, few studies have empirically examined the perceived customer's mediating role in supply chain management. Also, for the first time in the related literature, this study will examine the mediating role of

customer satisfaction between agility and firm performance, thus suggesting the following hypothesis:

H₇: Perceived Customer satisfaction has a significant mediating role in the relationship between supply chain agility and firm performance.

There are not many studies in the literature about the mediating role of resilience in the relationship between agility and performance.

A study was conducted by Kumar & Anbanandam, in 2020 on Indian manufacturing firms to examine whether agility is positively related to SC resilience and the results have shown that supply chain agility and visibility, connectivity, collaboration, and information sharing have a positive impact on performance through enhancing supply chain resilience.

Sc agility creates resilience which in turn increases firm performance, based on this idea in this study the mediating role of supply chain resilience will be examined.

H₈: Supply chain resilience has a significant mediating role in the relationship between supply chain agility and firm performance.

The summary of all and other previous studies about variables have shown below in table 4:

Table 4 Table of previous studies

SUPPLY CHAIN AGILITY-FIRM PERFORMANCE			
Study	Study Aim	Focus	Contribution
(Yahaya Y. Yusuf et al., 2014)	Effect of agility on firm performance	95 North Sea upstream oil and gas industry.	Supply chain agility has a significantly positive influence on company performance.

(Y. Y. Yusuf et al., 2004)	The study discusses growing supply chain integration patterns and investigates how these patterns relate to the achievement of competitive goals.	600 companies in the UK, as part of a larger study of agile manufacturing.	Despite not having an effect on company performance, the agile supply chain influences cost leadership.
(Degroote & Marx, 2013)	Investigates IT's impact on supply chain agility, measured by the firm's ability to sense and respond to market changes, and the impact of supply chain agility on firm performance	Supply chain executives at 193 U.S. manufacturing firm	Enhanced supply chain agility has positive impacts on the firm's sales, market share, profitability, speed to market, and customer satisfaction as a firm performance.
(Swafford et al., 2006)	Developed flexibility and agility scales to	Firms from Dunn and Bradstreet and	Supply chain agility of a firm is positively impacted by the

	measure effect of agility on firm performance.	membership lists from the Council of Logistics Management and Supply Chain Council organizations. Surveys were mailed to high-ranking executives	degree of flexibility present in the manufacturing and procurement/sourcing processes of the supply chain; while it is indirectly impacted by the level of flexibility within its distribution/logistics process.
(Abeysekara, Wang, & Kuruppuarachchi, 2019)	Investigated whether the Sri Lankan apparel industry implements supply chain flexibility (SCRs) capabilities (agility) and whether these have an impact on performance.	89 Sri Lankan apparel manufacturers	Agility shows the greatest influence on firm performance and competitive advantage

SUPPLY CHAIN RESILIENCE-FIRM PERFORMANCE			
Study	Study Aim	Focus	Contribution
(Lotfi & Saghiri, 2018)	Investigate how resilience along with withness and agility affects performance outcomes .	In 2018 to 151 automotive parts supplier companies in Iran	The results have shown that a higher level of resilience will lead to a better performance.
(Xiao et al., 2018)	Studied supply chain resilience, firm performance, and management policies	In the liner shipping industry	Supply chain resilience can improve the performance of Taiwan's shipping industry by improving the agility of organizations and performing supply chain restructuring.
(Siagian et al., 2021)	Investigates the impact of supply chain integration on business	Has obtained 470 questionnaires from Indonesia's manu- facturing companies.	Supply chain integration affects innovation system, supply chain flexibility, and

	performance through supply chain resilience, supply chain flexibility, and innovation system		supply chain resilience because of its ability to share complete product information and share production planning.
(Chowdhury, Quaddus, & Agarwal, 2019)	To explore the operating context in which supply chain resilience (SCRE) is likely to enhance the supply chain performance (SCP) of organizations.	Survey questionnaire of 274 apparel manufacturers and their suppliers in Bangladesh	SC Resilience were significant for improving SCP.

SUPPLY CHAIN AGILITY-DIGITAL TRANSFORMATION			
Study	Study Aim	Focus	Contribution
(Vickery, Droge, Setia, & Sambamurthy, 2010)	Investigating the impact of supply chain IT and supply chain organizational initiatives on SCA	Data gathered through a field survey of the top independently owned first tier suppliers to US automotive OEMs (a customer who is an original equipment manufacturer) is used to test the hypothesis.	The research shows that IT and organizational initiatives have a complementary effect on agility.
(White, Daniel, & Mohdzain, 2005)	One intention of study is to seek to encourage the	In total twelve interviews were carried	The research suggests that information technology and systems

	identification of further instances of the use of emergent information systems and technologies to enable supply chain agility.	out, both in the UK and in the USA to BM and E2Open software companies.	might help to increase supply chain agility.
(Swafford, Ghosh, & Murthy, 2008)	Investigating the effect of supply chain flexibility and IT integration on SCA	Survey-131 responses were received from the two-digit SIC code 35 representing the “industrial and commercial machinery and computer sector” .	The research found a domino effect among IT integration, supply chain flexibility, supply chain agility, and competitive business performance.

SUPPLY CHAIN AGILITY-CUSTOMER SATISFACTION			
Study	Study Aim	Focus	Contribution
(Barve, 2011)	Effect of agility in supply chains on customer satisfaction	Interpretive structural modeling	Hierarchical structure, agility indicators such as organizational integration, information technology tools, desire for improvement, and cooperative relations among partners have more driving force, while variables such as customer satisfaction are found to be weaker factors

CUSTOMER SATISFACTION-FIRM PERFORMANCE			
Study	Study Aim	Focus	Contribution
(Willie, 2021)	Investigate factors affecting customer satisfaction and their impact on organisational performance holistically	148 customers who have been in contact with the company called Multinum in Africa	Customer satisfaction has an important role in improving organizational performance.
(Yee et al., 2010)	Examine the relationships among employee loyalty, service quality, customer satisfaction, customer loyalty and firm profitability	210 high-contact service shops in Hong Kong	Employee loyalty increase customer satisfaction so it is enhancing performance.

SUPPLY CHAIN AGILITY-SUPPLY CHAIN RESILIENCE			
Study	Study Aim	Focus	Contribution
(Jüttner & Maklan, 2011)	How the resilience of extended supply chains can be strengthened	Longitudinal case study with the data collection aimed at investigating the risk management actions employed by the three companies supply chain processes.	The network can provide an agile response to potential disruptions that strengthen Supply chain resilience with improved end-to-end visibility throughout supply chain operations.
(Kumar & Anbanandam, 2020)	Investigate interactions between critical antecedents of supply chain resilience including risk management culture, supply chain connectivity, visibility, collaboration, agility, their impact on supply chain resilience, and finally on firm performance.	112 manufacturing firms in India	Supply chain agility is positively related to supply chain resilience and also an organization's supply chain resilience is a reflection of interdependencies between risk management culture and agility.

The hypotheses were developed according to the aim and model of the research shown in Table 5:

Table 5 Hypotheses of the study

SUMMARY TABLE:
H₁: Supply chain agility has a significant effect on supply chain resilience.
H₂: Supply chain agility has a significant effect on customer satisfaction.
H₃: Digital transformation plays a significant moderating effect in the relationship between supply chain agility and perceived customer satisfaction.
H₄: Perceived customer satisfaction has a significant effect on firm performance.
H₅: Supply chain agility has a significant direct effect on firm performance.
H₆: Supply chain resilience has a significant effect on firm performance.
H₇: Perceived customer satisfaction has a significant mediating role in the relationship between supply chain agility and firm performance.
H₈: Supply chain resilience has a significant mediating role in the relationship between supply chain agility and firm performance.

3.3. Research Population and Sampling

The population of the research consists of manufacturing companies registered to OSBUK (Organized Industrial Zones Senior Organization) operating in the Marmara Region. At end of the 2022 Total OSB (Organized industrial Zone) numbers reached 387 and 91 of them were established in the Marmara region.

The surveys were applied to these companies via e-mail. Top and middle-level managers of the companies answered the survey questions. Respondents to the surveys were managers who are experts in logistics, planning, purchasing, production, or distribution in the supply chain field.

Data collection was carried out between 1 June and 20 November.

A sample is a subgroup with characteristics appropriate for deducing from the population. Attention should be paid to the sample's representability and size (Özen & Gül, 2007).

There are different views on determining the number of samples. Some researchers state that if the sample size is greater than 30 and less than 500, it is sufficient for many studies. Some researchers also argue that for multivariate analysis, the sample size should be preferably at least 10 times or more multivariate. Some researchers state that the required sample size for SEM models should be in the range of 200-500 (Gilanli, 2018).

According to Kline, (2012), it is recommended that the number of expressions should be at least twice and preferably 10 times. Because the larger the sample size, the closer to the actual scores, and more sensitive estimations can be made.

To determine the sample size there is also the Barclay's 1995 "10 times" rule which is one method for calculating the minimal sample size required for a model estimate in a PLS path model -the amount of internal and external latent variables in the research model (Hair et al 2014). Accordingly, it is stated that 10 times the number of variable items in the study will be sufficient to determine the sample size. Within the scope of the study, 22 items ($22 \times 10 = 220$) belonging to 5 variables were determined as 220, based on the rule of 10 times. In this context, to ensure that the sample represents the population at a high level, it was aimed to collect data above the calculated sample size, and the survey was completed with 228 company participants reached via the online form. Therefore, the inclusion of 228 enterprises in the analysis shows that sufficient sample size has been reached (Akbulut & Capık, 2022).

The type of this study is a quantitative-based approach with cross-sectional data and the simple random sampling technique, which is one of the probabilistic sampling methods, was preferred for the study. The member companies of OSBUK operating in the Marmara region were randomly selected from the list and surveys were sent via e-mail.

With a positivist approach, data were collected from these targeted companies and tested with Structural Equation Modeling (SEM) via SmartPLS.

3.4. Data Collection Method and Measurements

To collect data, the questionnaire has been distributed to manufacturing companies in the Marmara region. Since the center of the Turkish economy is the Marmara Region as a traditional structure, it was found appropriate to choose this region. It has had an important position in trade throughout history, as it is the region that connects Europe and Asia. In addition, The Marmara Region, which plays a key role in the manufacturing industry and employment of the country, is the region that has the largest share of the country's economy (Selamci & Cetin, 2020).

The survey was divided into two sections. In the first section, there was a brief introduction and 6 questions related to the profile of respondents and characteristics of the companies such as levels of administrators, educational status, the industry of the company, number of employees, and annual turnover. In the second section, the survey includes 22 of them regarding supply chain agility, supply chain resilience, digital transformation, perceived customer satisfaction, and firm performance.

“All the questions in the second part were prepared according to the Likert scale: (1: Strongly Disagree, 2:Disagree, 3: Neither-Nor Agree, 4:Agree, 5: Strongly Agree)”

The questions in the study were adapted from the revised scales below:

- a. Customer satisfaction scale (to measure the perceived customer satisfaction of their customers from the perspective of the company managers) (Yee et al., 2010);
- b. Supply chain agility and firm performance revised scale (to measure the SC agility and performance of the companies) (Abeysekara et al., 2019);
- c. Supply chain resilience scale (to measure the resilience of the companies) (Um & Han, 2021);
- d. Digital transformation scale (Nwankpa & Roumani, 2016).

The questionnaire was translated into Turkish while keeping the essence of the original. The questionnaire was distributed to companies, and 228 of them were included in the study due to incomplete or wrongly answered questionnaires.

The scale items were summarized below in table 6.

Table 6 The variables of the study

Digital Transformation	
Please identify the degree to which your company uses digital technologies on a 1 to 5 scale (1 = strongly disagree, 5 = strongly agree).	
(Nwankpa & Roumani, 2016)	DT1: Our firm is driving new business processes built on technologies such as big data, analytics, cloud, mobile, and social media platform.
	DT2: Our firm is integrating digital technologies such as social media, big data, analytics, cloud, and mobile technologies to drive change.
	DT3: Our business operations are shifting toward making use of digital technologies such as big data, analytics, cloud, mobile, and social media platform.
Supply Chain Resilience	
(Um & Han, 2021)	SR 1 SC is not affected by disruptions/risks related to your suppliers
	SR 2 SC is not affected by disruptions/risks related to your customers
	SR 3 SC is not affected by disruptions/risks "related to your company's operations

Supply Chain Agility	
(Abeysekara, Wang, & Kuruppuarachchi, 2019)	SC Agi1: we have information systems that accurately track all operations.
	SC Agi2: we have real-time data on the location and status of supplies, finished goods, equipment, and employees.
	SC Agi3: we have a regular interchange of information among suppliers, customers, and other external sources.
	SC Agi4: we are sensitive to the changes in the market and opportunities.
	SC Agi5: we can quickly respond to the changing market.
	SC Agi6: we use computer-based technologies to design and improve our processes.
	SC Agi7: we continually strive to further reduce lead times for our production.

Firm Performance	
(Abeysekara, Wang, & Kuruppuarachchi, 2019)	Perf 1: we have a high market share growth
	Perf 2: we have a high sales growth rate.
	Perf 3: our products command a significant share of the market.
	Perf 4: we have a high-profit margin on sales.
	Perf 5: we have a high return on sales
Customer Satisfaction	
Our customers are satisfied with... Responses to the following questions ranged from scale (1 = strongly disagree, 5 = strongly agree).	
(Yee et al., 2010)	CS1 The price of their purchased product(s) in this company
	CS2 The inquiry service provided by this company
	CS3 The customer service in transactions
	CS4 The service of handling customer dissatisfaction in this company *

IBM SPSS program was used to evaluate descriptive statistics. Besides, confirmatory factor analysis and structural model analysis were performed through the SmartPLS 4 software data analysis program. Model fitness and the study's hypothesis were tested after the validity and reliability of the measurement model were examined.

3.5. Pilot Study of the Research

A pilot study was conducted to test the questionnaire. 50 respondents were asked to assess the comprehensibility of the survey's questions. Pre-data from respondents of three manufacturing enterprises were obtained by conducting a pilot test based on interviews to check that questions were understood without any hesitation or confusion. The form was tested and finalized after the assessments. Following this revision, the application was completed by academics who have studied the supply chain.

Smart PLS 4 has been used to evaluate the data. After that, the confirmatory factor analysis results of the pilot study are given in figure 9 to measure the validity of the measurement model. In studies, factor loadings are expected to be greater than 0,5, and 0,7 and above under ideal conditions (Hair et al., 2009). Also, in the preliminary analysis, Cronbach's alpha should be above 0.70 to test the reliability of the measurement model.

As a result, the variables of this study are found as reliable and the items were not needed correction, and the questionnaire was left in its final form. The survey was provided to the manufacturing companies once the pilot study was finished.

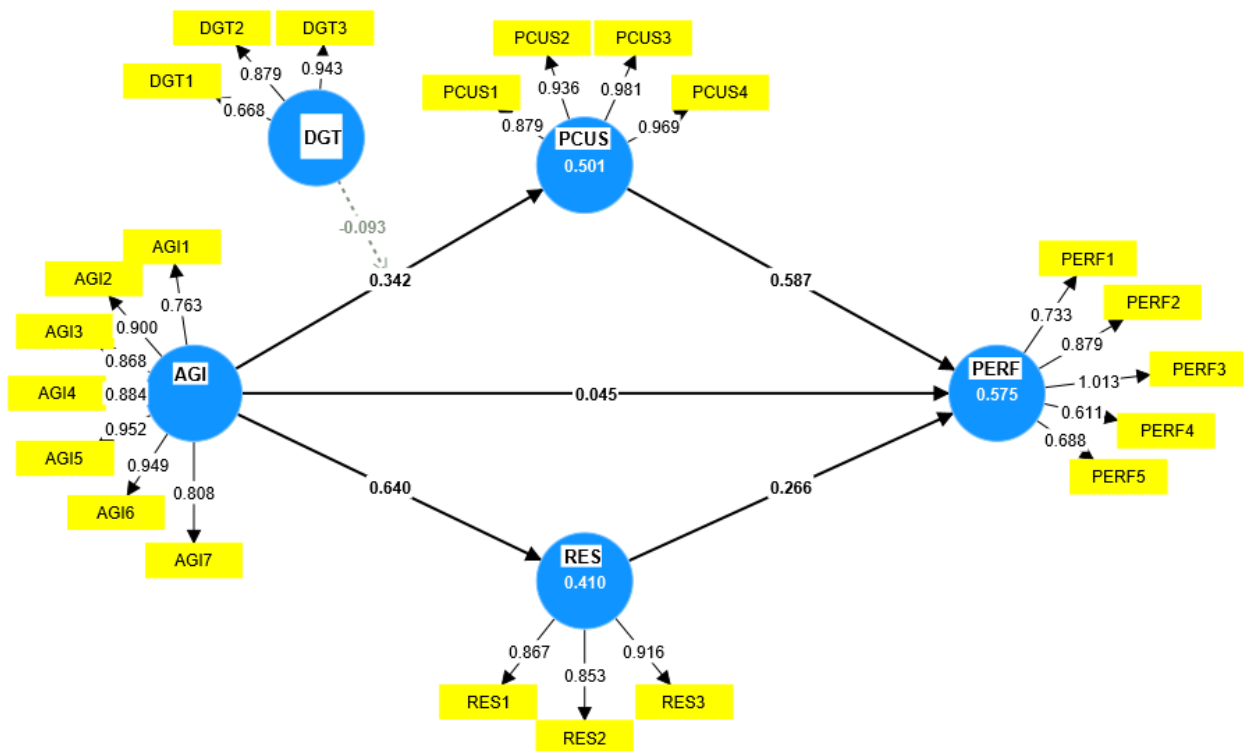


Figure 9 Pilot study path model

Table 7 Pilot study 's construct reliability and validity test

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	The variance average extracted (AVE)
AGIL	0,959	0,962	0,959	0,769
DGT	0,878	0,895	0,874	0,703
PCUS	0,968	0,971	0,969	0,888
PERF	0,900	0,92	0,894	0,636
RES	0,911	0,912	0,911	0,7736

4. DATA ANALYSIS AND RESULTS

SmartPLS is the most accepted technique for testing various hypotheses, as evidenced by several studies (Hair et al., 2014).

With this data analysis program, analysis can be carried out with both reflective and formative variables without any problems (Ozgül, 2020). In addition, it is one step ahead of other data analysis programs that do not require questioning whether the data is normally distributed or not.

Therefore, for this study, PLS-SEM is preferred to analyze the data, and the study is divided into two sections for analysis. Part one is based on an evaluation of the outer model's reliability and validity. The second part is based on a model evaluation within which hypotheses were evaluated (Ul-Hameed et al., 2019).

4.1. Descriptive Statistics and Response Rate

This section presents the profile of respondents and characteristics of the companies that they work for, such as administrator level, educational status, sector, employee number, and annual turnover.

The characteristics of the companies participating in the research and the respondents who answered the questionnaire are presented in Table 8, based on frequency (N) and percentage.

Table 8 Descriptive statistics of company and managers' profiles.

	Frequency (n)	Percent (%)
Administrator level		
Administrative, Top manager	87	38,2
Executive, Middle-level manager	141	61,8
Sector		
Plastic	20	8,8
Textile	45	19,7
Shoes	13	5,7
Food	10	4,4
Automotive	11	4,8
Chemical	32	14,0
Furniture	6	2,6
Metal	8	3,5
Others	83	36,4
Employee number		
0-100	141	61,8
100-200	43	18,9
200<+	44	19,3
Annual turnover		
<1 million Turkish liras	25	11,0
1-5 million Turkish liras	49	21,5
5-10 million Turkish liras	40	17,5
10 million Turkish liras < +	114	50,0
Educational status		
High school	84	36,8
University	123	53,9
Master or PhD	21	9,2

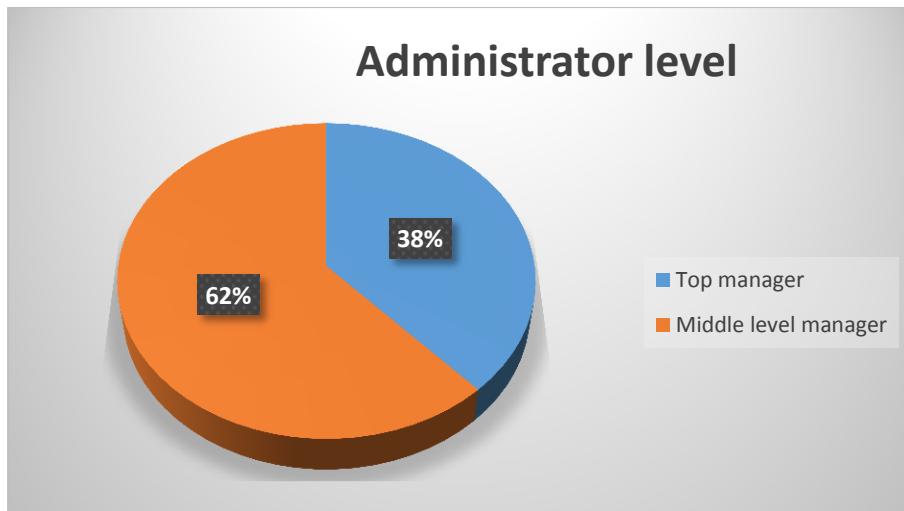


Figure 10 Adminisrator level

Regarding the administrator level of the participants, 38.2% of the participants are top managers, and 61.8% are mid-level managers.

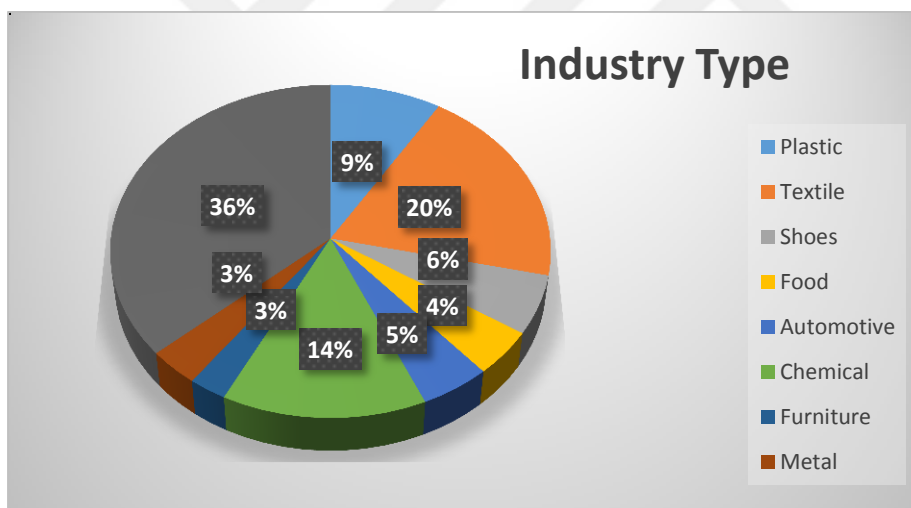


Figure 11 Industry Type

Considering the sector they work in, 19.7% of the companies operating in the textile, 14% in chemical, 8.8% in plastic, 5.7% in shoes, 4.8% in automotive, 4.4% in food, 3.5% in metal, 2.6% in furniture and 36.4% of them are operating in other sectors.

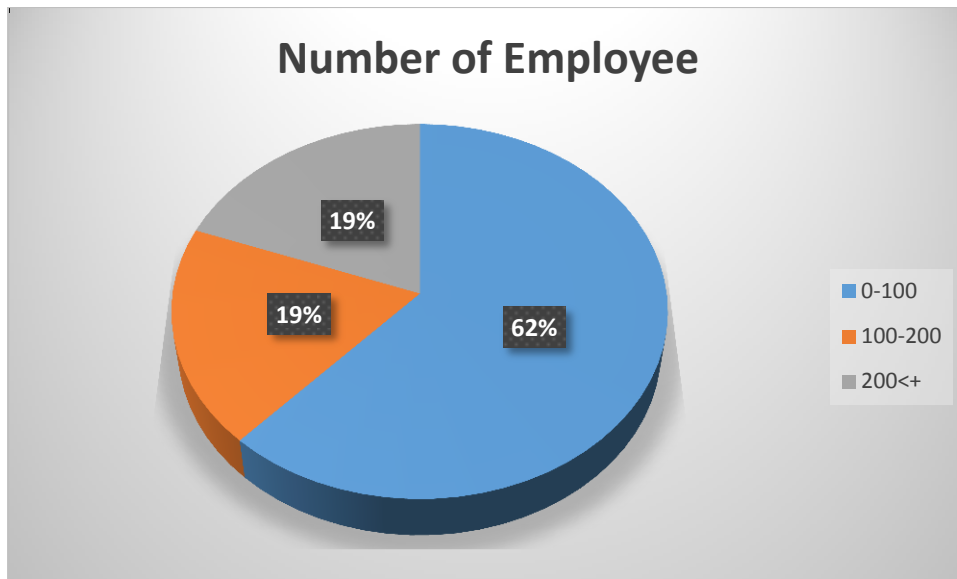


Figure 12 Number of employee

According to employee numbers, 61,8% have 0-100, 18,9 % have 100-200 and 19,3% have 200 and more employees.

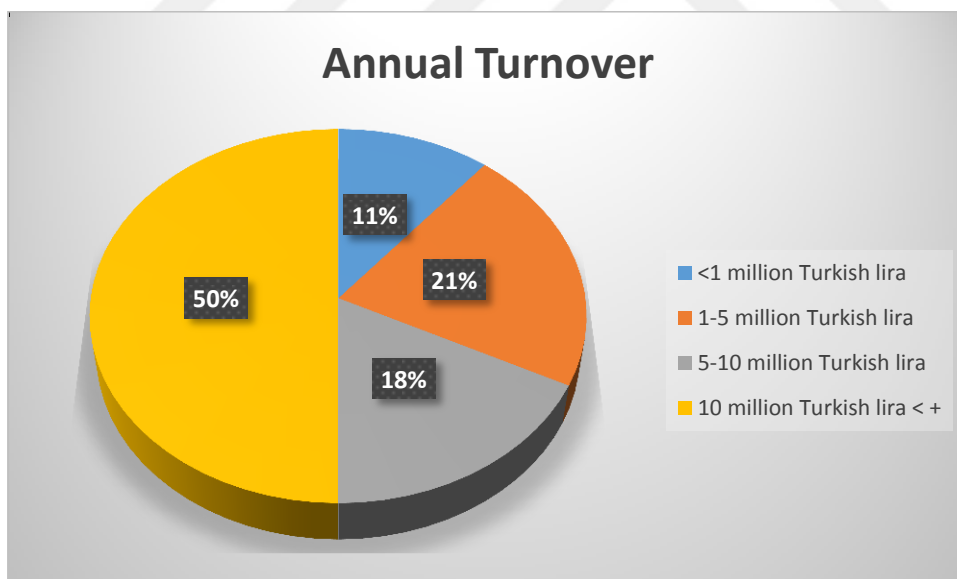


Figure 13 Annual turnover

Regarding annual turnover 11% of them earned less than one million Turkish liras, 17,5% earned between 5-10 million Turkish liras, 21,5 % earned 1-5 million Turkish liras, and 50% earned more than 10 million Turkish liras.

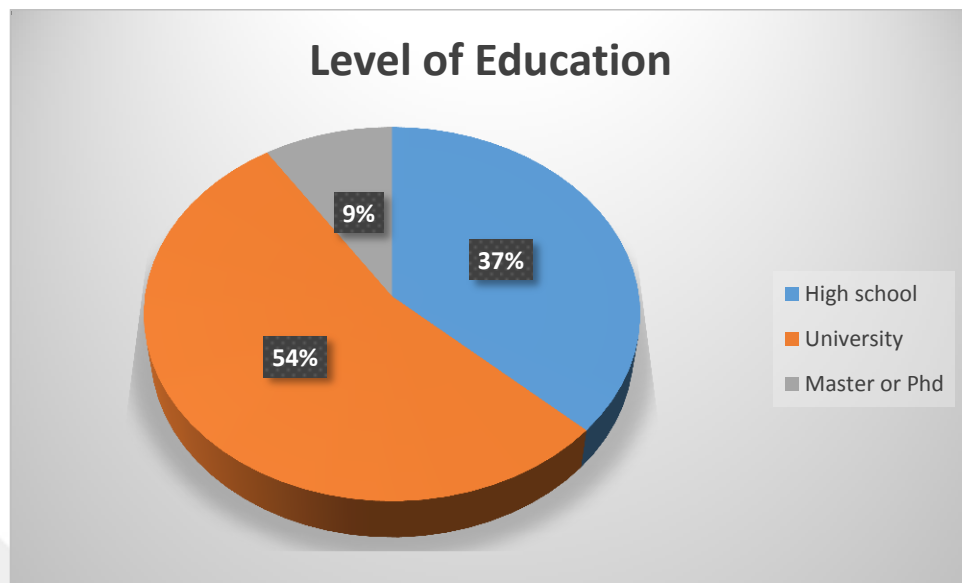


Figure 14 Level of education

Considering the level of education of the participants, 9.2% completed a master's or Ph.D., 36.8% from high schools, and 53.9% from universities.

4.2. Descriptive Statistics of Variables in the Research Model

Respondents were asked questions on supply chain agility, supply chain resilience, perceived customer satisfaction, digital transformation, and firm performance scale, then the mean and standard deviation values were obtained in line with their answers, below table indicates the results of the analysis:

Table 9 Values of Mean and Standard Deviation of Variables

	Mean	Std. Deviation
Supply Chain Agility	3,85	
SC Agi1: we have information systems that accurately track all operations.	3,61	1,099
SC Agi2: we have real-time data on the location and status of supplies, finished goods, equipment, and employees.	3,72	1,045
SC Agi3: we have a regular interchange of information among suppliers, customers, and other external sources.	3,93	0,95
SC Agi4: we are sensitive to the changes in the market and opportunities.	3,95	0,935
SC Agi5: we can quickly respond to the changing market.	3,8	0,925
SC Agi6: we use computer-based technologies to design and improve our processes.	3,89	0,996
SC Agi7: we continually strive to further reduce lead times for our production.	4,11	0,951
Firm Performance	3,30	
Perf 1: we have a high market share growth	3,46	1,088
Perf 2: we have a high sales growth rate.	3,36	1,071
Perf 3: our products command a significant share of the market.	3,71	1,05
Perf 4: we have a high-profit margin on sales.	2,94	1,101
Perf 5: we have a high return on sales	3,07	1,099
Customer Satisfaction	3,91	
PCS1 The price of their purchased product(s) in this company	3,59	1,097
PCS2 The inquiry service provided by this company	4,03	0,954
PCS3 The customer service in transactions	4,01	0,966
PCS4 The service of handling customer dissatisfaction in this company	4,04	1,002
Digital Transformation	3,27	
DT1: Our firm is driving new business processes built on technologies such as big data, analytics, cloud, mobile, and social media platform.	3,18	1,223
DT2: Our firm is integrating digital technologies such as social media, big data, analytics, cloud, and mobile technologies to drive change.	3,32	1,187
DT3: Our business operations are shifting toward making use of digital technologies such as big data, analytics, cloud, mobile, and social media platform.	3,43	1,168
Supply Chain Resilience	3,05	
SR 1 SC is not affected by disruptions/risks related to your suppliers	2,93	1,112
SR 2 SC is not affected by disruptions/risks related to your customers	3,06	1,133
SR 3 SC is not affected by disruptions/risks “related to your company’s operations	3,18	1,17

In the supply chain agility factor, 'AGI7: we continually strive to further reduce lead times for our production' phrase has the highest average with 4,11.

In the company performance factor, PERF 3: our products command a significant share of the market.' phrase has the highest average with 3,71.

In the perceived customer satisfaction factor, the 'PCS4 The service of handling customer dissatisfaction in this company ' phrase has the highest average with 4,04.

In the digital transformation factor, DT3: 'Our business operations are shifting toward making use of digital technologies such as big data, analytics, cloud, mobile, and social media platform. production' phrase has the highest average with 3,43.

In the supply chain resilience factor, the 'SR 3: SC is not affected by disruptions/risks "related to your company' phrase has the highest average with 3,18.

In general, it was determined that the Agi7 statement has the highest average value " we continually strive to further reduce lead times for our production' with an average of 4.11.

4.3. Measurement Model Assessment

The measurement model, called the outer model, refers to the relationships between the constructs and their indicators.

Figure 15 has shown the steps of SEM analysis below.

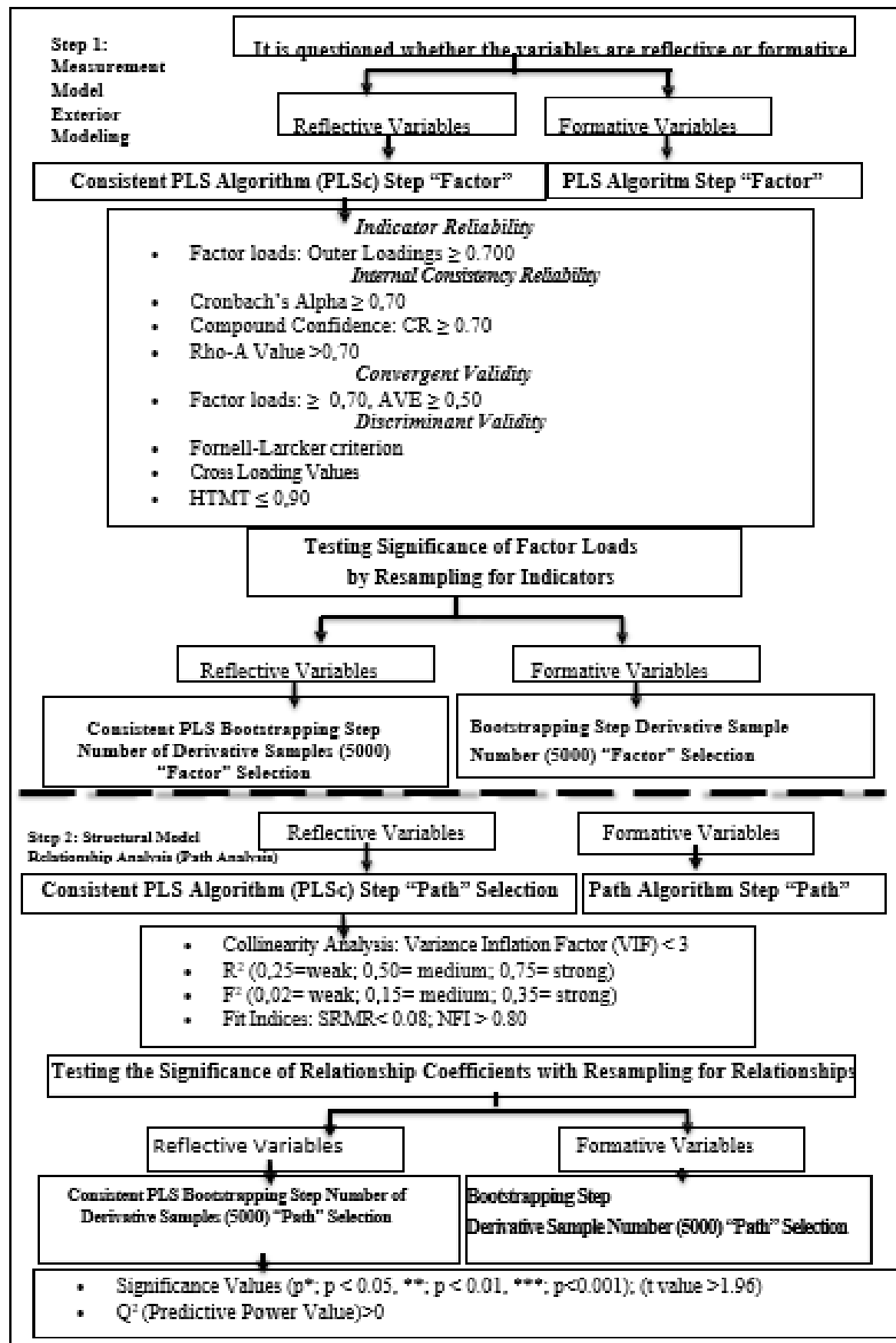


Figure 15 Analysis steps of SmartPLS (Ozgül, 2020)

4.4. Model Preliminary Analysis

Before conducting the research model path analysis, preliminary analyzes of the scales were made according to the following steps and criteria suggested by Hair et al. (Uymaz, 2020).

1. Reliability of the variables: It is recommended that the external loadings of the variables be greater than 0,70.
2. Internal consistency reliability: Cronbach's alpha and Composite reliability-CR values should be greater than 0,70.
3. Validity:
 - a. Convergent validity: AVE (The Average Variance Extracted) values must be greater than 0,50.
 - b. Three analyzes were performed for discriminant validity:
 - i. Fornell-Larcker discriminant validity analysis (Fornell & Larcker, 1981).
 - ii. Cross loadings (Urbach Frederik, 2010).
 - iii. The Heterotrait-Monotrait (HTMT) values are $<.90$ (Henseler et al., 2014).

4.5. Research Model Path Analysis

The research model path analysis was carried out in the order of analysis suggested by Hair et al. (2010):

1. Research model multicollinearity analysis: Variance Inflation Factor, VIF), $VIF < 5$
2. The research model path analysis and the significance level analysis of the relations within its scope ($p < 0,05$),
3. Explained analysis of variance R^2 value (0,190 poor; 0,333 moderate; 0,670 high),
4. Q^2 Predictive power analysis of endogenous variables (Q^2 value >0),
5. Analysis of model fit ($SRMR \leq 0,08$; $RMSt\theta \leq 0,12$),
6. PLS predict analysis Q^2 value >0

4.6. Confirmatory Factor Analysis

Confirmatory factor analysis is a multivariate statistical method that aims to find a small number of unrelated and significant new conceptual variables (dimensions, factors), or to test models that have already been found, by bringing together observable or measurable interrelated variables (İslamoglu & Alniacik, 2019).

Confirmatory factor analysis is carried out to test whether the scales obtained and combined under fewer factors are similar to the sample of the research.

It is also worth noting that it should be questioned whether the variables in the model are reflective or formative. It is recommended to use the Consistent PLS Algorithm/PLSc method when all variables are reflective.

On the other hand, if only one of the variables in the research model is a formative variable, the PLS Algorithm method should be used (Henseler et al., 2014). Since all variables are reflective in this research model, analyses were performed using the PLSc method. Confirmatory factor analysis was carried out and has shown in Table 10:

Table 10 Factor loadings

Latent Variables	Indicators	Outer loadings				
		1	2	3	4	5
AGI	AGI1	0,790				
	AGI2	0,788				
	AGI3	0,834				
	AGI4	0,787				
	AGI5	0,771				
	AGI6	0,808				
	AGI7	0,768				
DGT	DGT1		0,765			
	DGT2		0,916			
	DGT3		0,948			
PCUS	PCUS1			0,793		
	PCUS2			0,897		
	PCUS3			0,912		
	PCUS4			0,828		
PERF	PERF1				0,843	
	PERF2				0,781	
	PERF3				0,972	
	PERF4				0,631	
	PERF5				0,691	
RES	RES1					0,784
	RES2					0,824
	RES3					0,923

In analysis, methods based on PLS-SEM, external loading values should be higher than 0,700, values of 0,600 and above are accepted in the literature, too (Hair Jr. et al., 2014).

When the table is examined, it is seen that all external loadings belonging to 4 variables are above 0,700 and revisions were not necessary.

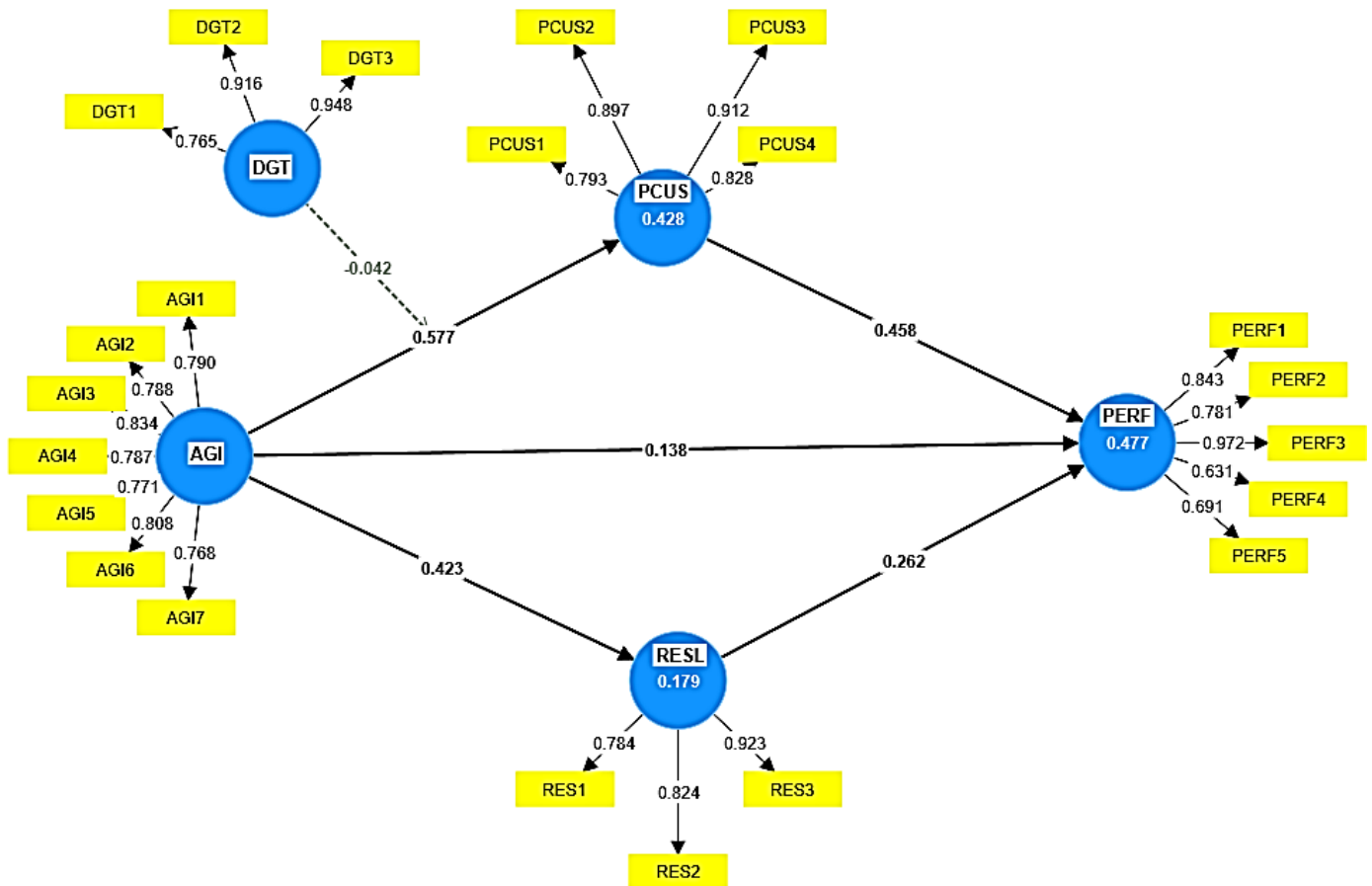


Figure 16 Structural model of the study

4.7. Validity and Reliability Analysis

Reliability is the ability of a measurement tool to provide similar and consistent results in various measurements, while validity is the measurement tool's ability to measure the intended phenomenon. Reliability tests of the reflective scales in the study were carried out considering internal consistency analysis and average variance extracted (AVE). Most studies in the literature examine internal consistency with the Cronbach Alpha coefficient. However, recently, many researchers, particularly Hair et al (2017), suggest that the composite reliability coefficient should

be preferred instead of Cronbach's Alpha coefficient when evaluating the internal consistency of scales regarding reflective variables.

The acceptable limit for internal consistency is accepted as Cronbach's alpha and CR coefficients should be above $\geq 0,60$ in explanatory models and $\geq 0,70$ in confirmatory models (Henseler et al., 2014).

In addition, the average variance extracted (AVE) reflects the average commonality of the indicators of each latent factor in reflective structures (Garson, 2016). In a structure that can be expressed reliably, the AVE value should be $\geq 0,50$ for each latent factor (Duran, 2021).

As a result of the reliability and validity test of the reflective scales used in the research, the values in Table 11 were obtained.

Table 11 Construct Reliability and Validity Analysis

Scales		Standardized Factor Loading	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)	rho-A
AGI	AGI1	0,79	0,922	0,922	0,628	0,922
	AGI2	0,788				
	AGI3	0,834				
	AGI4	0,787				
	AGI5	0,771				
	AGI6	0,808				
	AGI7	0,768				
DGT	DGT1	0,765	0,911	0,911	0,774	0,92
	DGT2	0,916				
	DGT3	0,948				
PCUS	PCUS1	0,793	0,916	0,918	0,738	0,921
	PCUS2	0,897				
	PCUS3	0,912				
	PCUS4	0,828				
PERF	PERF1	0,843	0,896	0,892	0,628	0,911
	PERF2	0,781				
	PERF3	0,972				
	PERF4	0,631				
	PERF5	0,691				
RES	RES1	0,784	0,883	0,882	0,715	0,888
	RES2	0,824				
	RES3	0,923				

When Cronbach's alpha and CR coefficients were examined for internal consistency reliability, Cronbach's alpha coefficient and CR coefficient of each scale were obtained between 0,882 and 0,922. Cronbach's alpha and CR coefficients should be 0,70 and above to ensure internal consistency. According to these coefficients, internal consistency reliability was provided in the study.

Cronbach's alpha, composite reliability and rho_A values should be greater than 0,70. If the factor loadings are between 0,40 and 0,70 and above the threshold values of the AVE and CR coefficients, the items are not removed from the scale. When we examine the factor loadings first, the factor loadings of the items vary between 0,631 and 0,948. As the AVE values of the scales were obtained as higher than 0,50 and the factor loadings were obtained higher than 0,40, convergent validity was ensured in the study.

4.8. Validity of Reflective Scales

As for reflective scales, the expressions that make up the scale reflect the structure they represent. In other words, the expressions that make up the scale are indicators of the measured variable and are shaped by the variable. Therefore, the expressions that make up the scale have a high correlation with each other (Baxter, 2009). For this reason, the validity of reflective scales should be examined from two aspects: convergence and divergence.

The analyzes conducted to determine the convergent and discriminant validity of the reflective scales used in the study are presented in detail below.

First, discriminant validity was tested. Discriminant validity reveals the extent to which a variable used in the research diverges from other variables.

Discriminant validity can be examined in three different ways:

- Fornell ve Larcker
- HTMT
- Cross Loadings

The square root of the AVE of each latent variable should be greater than the correlation of the latent variable with other latent variables according to the initial method proposed by Fornell and Larcker (1981).

4.8.1 Fornell-Larcker Discriminant Validity

Table 12 Discriminant Validity (Fornell-Larcker)

	AGI	DGT	PCUS	PERF	RES
AGI	0,792				
DGT	0,561	0,880			
PCUS	0,651	0,395	0,859		
PERF	0,547	0,446	0,621	0,792	
RES	0,423	0,530	0,279	0,448	0,846

In the Fornell-Larcker criterion, whose discriminant validity was developed, the square root of the AVE coefficients of the factors should be higher than the correlation

coefficients between the other factors in the structure. The values in the diagonals and shown in bold font are the AVE square root of the factors, while the other values are the correlation coefficient between the factors. As a result of the analysis, since the AVE square root coefficients were obtained higher than the correlation coefficients in their row and column, and discriminant validity was ensured.

4.8.2 Heterotrait-Monotrait Ratio (HTMT)

It is called Heterotrait-Monotrait Ratio (HTMT) analysis. HTMT indicates the ratio of the mean of the correlations of the indicators of all hidden variables in the research model to the geometric mean of the correlations of the indicators of the same latent variable.

Table 13 Heterotrait-Monotrait Ratio (HTMT)

	AGI	DGT	PCUS	PERF	RES
AGI	---				
DGT	0,562				
PCUS	0,652	0,395			
PERF	0,540	0,441	0,608		
RES	0,421	0,540	0,280	0,449	---

Another criterion developed for discriminant validity is HTMT coefficients. To provide discriminant validity, HTMT coefficients should be below $\leq 0,90$. Since all of the HTMT coefficients obtained were below 0,90, discriminant validity was ensured.

4.8.3 Cross Loading Discriminant Validity

Table 14 Discriminant validity (Cross-loading)

	AGI	DGT	PCUS	PERF	RES
AGI1	0,790	0,560	0,459	0,431	0,424
AGI2	0,788	0,460	0,465	0,448	0,387
AGI3	0,834	0,452	0,589	0,434	0,311
AGI4	0,787	0,372	0,557	0,419	0,278
AGI5	0,771	0,396	0,483	0,470	0,292
AGI6	0,808	0,494	0,516	0,450	0,347
AGI7	0,768	0,375	0,541	0,383	0,308
DGT1	0,479	0,765	0,303	0,375	0,520
DGT2	0,483	0,916	0,362	0,413	0,443
DGT3	0,522	0,948	0,375	0,392	0,450
PCUS1	0,476	0,320	0,793	0,532	0,262
PCUS2	0,580	0,347	0,897	0,567	0,226
PCUS3	0,616	0,355	0,912	0,547	0,247
PCUS4	0,559	0,336	0,828	0,488	0,227
PERF1	0,466	0,361	0,532	0,843	0,360
PERF2	0,448	0,350	0,513	0,781	0,284
PERF3	0,516	0,439	0,637	0,972	0,408
PERF4	0,338	0,309	0,328	0,631	0,383
PERF5	0,378	0,292	0,399	0,691	0,353
RES1	0,307	0,507	0,219	0,374	0,784
RES2	0,353	0,452	0,208	0,365	0,824
RES3	0,407	0,397	0,277	0,398	0,923

Another criterion in discriminant validity is the examination of cross-loadings. It is necessary to examine whether the items refer to cross-loading. The highest factor load value of each item in the model should be within its own sub-dimension and there should be more than a 0,1 difference between the factor loadings in other dimensions. If this difference is less than 0,1, it is expressed as stacking items and these items should be removed from the model (Duran, 2021). In other words, items with factor scores $>0,3$ and differences between cross-loadings $>0,1$ were retained. When the cross-loadings of the items are examined, there is no stacking item in the scale. The discriminant validity was also provided according to the cross-loadings.

According to the table, the highest factor loadings are Agi3 with 0,834 in supply chain agility, DGT2 with 0,948 in Digital Transformation, Pcus3 with 0,912 in Perceived customer satisfaction, PERF3 with 0,972 in Firm performance and Res3 with 0,923 for supply chain resilience.

4.9 Structural Model

The path coefficient estimates for the structural model relationships, which represent the hypothetical linkages between the reflective constructs, were produced after the PLS-PM method was run. The bootstrapping procedure was used to determine the statistical significance of the path coefficients (5,000 sub-sample).

The significance of path coefficients and the R^2 values were tested to analyze the structure model. R^2 value shows what percentage of the exogenous variables explain the endogenous variable; R^2 values are supposed to be between 0 and 1. R^2 values of all variables in this study are between 0 and 1 as shown in Table 15. (Hair et al., 2011).

To see whether the β values obtained as a result of the analysis were significant at the 5% significance level, the t-test and p-values were examined. For the 5% significance level, the p-value should be $<0,05$.

Table 15 Path coefficients of the structural model

	Stand. Beta	St. deviation	t-statistics	P	VIF	f ²	R ²	Adjusted R ²	Hypothesis
AGI -> PCUS	0,577	0,118	4,888	<0,001	2,722	0,214	0,428	0,42	H₂ Supported
AGI*DGT -> PCUS	-0,042	0,07	0,6	0,549	2,018	0,003			H₃ Rejected
AGI -> PERF	0,138	0,138	0,998	0,318	1,951	0,019			H₅ Rejected
PCUS -> PERF	0,458	0,132	3,467	0,001	1,737	0,231	0,477	0,47	H₄ Supported
RES -> PERF	0,262	0,076	3,467	0,001	1,218	0,108			H₆ Supported
AGI -> RES	0,423	0,065	6,474	<0,001	1	0,218	0,179	0,175	H₁ Supported
Model fit indices	SRMR=0,059; NFI=0,774; GoF=0,824								

The relationship between AGI and PCUS was found to be significant and AGI variables had a positive impact on PCUS ($\beta=0,577$; $p<0,001$). The relationship between PCUS and PERF was found to be significant and PCUS variables had a positive impact on PERF ($\beta=458$; $p=0,001$). The relationship between RES and PER was found to be significant and RES variables had a positive effect on PERF ($\beta=262$;

$p=0,001$). The relationship between AGI and RES was found to be significant and AGI variables had a positive impact on RES ($\beta=423$; $p<0,001$).

It has shown that DGT does not have a positive and statistically significant moderator effect on the relationship between AGI and PCUS. ($p=0,549$). This may be justified by companies that do not know how to take full advantage of digital technologies to increase customer satisfaction such as the Internet of Things (IoT), Cloud Computing, Big Data Analytics (BDA), Smart solutions, social media, and mobile platforms. Maybe they could not show their customers what kind of contributions they have made with digital transformation. Explaining its advantages and differences from other companies with the right marketing can make a difference.

The effect of the AGI variable on PERF was not found statistically significant ($p=0,318$).

As for the adjusted R^2 result, the independent variable in the model explained 42% of the PCUS, 47% of the PERF variable, and 17.5% of the RES variable.

It can maybe be said that agile companies can increase company performance by providing customer satisfaction or gaining resilience, instead of directly affecting company performance. Therefore, it should be checked the mediation role of Sc AGI and Res.

As for the VIF values, there was no multicollinearity problem between the variables since the obtained VIF values are below 5. The f^2 effect size values show the shares of each independent variable in explaining the dependent variable ($r^2/(1-r^2)$). It is expressed as low if it is 0,02 and above, medium if it is 0,15 and above, and high if it is 0,35 and above. f^2 is essentially an indicator of how much change in the value of R^2 occurs when an exogenous variable is removed from the model. A high f^2 indicates that the relevant parameter has a high effect. The effect of the AGI variable on PCUS, the effect of the PCUS variable on PERF, and the effect of the AGI variable on RES were medium, while the effect of the RES variable on PERF was low. Moreover, model fit indices were found to be SRMR Standardized Root Mean Square Residual =0,059, (Normed Fit Index) NFI=0,774, and (Goodness of fit) GoF=0,824. These values showed that the structural model was compatible with the data.

To summarize, all hypotheses from hypothesis 1 to hypothesis 6 are supported in this research except for hypotheses 3 and 5.

Table 16 Examination of the total effects of the structural model

Variable Relationships	Total effects (Standardized)	S. deviation	t-statistics	P
AGI -> RES	0,423	0,065	6,474	<0,001
AGI -> PCUS	0,577	0,118	4,888	<0,001
AGI -> PERF	0,513	0,088	5,857	<0,001
RES -> PERF	0,262	0,076	3,467	0,001
PCUS -> PERF	0,458	0,132	3,467	0,001

When we look at the direct effect of the structural model, it is indicated that the direct effect of the AGI variable on PERF was found to be statistically significant. However, when we included all the relationships in the model, it was seen that the relationship between AGI and PERF was not found significant. Therefore, mediation impact was examined in detail; the results of PCUS and RES analyzed both separately and together are shown as follows.

4.10 In-Depth Examination of Mediation Impact

4.10.1. Mediation Analysis for Perceived Customer Satisfaction and Supply Chain Resilience

First, the mediating role of PCUS and SC RES was analyzed together. To see the mediating role of these variables separately, we then reanalyzed without adding them together to the model and compared the results.

When analyzing the mediating role in PLS-SEM structural models, the direct effect should be tested first. Secondly, the effect of the mediation should be determined by looking at the strength of the indirect effect. Researchers should apply resampling routines to test the significance of the indirect effect. Figure 17 presents a decision tree that can be used to identify the type of mediation analysis.

When the indirect effect in Step 1 is significant, there is a mediating role. In such a case, Step 2 is required to define the mediating role. Mediation is divided into two as full and partial mediation. Partial mediation can also be divided into two

complementary and competitive partial mediation. All cases represent partial mediation, provided that both the direct effect and the indirect effect are significant.

Where the direct effect is not significant but the indirect effect is significant, there is full mediation. If the indirect effect is not significant, the mediator variable has no effect (Zhao et al., 2010). Recent research says the direct effect does not have to be significant

A three-variable nonrecursive causal model Figure 17 is shown below:

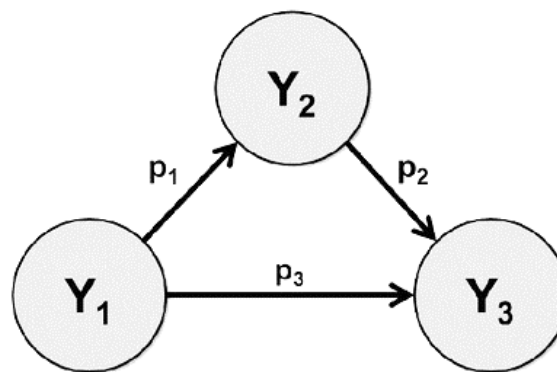


Figure 17 A three-variable nonrecursive causal model (Hair et al., 2014)

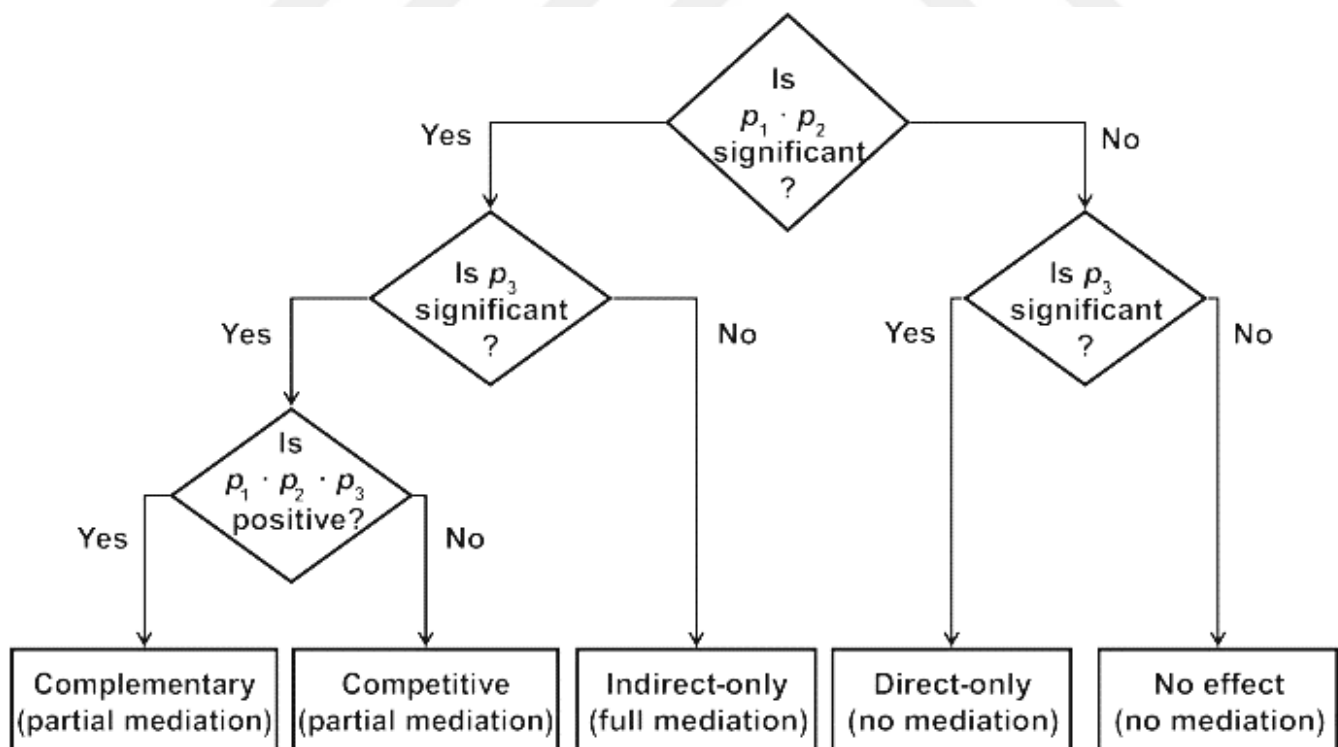


Figure 18 Mediation Analysis Steps (Zhao et al., 2010).

Table 17 Examining the indirect effects of the structural model

	Indirect effects (Standardized)	S. deviation	t-statistics	P
AGI -> PCUS -> PERF	0,264	0,095	2,773	0,006
AGI -> RES -> PERF	0,111	0,034	3,256	0,001

The indirect effect of the AGI variable on PERF through PCUS was found to be statistically significant ($\beta=0,264$; $p=0,006$). The indirect effect of the AGI variable on PERF through RES was found to be statistically significant ($\beta=0,111$; $p=0,001$).

Table 18 Examining the mediation role of the study

Hypothesis		B	S. deviation	t-statistics	P	Result	H
	Step 1						
	AGI -> PCUS -> PERF	0,264	0,095	2,773	0,006	Full Mediation	H ₇ Supported
	Step 2						
	AGI -> PERF	0,138	0,138	0,998	0,318	Indirect Only	
	Step 1						
	AGI -> RES -> PERF	0,111	0,034	3,256	0,001	Full Mediation	H ₈ Supported
	Step 2						
	AGI -> PERF	0,138	0,138	0,998	0,318	Indirect Only	

The direct and indirect effects of the mediator model showed that the indirect effect of the AGI variable on PERF through PCUS was statistically significant, whereas the direct effect of the AGI variable on PERF was not significant, and it can be said that the PCUS variable had a full mediation role-indirect only. The indirect effect of the AGI variable on PERF through RES was found to be statistically significant. Since the direct effect of the AGI variable on PERF was not significant,

According to Zhao et al (2010) it was found that the RES variable had a full mediation role -indirect only because the direct effect is not significant.

4. 10. 2. Mediation Analysis for Perceived Customer Satisfaction

For mediation roles of perceived customer satisfaction and SC resilience were also analyzed separately, and their mediation powers were examined. The below tables indicate the results of the analysis:

Table 19 The mediation role of perceived customer satisfaction

	β	S, deviation	t	P		H
Direct Effect						
AGI -> PERF	0,547	0,082	6,656	<0,001	Partial Mediation (Complementary)	H ₇ Supported
Direct Effect						
AGI -> PCUS	0,652	0,086	7,544	<0,001		
AGI -> PERF	0,244	0,120	2,024	0,043		
PCUS -> PERF	0,465	0,117	3,967	<0,001		
Indirect Effect						
AGI -> PCUS -> PERF	0,303	0,083	3,648	<0,001		

The direct effect of AGI on PERF was obtained as 0,547. AGI has a statistically significant effect on PERF ($p < 0,001$).

The effect of the mediator variable PCUS on PERF was 0,465, which was found statistically significant ($p < 0,001$). It means if perceived customer satisfaction increases it makes company PERF values increase. When the mediator variable was in the model, the effect of AGI on PERF was obtained as 0,244 and it was not found to be statistically significant ($p = 0,043$).

41.8% of AGI, PCU, and Perf variables are explained. The effect of the AGI variable on PCUS was 0,652 and it was found to be statistically significant ($p < 0,001$).

The indirect effect of the AGI variable on PERF via PCUS was found to be statistically significant ($\beta = 0,303$; $p < 0,001$).

The direct and indirect effects of the AGI variable on PERF are significant, and it can also be said that the PCUS variable has a complementary partial mediator effect since the multiplication of the direct effects ($a*b*c$) in other words the sign of $a*b*c$ is positive. The path model has shown below:

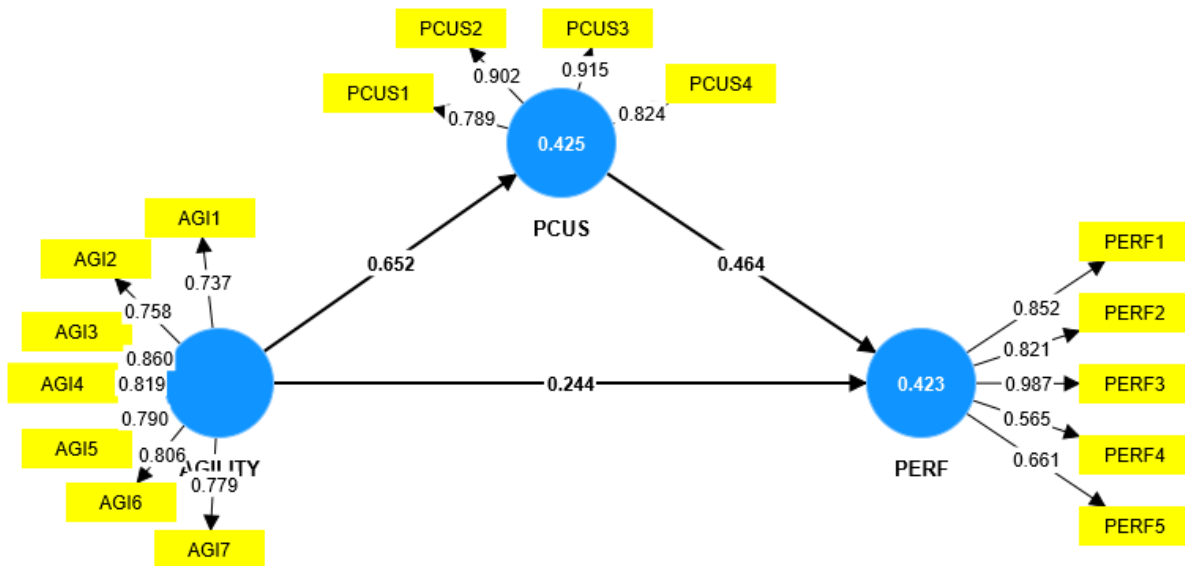


Figure 19 Path model of perceived customer satisfaction

4. 10.3. Mediation Analysis for Supply Chain Resilience

Table 20 Mediating role of supply chain resilience

	β	Std.Dev	T	P		H
Total Effect						
AGI -> PERF	0,549	0,081	6,755	<0,001	Partial Mediation (Complementary)	H₇ Supported
Direct Effect						
AGI -> PERF	0,435	0,088	4,966	<0,001		
AGI -> RES	0,428	0,064	6,651	<0,001		
RES -> PERF	0,265	0,085	3,122	0,002		
Indirect Effect						
AGI -> RES -> PERF	0,113	0,038	2,985	0,003		

The direct effect of AGI on PERF was obtained as 0,549, and there is a positive effect of AGI on PERF was found ($p < 0,001$).

The effect of the mediator variable RES on PERF was 0,265, which was statistically significant ($p=0,002$). It means increasing the Resilience of the company increases the PERF values. When the mediator variable was in the model, the effect of AGI on perf was obtained as 0,435, which was statistically significant ($p<0,001$). The effect of the AGI variable on the RES was obtained as 0,428, which was statistically significant ($p<0,001$). These two variables explain 35.3% percent of the variation in performance.

The indirect effect of the AGI variable on PERF through RES was found to be statistically significant ($\beta=0,113$; $p=0,003$).

It was found that the direct and indirect effects of the AGI variable on PERF were significant and the multiplication of the direct effects ($a*b*c$) was positive, so the RES variable had a complementary partial mediator effect. The path model has shown below:

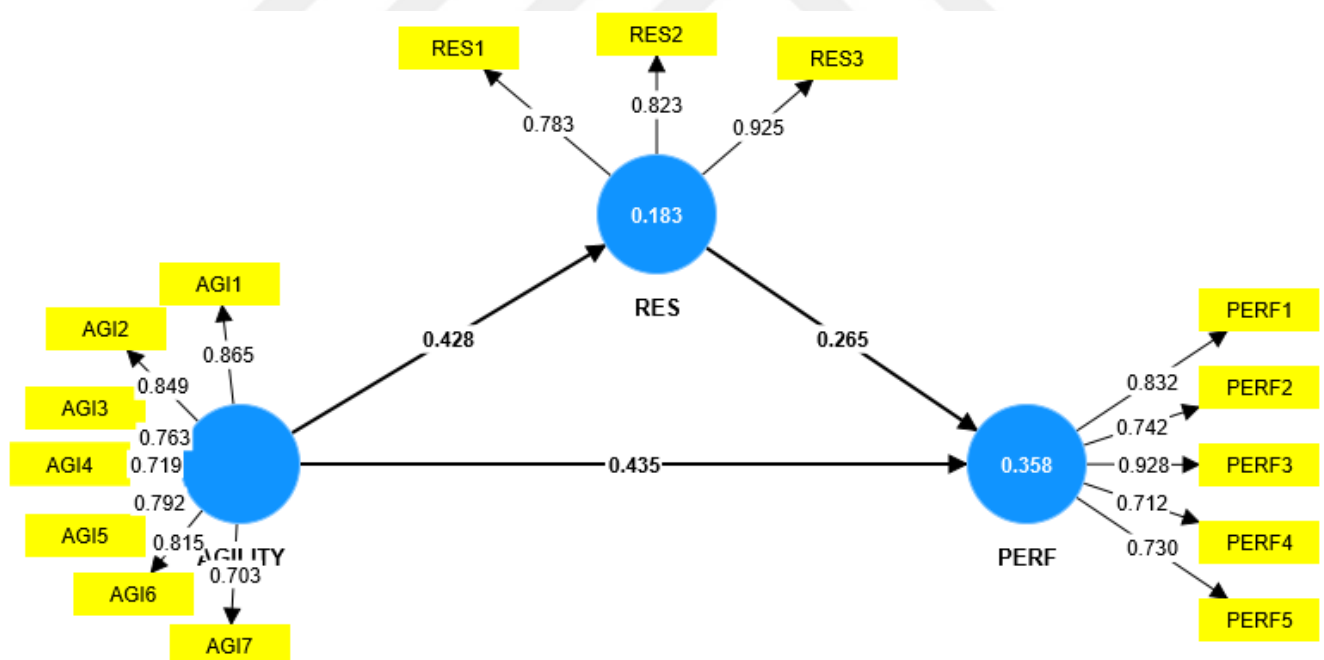


Figure 20 Path model of perceived supply chain resilience

As a result, the following evaluations can be made when the separate mediating role analyzes are compared:

The effect of PCUS, which mediated the relationship between AGI and PERF, was found to be more effective than the other variable RES, which mediated the relationship as well.

Taken separately, PCUS and RES, which are complementary mediators, act as full mediators on the relationship between AGI and PERF when included in the analysis together.

Table 21 Path model's predictive power analysis results (Blindfolding/Q2)

	Q ²
PCUS	0,287
PERF	0,275
RES	0,114

Q² values higher than 0 showed that the model had predictive power on dependent variables and the obtained values were significant. Values greater than 0, 0,25, and 0,50 indicate low, medium, and high prediction accuracy, respectively. The predictive power of the models created for PCUS and PERF dependent variables was found to be moderate, while the predictive power of the model created for the RES dependent variable was found to be low.

5. CONCLUSION

5.1. Findings

This study aims to analyze the relationships between supply chain resilience, supply chain agility, perceived customer satisfaction, and firm performance. On the other hand, it was analyzed whether the perceived customer satisfaction and supply chain resilience variables have mediating role between supply chain agility and firm performance. Also, the moderating effect of digital transformation between supply chain agility and firm performance was tested. For data analysis, SmartPLS 4 and IBM SPSS V23 programs were used.

The main population of this study is supply chain managers of manufacturing companies affiliated with OSBUK operating in the Marmara Region. The questionnaire form created to collect data consists of 27 questions in total. The first five questions asked were prepared to describe the rate of company characteristics and managers' profiles. Seven questions were included in the survey to measure supply chain agility, four questions about perceived customer satisfaction, three questions about digital transformation, other three questions about supply chain resilience, and five questions about firm performance.

For the questions in the last part, a 5-point Likert scale was used. These questions were translated from their original language, English, into Turkish, and checked by academics. Afterward, the opinions of the respondents were taken with the pilot application, and after the questionnaire was finalized, it was distributed. 228 company managers participated in the survey and all of them were included in the analysis thanks to the complete data filling.

According to the descriptive statistics and response rate, 61.8 percent of the managers participating in the survey were top managers and 38.2 percent were mid-level managers.

The distribution of the companies participating in the study according to the industry 19.7% of the companies are operating in the textile, 14% are in the chemical, 8.8% are in plastic, 5.7% in shoes, 4.8% in automotive, 4.4% in food, 3.5% in metal, 2.6% in furniture sector of the companies and 36.4% of them are operating in other sectors. According to employee numbers, 61,8% have between 0-100, 18,9 % have between 100-200 and 19,3% have 200 and + employees.

Regarding annual turnover, 11% of them had less than one million Turkish liras, 17,5% had between 5-10 million Turkish liras, 21,5 % had 1-5 million Turkish liras and 50% had more than 10 million Turkish liras. Considering the level of education of the participants, 9.2% completed a master's or Ph.D., 36.8 % graduated from high school, and 53.9 % of them graduated from university.

After descriptive statistics, Structural Equation Modeling (SEM) was used to examine the reliability and validity of the measurement model and to test the path. The analysis was made based on the bootstrap method in the examination of the direct, indirect, and total effects of the constructs on each other.

As for the bootstrap analysis, 5000 resamples were preferred and the significance level was determined as $p < 0,05$.

The reliability and validity test for the reflective model used in the research. In the studies, it was determined that the scales of all items used in the research provided a very good level of convergent and divergent validity. Considering the evaluations regarding convergent validity, the factor loadings of the indicators forming the variables, and the AVE values of the variables; Evaluations of discriminant validity were carried out by considering cross-loadings, Fornell Larcker criterion, and HTMT ratios.

When convergent validity is examined, factor loadings must be $\geq 0,70$, as recommended by Hair et al. (1998), and AVE coefficients $\geq 0,50$ for convergent validity. If the factor loadings are between 0,40 and 0,70 and above the threshold values of the AVE and CR coefficients, the items are not removed from the scale. When we examine the factor loadings first, the factor loadings of the items vary between 0,631 and 0,948. As the AVE values of the scales were obtained as higher than 0,50 and the factor loadings were obtained higher than 0,40, convergent validity was ensured.

When Cronbach's alpha and CR coefficients were examined for internal consistency reliability, Cronbach's alpha coefficient and CR coefficient of each scale were obtained between 0,882 and 0,922. Cronbach's alpha and CR coefficients should be 0,70 and above to ensure internal consistency. According to these coefficients, internal consistency reliability was provided.

According to path coefficients of the structural model results; The relationship between supply chain agility and supply chain resilience was found to be significant and SC agility variables had a positive impact on SC resilience ($\beta=423$; $p < 0,001$). H1

stated that supply chain agility has a positive effect on supply chain resilience, and it has been accepted.

The relationship between supply chain agility and perceived customer satisfaction was found to be significant and the SC agility variable had a positive impact on perceived customer satisfaction ($\beta=0,577$; $p<0,001$). Therefore, H2, stating that supply chain agility has a positive effect on perceived customer satisfaction, has been accepted.

H3 states that Digital transformation plays a significant moderating effect in the relationship between supply chain agility and customer satisfaction, and it has been rejected.

The Relationship between perceived customer satisfaction and firm performance was found to be significant. ($\beta=458$; $p=0,001$). So H₄, states that perceived customer satisfaction has a positive effect on firm performance, and it has been accepted.

The direct effect of the supply chain agility variable on firm performance was not statistically significant ($p=0,318$). So, H₅, Supply chain agility has a direct significant impact on the firm performance hypothesis, and it has been rejected.

The relationship between supply chain resilience and firm performance was found to be significant and SC resilience variables had a positive impact on firm performance ($\beta=262$; $p=0,001$). H6 stated that supply chain resilience has a positive effect on firm performance, and it has been accepted.

Lastly, the mediation effect was examined. The direct and indirect effects of the mediator model showed that the indirect effect of the AGI variable on PERF through PCUS was statistically significant, whereas the direct effect of the AGI variable on PERF was not significant, and the PCUS variable had a full mediator role.

The indirect effect of the AGI variable on PERF through RES was found to be statistically significant. Since the direct effect of the AGI variable on PERF was not significant, it was found that the RES variable had a full mediation role between the SC agility and company performance relationships.

To see the mediating role of PCUS and RES between SC agility and company performance separately, two separate path analyses were performed.

First, the effect of the mediator variable PCUS on PERF was 0,465, which was found statistically significant ($p<0,001$). It means if perceived customer satisfaction increases, it makes company PERF values increase. When the mediator variable was

in the model, the effect of AGI on PERF was obtained as 0,244 and it was not found to be statistically significant ($p=0,043$).

41.8% of AGI, PCUS, and PERF variables are explained. The effect of the AGI variable on PCUS was 0,652 and it was found to be statistically significant ($p<0,001$).

The indirect effect of the AGI variable on PERF via PCUS was found to be statistically significant ($\beta=0,303$; $p<0,001$).

The direct and indirect effects of the AGI variable on PERF are significant, and it can also be said that the PCUS variable has a complementary partial mediator effect since the multiplication of the direct effects ($a*b*c$) is positive.

According to the mediator effect analysis of the RES variable: the effect of the mediator variable RES on PERF was 0,265, which was statistically significant ($p=0,002$). It means increasing the resilience of the company increases the PERF values. When the mediator variable was in the model, the effect of AGI on PERF was obtained as 0,435, which was statistically significant ($p<0,001$). 35.3% of AGI and RES variables are explained. The effect of the AGI variable on the RES was obtained as 0,428, which was statistically significant ($p<0,001$). 18% of RES and AGI are explained.

The indirect effect of the AGI variable on PERF through RES was found to be statistically significant ($\beta=0,113$; $p=0,003$).

It was found that the direct and indirect effects of the AGI variable on PERF were significant and the multiplication of the direct effects ($a*b*c$) was positive, so the RES variable had a complementary partial mediator effect, too.

As a result, the following evaluations can be made when the separate mediating role analyses are compared:

The effect of PCUS, which mediated the relationship between AGI and PERF, was found to be more effective than the other variable RES, which mediated the relationship as well.

Taken separately, PCUS and RES, which are complementary mediators, act as full mediators on the relationship between AGI and PERF when included in the analysis together.

H₇, 'Customer satisfaction has a significant mediating role on the relationship between supply chain agility and firm performance, and it has been accepted.

H₈, Supply chain resilience has a significant mediating role in the relationship

between supply chain, agility, and firm performance, and it has been accepted.

In light of these findings, the results are summarized in the table below:

Table 22 Summary table of hypothesis

SUMMARY TABLE:	
H₁: Supply chain agility has a significant effect on supply chain resilience.	Supported
H₂: Supply chain agility has a significant effect on customer satisfaction.	Supported
H₃: Digital transformation plays a significant moderating effect in the relationship between supply chain agility and perceived customer satisfaction.	Rejected
H₄: Customer satisfaction has a significant effect on firm performance.	Supported
H₅: Supply chain agility has a significant direct effect on firm performance.	Rejected
H₆: Supply chain resilience has a significant effect on firm performance.	Supported
H₇: Customer satisfaction has a significant mediating role in the relationship between supply chain agility and firm performance.	Supported
H₈: Supply chain resilience has a significant mediating role in the relationship between supply chain agility and firm performance.	Supported

5.2. Theoretical Implications

The study aimed to contribute to the literature in several aspects.

The first aim of this study was to investigate the effects of supply chain agility, supply chain resilience, perceived customer satisfaction on firm performance, and the moderator effect of digital transformation between supply chain agility and perceived customer satisfaction.

In addition, the mediation roles of supply chain resilience and perceived customer satisfaction between supply chain agility and firm performance were examined separately and together by including them in the model.

Consequently, the findings provided a theoretical perspective and explanations for the following research questions:

RQ1: Do supply chain agility and supply chain resilience affect firm performance?

In the study, the direct effect of the supply chain agility variable on firm performance was not found statistically significant from the perspectives of turnover, net profit, and market share. Thus, this hypothesis has been rejected.

The results differed from the common literature in terms of how agility affects firm performance as shown in the study conducted by Abeysakara et al (2019), Swafford et al. (2008), Yusuf and Adeleye (2002), (Degroote & Marx, 2013).

Contrary to these studies, some studies did not find an effect of agility on firm performance parallel to our findings. Gligor, Esmark, and Holcomb (2015) looked at how supply chain agility affected financial performance and found that only cost and customer effectiveness were positively correlated with agility. Yang (2014) discovered in a similar manner that supply chain agility has no impact on firm performance.

This result and mediation analysis shows that sc agility has to be transformed into resilience before it can enhance firm performance. In addition, sc agility can enhance firm performance through customer-oriented performance (Liu et al., 2018).

In the study, SC resilience variables had a positive impact on firm performance. This result coincides with the results of the positive relationship between SC resilience and performance as shown in the study conducted by Kumar & Anbanandam, (2020), (Liu et al., 2018), (Lotfi & Saghiri, 2018), (Chowdhury et al., 2019), (Carvalho, 2012) and common literature.

Under environmental uncertainties, supply chain resilience was viewed as a type of resource that can help reduce supply chain risks to the rapidly changing customer profile and environment, protect continuity against disruption, increase productivity (Liu et al., 2018), and regain performance (Tuğrul, 2005).

RQ2: Is there a mediating role of perceived customer satisfaction between supply chain agility and firm performance?

Customer satisfaction has a significant mediating role in the relationship between supply chain agility and firm performance.

The study aims to contribute to the literature with mediation analyses. We provide a new insight not previously reported in the literature, the mediating effect of perceived customer satisfaction on this causality cannot be ignored. Supply chain agility affects company performance through perceived customer satisfaction.

With effective and agile supply chain management, companies can meet the expectations of their customers for the timely delivery of their products and services, offering customers at the right time and place with the most affordable prices, enabling them to increase customer satisfaction. (Wisner et al., 2013).

RQ3: Is there a mediating role of supply chain resilience between supply chain agility and firm performance?

Supply chain resilience has a significant mediating role in the relationship between supply chain, agility, and firm performance.

Some suggest that agility and resilience can be considered separately, but this study was also consistent with Christopher & Peck, (2004) 's study and concluded that supply chain agility provides resilience. Because also mediation role of resilience shows that sc agility should first create sc resilience to affect performance.

A company with an agile supply chain can maintain its profitability by responding more quickly when demand increases, but it has been seen that agility alone is not enough in the face of a sudden decrease in that demand. The agile company needs to be resilient to risks because resilience is a business strategy today (Banker, 2021).

Agile systems, such as Dell's make-to-order model, are used by companies that launch products with very short product life cycles, such as electronic goods (Yagmur & Tazegul, 2016). For this reason, it can be said that agile systems should create resilience which in turn increases firm performance.

RQ4: Does supply agility affect supply chain resilience and perceived customer satisfaction?

According to the study, supply chain agility has a positive effect on supply chain resilience. This result coincides with common literature and the results of the positive relationship between SC resilience and SC agility as shown in the study conducted by Kumar & Anbanandam, (2020), Agarwal (2006), and (Gunasekaran et

al., 2015). Agility and resilience complement each other because an agile supply chain is inherently more resilient (Henrich et al., 2022).

Also, the supply chain agility has a positive effect on perceived customer satisfaction hypothesis was accepted.

Company capabilities such as agility, responsiveness, and quickness enhance customer satisfaction (Pantouvakis & Dimas, 2013). Quick and efficient service delivery can strengthen customer relationships and increase satisfaction (Ying et al., 2016).

RQ5: Does perceived customer satisfaction affect firm performance?

The relationship between perceived customer satisfaction and firm performance was found to be significant. This outcome is consistent with the findings of Willie's study, which demonstrated a significant relationship between customer satisfaction and performance. Customer satisfaction determinants such as service quality are important factors in improving company performance.

RQ6: What is the moderating effect of digital transformation between supply chain agility and perceived customer satisfaction?

Contrary to popular belief, digital transformation does not play a significant moderating effect in the relationship between supply chain agility and customer satisfaction as expected. The same model has not been found in the literature on this subject, so the result could not be compared with previous studies in the literature.

'Companies are investing billions of dollars in digital technologies' (Kuscu, 2019), and also logistics companies in Türkiye are very open to innovation, but they see technology investments as a major cost item. In addition, they use these investments, especially in transportation and warehousing instead of the entire logistics process (Doyduk & Karagoz, 2020).

Digital applications also require digital customer experience design and digital value creation (Schallmo et al., 2022). Perhaps for this reason, they may not be able to fully ensure that their customers benefit from these technologies. This may be justified by companies that do not know how to take full advantage of digital technologies to increase customer satisfaction, they may need a holistic view for digital transformation.

This study, which takes a resource-based approach, also focuses on how businesses use their resources in the supply chain and how they exhibit agility and resilience in challenging and unforeseen circumstances.

According to the resource-based theory, the ability to supply chain agility and resilience are necessary both for small companies that do not need investment and for large companies (Ying et al., 2016).

To summarize the contributions to the literature: It can be said that very few studies have discussed the relationships between sc agility, sc resilience, customer satisfaction, and firm performance together.

To our knowledge, also the mediation role of customer satisfaction between sc agility and firm performance and the moderating effect of digital transformation on the relationship between sc agility and customer satisfaction for the first time were analyzed. Our research explores these effects and extends the literature.

The research also looks into the function of digital transformation as a moderating effect between supply chain agility and perceived customer satisfaction. Therefore, the study is expected to fill an important gap in the literature.

In light of these theoretical syntheses, the creation of the conceptual model of study by the researcher differentiates the subject from previous studies.

5.3. Managerial Implications

The COVID-19 pandemic, in particular, has exposed significant weaknesses in supply chains worldwide and shed light on the need for smart supply chains that enable faster decision-making. Businesses should now see risks as a disease or viruses, and resilience as an immune system that shows the strength of the business against these viruses. Because the more resilient the business, the more likely it will be able to respond to risks (Tuğrul, 2005).

The pandemic has caused disruptions in supply chains and accordingly, companies have started to develop different strategies. Companies need to make emergency plans with the awareness of their scarce intangible or tangible assets with a resource-based approach.

That is why academia and companies have begun to pay more attention to supply chain agility and resilience. Increasing difficulties, uncertainty, and complexity in the global supply chain have necessitated the need for manufacturers to focus more on supply chain strategies and firm performance.

Based on the research findings, some managerial suggestions can be presented to the practitioners.

According to the results of the analysis, supply chain resilience has a positive effect on firm performance. Companies can positively affect firm performance by taking precautions against risks and distractions in the supply chain. Firms that eliminate risks or are prepared for risks for suppliers, consumers, and company operations can cope with problems much more easily. Consistent with the study of (Um & Han, 2021), there was also a positive effect in this study. Adopting an appropriate mitigation strategy in various risk environments is a critical decision to achieve supply chain resilience.

Understanding customer demands correctly, analyzing competitors in the market well, and using all this information within their capabilities are the factors that help companies to create an agile supply chain. Also by looking at other significant hypotheses, it can be said that agile companies can increase company performance by providing customer satisfaction or gaining resilience first, instead of directly affecting performance.

Also, according to another hypothesis, supply chain resilience has a significant mediating role in the relationship between supply chain agility and firm performance. This indicates that although firm supply chain agility is not directly reflected in firm performance, it can positively affect firm performance by providing a resilient supply chain. It is also possible to see the contribution of agility to resilience here. Firms can provide resilience by meeting demands quickly and adequately, thus increasing firm performance.

The study concluded that agility not only provides resilience but also creates customer satisfaction and positively affects firm performance. In today's world where the supply chains of companies are competing, it is an inevitable fact that companies that understand the consumer, plan their demands in advance, and make fast and reliable deliveries satisfy their customers. This will have a significant impact on company performance.

Digital transformation is inevitable for supply chains. However, the expected benefit of digital technologies that produce solutions to agile expectations such as traceability and speed may also be different according to customers. Perhaps for these reasons, these technology resources used by customers may be perceived as unimportant. For this reason, it can be suggested to practitioners that they first understand the needs of the customers and offer digital solutions accordingly.

5.4. Limitations and Future Research Directions

Although this study was conducted to contribute to the literature and managers, this research is still limited in some concerns.

Taking only the Marmara region as a basis and applying a survey only to supply chain managers can be accepted as a limitation and those managers, not customers, answered customer satisfaction questions so it can also be seen as another limitation of the study.

Future studies may include other regions of Türkiye. Comparisons can be made with different countries. It would be interesting to find out the moderator effect or mediating role of digital transformation between SC agility and firm performance.



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APPENDIX

Questionnaire Items in Turkish :



Sayın Katılımcı,

Bu araştırma Yeditepe Üniversitesi Sosyal Bilimler Enstitüsü İşletme Doktora Programı'nda yürütülmektedir. Çalışmanın amacı, Marmara Bölgesi'nde OSBUK üyesi üretim firmalarında **tedarik zinciri çevikliğinin, tedarik zinciri dayanıklılığının** firma performansına etkisini araştırmaktır.

Anket sorularına verdiğiniz cevaplar tamamıyla gizli tutulacak, sadece araştırmacı tarafından bilimsel bir amaç için değerlendirilecek, herhangi bir **ticari amaçla kullanılmayacaktır.**

Anket sonunda, çalışma hakkındaki soru ve yorumlarınız için araştırma yürütücüsü Esra Nur Gökhan ile iletişim kurabilirsiniz.

Değerli zamanınız ve sağladığınız katkı için teşekkür eder, işlerinizde başarılar dileriz.

Prof.Dr.Tulin URAL

Esra Nur GOKHAN

*Firmadaki Pozisyonunuz:

☐ Orta Düzey Yönetici

☐ Üst Düzey Yönetici

* Eğitim Durumunuz:

Lise ☐

Üniversite ☐

Yüksek Lisans-Doktora ☐

*Firmanızın bulunduğu sektör:

*Firmanızdaki çalışan sayısı:

0-100 ☐ 100-200 ☐ 200 < + ☐

*Firmanızın yıllık satış rakamları (son mali yıldaki cirosu) :

~1 Milyon Türk Lirası ☐

1-5 Milyon Türk Lirası ☐

5-10 Milyon Türk Lirası ☐

10 < + Milyon Türk Lirası ☐



Aşağıda sunulan ifadelerle katılma derecenizi <u>firmanızın niteliklerini</u> göz önünde bulundurarak değerlendiriniz.	Kesinlikle Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle Katılıyorum
1 Şirketimiz, büyük veri, analitik, bulut, mobil ve sosyal medya platformu gibi teknolojiler üzerine kurulu olan yeni iş süreçlerini yönetmektedir.	☐	☐	☐	☐	☐
2 Şirketimiz, değişimi yönlendirmek için sosyal medya, büyük veri, analitik, bulut ve mobil teknolojiler gibi dijital teknolojileri bünyesine entegre etmektedir.	☐	☐	☐	☐	☐
3 İş operasyonlarımız büyük veri, analitik, bulut, mobil ve sosyal medya platformu gibi dijital teknolojilerin kullanımına yönelmektedir.	☐	☐	☐	☐	☐
4 Tedarik Zinciri, tedarikçilerimizle ilgili aksaklıklardan/risklerden etkilenmez.	☐	☐	☐	☐	☐
5 Tedarik Zinciri, müşterilerimizle ilgili aksaklıklardan/risklerden etkilenmez.	☐	☐	☐	☐	☐
6 Tedarik Zinciri şirketimizin faaliyetleri/operasyonlarıyla ilgili aksamalardan/risklerden etkilenmez.	☐	☐	☐	☐	☐
7 Tüm operasyonları doğru bir şekilde takip eden bilgi sistemlerimiz bulunmaktadır.	☐	☐	☐	☐	☐
8 Sarf malzemelerin, bitmiş ürünlerin, ekipmanların ve çalışanların konumu ve durumu hakkında gerçek zamanlı verilere sahibiz.	☐	☐	☐	☐	☐
9 Tedarikçiler, müşteriler ve diğer dış kaynaklar arasında düzenli bilgi alışverişi yapıyoruz.	☐	☐	☐	☐	☐
10 Pazardaki değişimlere ve fırsatlara karşı duyarlıyız.	☐	☐	☐	☐	☐
11 Değişen pazara hızla yanıt verebiliriz.	☐	☐	☐	☐	☐
12 Süreçlerimizi tasarlamak ve iyileştirmek için bilgisayar tabanlı teknolojiler kullanıyoruz.	☐	☐	☐	☐	☐
13 Üretimimiz için teslim sürelerini daha da azaltmak amacıyla sürekli çaba gösteriyoruz	☐	☐	☐	☐	☐
Aşağıdaki göstergelere göre son iki yılda kurumunuzun performansını nasıl değerlendirirsiniz? 1 = Kesinlikle katılmıyorum; 5 = Kesinlikle katılıyorum					
14 Yüksek bir pazar payı büyümesine sahibiz.	☐	☐	☐	☐	☐
15 Yüksek bir satış büyüme oranına sahibiz.	☐	☐	☐	☐	☐
16 Ürünlerimiz pazarda önemli bir paya sahiptir.	☐	☐	☐	☐	☐
17 Satışlarda yüksek bir kar marjımız var.	☐	☐	☐	☐	☐
18 Yüksek bir satış getirisine sahibiz.	☐	☐	☐	☐	☐

Aşağıdaki sorulara müşterilerinizin memnuniyetine göre cevap veriniz:
“1=Kesinlikle katılmıyorum” **“5=Kesinlikle katılıyorum”**

19 Müşterilerimiz şirketimizden satın aldıkları ürünlerin fiyatından memnundur.	[]	[]	[]	[]	[]
20 Müşterilerimiz şirketimiz tarafından sağlanan danışma hizmetinden memnundur.	[]	[]	[]	[]	[]
21 Müşterilerimiz işlemler sırasında şirketimizin sağladığı müşteri hizmetlerinden memnundur.	[]	[]	[]	[]	[]
22 Müşterilerimiz müşteri memnuniyetsizliğinin giderilmesi hizmetinden memnundur.	[]	[]	[]	[]	[]



Questionnaire Items in English

*Your Position in the Company:

☐ Mid-Level Manager

☐ Senior Manager

*Level of Education:

High school ☐

University ☐

Master-PhD ☐

* Companies working industry.....

* Number of employees in your company:

0-100 ☐ 100-200 ☐ 200< + ☐

* Your company's annual turnover in the last financial year:

~ ₺1 Million Turkish Liras ☐

₺1-5 Million Turkish Liras ☐

₺5-10 Million Turkish Liras ☐

₺10 < + Million Turkish Liras ☐

Please indicate to what degree each statement applies to your company	Strongly	Disagree	Neither/Nor Agree,	Agree	Strongly Agree
DT1: Our firm is driving new business processes built on technologies such as big data, analytics, cloud, mobile, and social media platform.	☐	☐	☐	☐	☐
DT2: Our firm is integrating digital technologies such as social media, big data, analytics, cloud, and mobile technologies to drive change.	☐	☐	☐	☐	☐
DT3: Our business operations are shifting toward making use of digital technologies such as big data, analytics, cloud, mobile, and social media platform.	☐	☐	☐	☐	☐
SR 1 SC is not affected by disruptions/risks related to your suppliers	☐	☐	☐	☐	☐
SR 2 SC is not affected by disruptions/risks related to your customers	☐	☐	☐	☐	☐
SR 3 SC is not affected by disruptions/risks “related to your company’s operations	☐	☐	☐	☐	☐
SC Ag<i1: we have information systems that accurately track all operations.	☐	☐	☐	☐	☐
SC Agi2: we have real-time data on the location and status of supplies, finished goods, equipment, and employees.	☐	☐	☐	☐	☐
SC Agi3: we have a regular interchange of information among suppliers, customers, and other external sources.	☐	☐	☐	☐	☐
SC Agi4: we are sensitive to the changes in the market and opportunities.	☐	☐	☐	☐	☐
SC Agi5: we can quickly respond to the changing market.	☐	☐	☐	☐	☐
SC Agi6: we use computer-based technologies to design and improve our processes.	☐	☐	☐	☐	☐
SC Agi7: we continually strive to further reduce lead times for our production.	☐	☐	☐	☐	☐
How would you evaluate the performance of your company in the last two years according to the following indicators?					
Perf 1: we have a high market share growth	☐	☐	☐	☐	☐
Perf 2: we have a high sales growth rate.	☐	☐	☐	☐	☐
Perf 3: our products command a significant share of the market.	☐	☐	☐	☐	☐
Perf 4: we have a high-profit margin on sales.	☐	☐	☐	☐	☐
Perf 5: we have a high return on sales	☐	☐	☐	☐	☐

Responses to the following questions : Our customers are satisfied with...					
CS1 The price of their purchased product(s) in this company	☐	☐	☐	☐	☐
CS2 The inquiry service provided by this company	☐	☐	☐	☐	☐
CS3 The customer service in transactions	☐	☐	☐	☐	☐
CS4 The service of handling customer dissatisfaction in this company	☐	☐	☐	☐	☐

