**T.C.**
**ISTANBUL GEDİK UNIVERSITY**
**INSTITUTE OF GRADUATE STUDIES**

# INNOVATIONS IN SUPPLY CHAIN MANAGEMENT TRANSFORMING COMMERCE WITH LIDER KOZMETIK TURKEY

**MASTER'S THESIS**

**Maryam Natiq AL-KHAYAAT**

**Department of Business Administration**

**Master's Program in Business Administration in English**

**NOVEMBER 2024**
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Bu çalışma 27/11/2024 tarihinde aşağıdaki jüri tarafından İşletme Yönetimi Anabilim Dalı, İşletme Yönetimi (Tezli Yüksek Lisans) Programı Yüksek Lisans Tezi olarak kabul edilmiştir.

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## DECLARATION

I, Maryam Natiq AL-KHAYAAT , declare that this thesis titled “Technology Transfer and innovation adoption in less developed: A Case Study of Cameroon” is original work I completed this to receive my master's in engineering management. I further declare that neither this thesis nor any part of it has ever been submitted to or presented for a research paper or other degree at any other university or institution. (01 /11/2024)

Maryam Natiq AL-KHAYAAT

## DEDICATION

To whose dream was to obtain a master's degree, my mother (may God have mercy on her)

To my father, who did not stand in my way when I decided to travel despite his fear for me

To my sisters who supported me until the last minute

To my fiancé (Arslan Bhatti), who encouraged me a lot and gave me self-confidence

To my two best friends (Maryam Kamal) and (Maryam Gamal)

To those who supported me to get here, my friends

To my teachers at Gedik University, especially my dear supervisor

I dedicate this study of mine, and I hope to God that it will be beneficial to those after me

## PREFACE

Praise be to God who blessed me with this study and this university, where we met many distinguished professors who were able to support us

Thanks to my sincere supervisor (Prof. Dr. Ahmet Kesik). You have put in a lot of effort and time to make me complete my master's thesis. Thank you from my heart.

"Thank you" to all the loyal employees in the Business Administration Department. I am grateful to all of you.

Thank you to the friends I made at this university and those who helped me in some matters

Thanks to everyone I met in Turkey who supported me even with the simplest things

November 2024 Maryam Natiq AL-KHAYYAT

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## ABBREVIATONS

| | |
|---|---|
| **SCM** | : Supply Chain Management |
| **SCI** | : Supply Chain Innovation |
| **IT** | : Information Technology |
| **MOIA** | : Marketing Oriented Innovation Activities |
| **TDOIA** | : Technological Development Oriented Innovation Activites |
| **LOIA** | : Logistics Oriented Innovation Activites |
| **AI** | : Artificial Intelligent |
| **IOT** | : internet of Things |
| **AR** | : Augmented Reality |
| **GSCM** | : Green Supply Chain Management |
| **CR** | : Cost Reduction |
| **COMPAD** | : Competitive Advantage |

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**INNOVATIONS IN SUPPLY CHAIN MANAGEMENT TRANSFORMING COMMERCE WITH LIDER KOZMETIK TURKEY**


## ABSTRACT

Supply chain innovations are a broad process that includes many innovations, and the application of innovations is important to achieve competitive advantage for companies and improve supply chain performance. Here we will focus on one of the Turkish companies to find out the impact of innovations in supply chain and its potential extent to reduce costs and achieve competitive advantage through the use of classifications of innovations, which are Marketing activities, technological activities, and logistical activities, as classified by Wong. As for the dimensions of competitive advantage, its include cost, quality &time. A questionnaire was prepared regarding these variables and distributed to those concerned in the company. The answers were collected and analyzed using the SPSS program. The research showed that there is a strong positive connection between innovation activities directed towards technology and achieving competitive advantage and a moderate effect on reducing costs on the other side. It also showed that there is a strong positive connection between innovation activities directed towards marketing and reducing costs on the one side and they are not effective in achieving competitive advantage on the other side. As for innovation activities directed towards logistics services, the research showed that their effect on reducing costs was ineffective and their effect on competitive advantage was moderate.



**Keywords:** *Supply chain management, Supply chain innovation, IOT, Block chain, Competitive advantage, Business operations*

# TEDARİK ZİNCİRİ YÖNETİMİNDE DÖNÜŞÜMDE YENİLİKLER LİDER KOZMETİK TÜRKİYE İLE TİCARET


## ÖZET

Tedarik zinciri yenilikleri, birçok yeniliği içeren geniş bir süreçtir ve yeniliklerin uygulanması, şirketler için rekabet avantajı elde etmek ve tedarik zinciri performansını iyileştirmek için önemlidir. Burada, tedarik zincirindeki yenilikler ile maliyetleri düşürme ve Wong tarafından sınıflandırılan Pazarlama faaliyetleri, teknolojik faaliyetler ve lojistik faaliyetler olmak üzere yenilik sınıflandırmalarının kullanımı yoluyla rekabet avantajı elde etme potansiyelinin kapsamı ve maliyet, kalite ve zaman olan rekabet avantajının boyutları arasındaki ilişkiyi bulmak için Türk şirketlerinden birine odaklanacağız. Bu değişkenlerle ilgili bir anket hazırlandı ve şirketteki ilgililere dağıtıldı. Cevaplar SPSS programı kullanılarak toplandı ve analiz edildi. Araştırma, teknolojiye yönelik yenilik faaliyetleri ile rekabet avantajı elde etme arasında güçlü bir pozitif ilişki ve diğer yandan maliyetleri düşürme üzerinde orta düzeyde bir etki olduğunu gösterdi. Ayrıca, pazarlamaya yönelik yenilik faaliyetleri ile maliyetleri düşürme arasında güçlü bir pozitif ilişki olduğunu ve diğer yandan rekabet avantajı elde etmede etkili olmadıklarını da gösterdi. Lojistik hizmetlerine yönelik yenilik faaliyetlerine gelince, araştırma, maliyetleri düşürme üzerindeki etkilerinin etkisiz olduğunu ve rekabet avantajı üzerindeki etkilerinin orta düzeyde olduğunu gösterdi.



**Anahtar kelimeler:** *Tedarik zinciri yönetimi, Tedarik zinciri inovasyonu, IoT, Blok zinciri, Rekabet avantajı, İş operasyonları*

# 1. INTRODUCTION

## 1.1 Overview

In 1973 and 1979, with the occurrence of the two oil crises, industrial companies realized that long supply chains meant inflexibility in responding to changes in demand and a large amount of inventory. It was realized that these supply chains would become socially unacceptable and economically prohibited, so production in large quantities turned into A cause of problems after it was the most efficient production philosophies. The supply chain has witnessed many developments during our life, as from 1800 to 1900, crafts were manual and local transportation was carried out by animals over short distances. After the industrial revolution, production expanded with large factories and transportation by steamers ships and railways, so the transportation distance increased. The first railway was opened in 1825 in England and the first steamship, the Savannah, crossed the Atlantic Ocean in 1819. From 1900 to now, improvements have appeared in transportation and communications, such as the telegraph and telephone for communication between suppliers and customers. This was the beginning of the twentieth century, and the emergence of cars in 1908, airplanes in 1903, and the first air transport after World War I in 1918. In the middle of the same century, computers appeared in 1945 and automation, which led to reducing costs and increasing production, then global trade in 1995, which led to product components being manufactured in multiple countries and the development of maritime and air transport. In the twenty-first century, the Internet, AI, and IOT appeared in 1999, which improves tracking and prediction in supply chains and block chain technology in 2008 for transparency and security.

Let’s take McDonald’s as an example of a company that has developed its own supply chain. It was founded in 1940, and its first restaurant was in California. In 1954, assembly lines were used to prepare food quickly. Ray Kroc introduced this idea of fast service after joining McDonald’s, where fast service was provided to customers efficiently. Its restaurants expanded worldwide from 1960 to 1980, and

here it relied on local suppliers for each country to ensure low costs and fresh food. From 1980 to 2000, to track ingredients and know the needs, inventory management systems and refrigerated transportation technologies were used to transport ingredients without spoiling them. In 2000 and until now, several technologies have been used, such as the Internet of Things to monitor quality and temperatures, and block chain technology to track the source of ingredients and transparency. These developments have led to efficiency, quick response to changes in demand, reduced spoilage, global expansion and entry into new markets. The survival and competitiveness of companies in the markets depends on the ability of these companies to expansion innovations which customers prefer (Song et al., 2017) and that companies cooperate with effective external parties and benefit from their internal resources to improve the innovation process (Zimmermann, et al., 2016)

The use of automation and robotics led to a balance between efficiency and flexibility in production, logistical operations, and supply chain integration. Innovations in supply chains, from automation and computerization, led to the prosperity of many industries and countries. Companies are in dire need of integration along the supply chain, from raw materials to the delivery of products to the last customer (Stank, 2001).

The supply chain is of great importance in the process of business success, meeting customer needs, and delivering the product at the appropriate time to the customer, as the supply chain is a group of functions and processes that seek to transform raw materials into a finished product and deliver it to the customer. Today, we see that technological development has an effective role in the development of trade. And its transition to a certain level through the positive impact of technology on supply chains, which leads to improvement in product quality, reduction of costs, and ease of tracking and delivering the product to the customer in a timely manner. Looking at companies and factories, we see that there is a great development when comparing their previous work and the current work, which is distinguished by the presence Innovations in supply chains. In our time, we face many challenges and discover many innovations that enable us to confront these difficulties. Companies need a strong supply chain to survive in a competitive environment where demand and customer satisfaction are important (Lii & Kuo, 2016). Technology today plays an important role in many aspects of life and makes many tasks easier for us. Today,

with the push of a button, you can travel, prepare a meal, or even connect across the world with people face to face. Automated systems and artificial intelligence have exceeded human efficiency in some cases, as in modern trucks that work to avoid slopes by reducing the speed of the truck, and this is better compared to humans, as it predicts slopes before the human driver sees them. All this thanks to innovations and technology. The world today is moving towards the possibility of making the most of innovations in supply chains to move towards high quality, flexibility in changing demand, and low cost, thus obtaining customer satisfaction and achieving a competitive advantage. Many major companies today are adopting many innovations that make them able to create a good market share among companies the competition. The thesis will be divided into five main chapters. In chapter one, we will review an introduction to the topic. This is followed by chapter two, which deals with the subject of the supply chain. In the third chapter, the researcher will talk about innovations in the supply chain, the fourth chapter will be devoted to studying practical cases, and finally we will conclude the last chapter with conclusions and recommendations.

## 1.2 Literature Review

### Study Wong, D. T. & Ngai, E. W. (2022)

In this study, the researchers aimed to develop measures of supply chain innovations. It identified three dimensions for measuring supply chain innovations, namely marketing, technological development, and activities related to innovation directed toward logistics services. It was concluded that these activities are important in supply chain performance and have a major role.

### Study of Muhammad Al-Saghir (2020):

In this study, the researcher aimed to know the impact of block chain technology, which is one of the innovations in tracking supply chains, and its impact on activating inter-cost management tools and achieving competitive advantage. Private industrial companies, including spinning and weaving companies, food companies, and others in the Arab Republic of Egypt, are the community of this study. The study included many results, the most important of which are: the

importance of this technology in control and helped in activating cost management tools and achieving competitive advantage (Mohamed Al-Sagheer, 2020).

**Study by Mustafa Raouf and Rana Khalil 2023**

In this study, the researchers aimed to know the potential of industrial supply chains in raising the efficiency and tracking of industrial supply chains and achieving competitive advantage. The study population is universities in the Iraqi Republic. An important finding of this study is that block chains rely on mechanisms that make it possible to track and monitor any activities and connect a group of participating parties (Mustafa Raouf and Rana Khalil, 2023).

**Study Ukazu Noel Chinedu, Eje Brendan 2023**

The study aimed to know how much the impact of the Internet of Things will be on the efficiency of the organization, as well as its impact on time, cost, and labor. The study population is general in the framework of modern business. This study has proven that the contribution of the Internet of Things to organizational efficiency is very large, and also that the Internet of Things saves time and cost for the organization (Study Ukazu Noel Chinedu, Eje Brenda, 2023)

**Aziza Tazhiyeva 2018 study**

The study aims to identify the benefits & challenges of applying IOT and AI applications to the supply chain. Data was adopted from various companies in Europe and elsewhere. One of the important results of this study is that the application of IOT has positive role in supply chain as well as in the effectiveness of tracking and automation, and that programs Artificial intelligence represented by predictive analysis leads to the elimination of failure in operations (Aziza Tazhiyeva,2018).

**Abdul Kadar Muhammad Masum, Faruk Bhuiyan & Md. Abul Kalam Azad 2013 Study**

This study looks for determine the extent of the impact of (RFID), one of the supply chain innovations, on the efficiency of the supply chain. The study showed the importance of RFID in product tracking and inventory control, which leads to reducing inventory costs and the possibility of identifying discrepancies between the purchase order and incoming goods with great ease and reducing errors in the

product (Abdul Kadar Muhammad Masum, Faruk Bhuiyan & Md. Abul Kalam Azad (2013)

### 1.2.1 Comment on previous studies

Our study focuses on innovations in the supply chain and their importance in reducing costs, improving competitive advantage. We have found that previous studies have proven the influence of some supply chain innovations, such as Internet of Things and Block chain. Studies have shown how relying on these innovations has a positive impact on business. In our study, we will highlight a company in Turkey to study innovations in the supply chain, compare the results with previous studies, and find out the most benefits that can be obtained from applying innovations in the supply chain and their potential to move trade to a very high level.

## 1.3 The Importance of Studying

Supply chain innovations have revolutionized businesses across the world, and the use of technology and innovations has become inevitable. Here the importance of this study stems from knowing how innovations in supply chain have led to reduced costs, the ability to track the product, quickly address defects, and competitive advantage. Here we will highlight a company in Turkey to see how much it has changed after using innovations in the supply chain to be an example of how important innovations are for supply chain management.

## 1.4 Objectives of This Study

- Know and understand the concept of supply chain management
- Knowledge and understanding supply chains innovations
- The study aims to achieve a set of objectives that are summarized as follows:
- Finding links between supply chain innovations & trade transfer
- The extent of the impact of applying innovations in the company under study
- Knowing how to reduce costs through innovation
- How can innovations be exploited to gain a good competitive advantage

### 1.5 Study Problem

Many factories and companies do not have sufficient knowledge of the developments which can be used for supply chain management, and some companies still rely on traditional methods of tracking the product, for example. This leads to great effort, time, and cost. In this study, we will focus on the importance of developments for a company in Turkey to see what benefits and complications accompany these innovations Thus, providing results, advice, and benefits that can be taken into consideration to work with innovations in a safe and inexpensive manner, and to avoid the harms that accompany working with these innovations.

### 1.6 Study Questions

By reviewing previous studies and the research problem, the following questions were formulated:

- What are innovations in supply chain and what are their benefits?
- Is there any connection between supply chain innovations and the success of companies?
- What innovations does the company under study use in its work?
- Do innovations reduce cost?
- Do innovations led to get competitive advantage?
- Do most successful companies depend on innovations in supply chains?

### 1.7 Purpose of the Study

Innovations in the supply chain have revolutionized businesses around the world. Business has become dependent on consumer intelligence. Smaller supply chain cycles have become necessary for companies to survive. The use of technology has become like water and air inevitable. The research aims are to know innovations in supply chain, necessaries supply to advance production, reduce cost and effort, and know the value of each innovation in supply chain, the extent of its importance, and the possibility of working with it in companies and factories to become more

competitive and more profitable, with a great focus on a cosmetics company in Turkey.

### 1.8 Study Hypotheses

The impact of supply chain innovations on competitive advantage & reducing cost. We aim to reveal this impact. Thus, the hypothesis of this study is derived as below:

**H1**. A statistically significant positive effect is expected between marketing oriented innovation activities and cost reductions

**H2**. A statistically significant positive effect is expected between logistics oriented innovation activities and cost reductions

**H3**. A statistically significant positive effect is expected between Technological oriented innovation activities and cost reductions

**H4**. A statistically significant positive effect is expected between marketing oriented innovation activities and competitive advantage

**H5**. A statistically significant positive effect is expected between logistics oriented innovation activities and competitive advantage

**H6**. A statistically significant positive effect is expected between Technological oriented innovation activities and competitive advantage

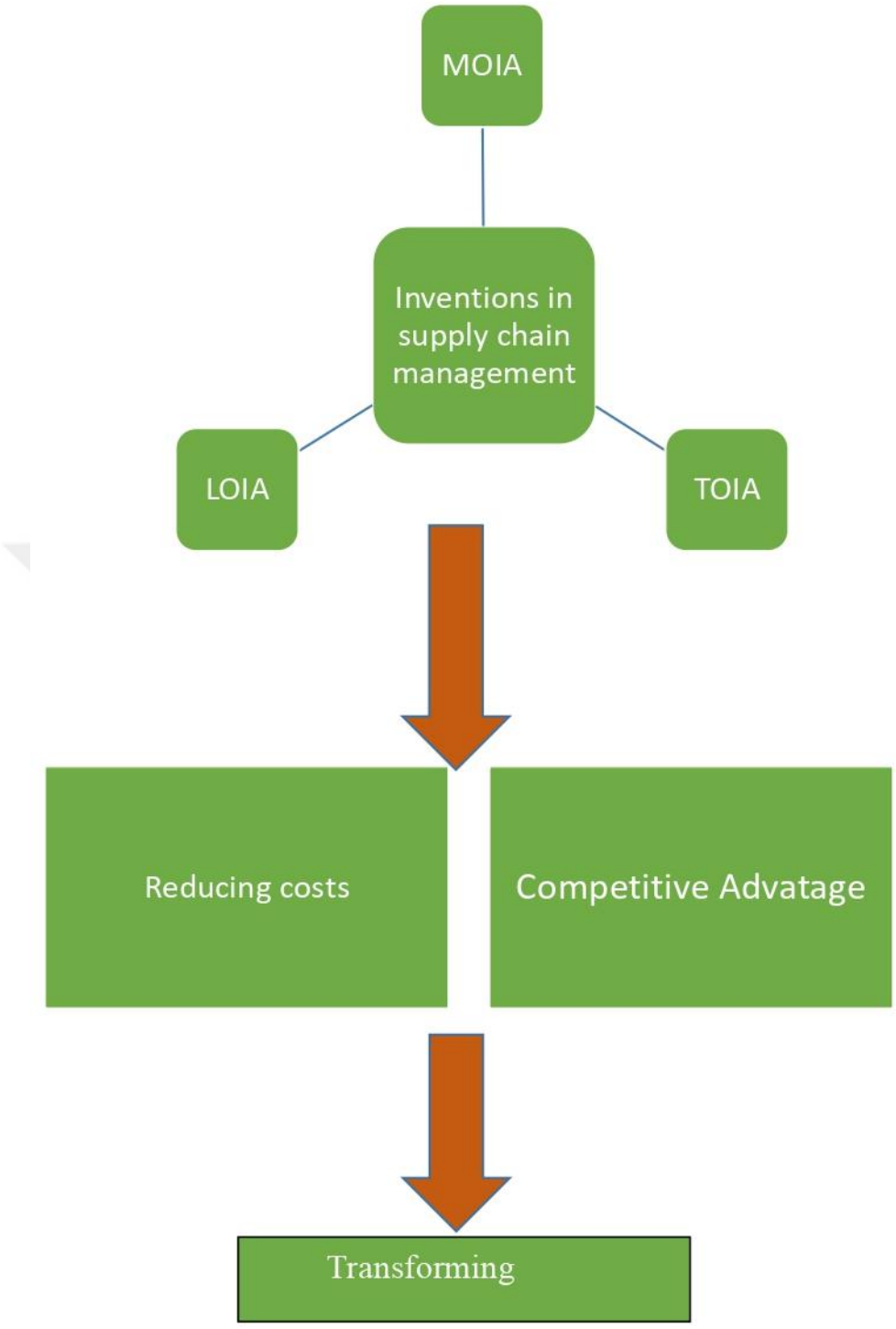


**Figure 1.1: Study Model**

# 2. SUPPLY CHAIN MANAGEMENT

## 2.1 What Is Supply Chain Management

In this day, we see that organizing operations and seeking to reach the customer's needs and satisfy him is an important process in gaining a competitive advantage and reducing waste of time and cost. This is done through cooperation between companies to organize their operations in a way that leads to ensuring that the product arrives at the right time to the final customer. This is what is called supply chain management. It is of great importance in business and cannot be dispensed with at the present time. Rather, we should strive to develop it and study the possibility of reducing the time and cost necessary to deliver the product in its final form to the customer.

### 2.1.1 The concept of SCM

Supply chain management has been defined as an integrated system of information, materials, and services flowing from suppliers, factories, and warehouses to the customer (Alex Muheesi, 2022, 3). Muheesi added another definition that it is a group of organizations, functions, and logistical processes that are linked together to provide a specific product to the customer (Alex Muheesi, 2022, 3) while Al-Shaarawi defined it as converting inputs into outputs through integrated processes to ensure product quality and delivery on time and at good prices using the necessary technology (Al-Shaarawi, 2021, 42). It was defined as increasing the effectiveness and strength of companies when they are interconnected with each other, which is what they seek. These companies are part of this partnership (Bowersox et. al., 2002) and are also defined as the operations that are virtual or real provided to the final customer by service providers (Waters, 2007; Waters, 2003). Stevenson defined it as providing the product to the final customer via A wide network of a mixture of establishments contributing to the production of this product (Stevenson, 2018,: 654-655) Lambert defines it as a network of independent organizations that begins with the supplier and ends with the customer (Lambert et

al, 2005: 76)  As for (Render, Heizer), it is defined as the activities that obtain materials and services and transform them into complete or intermediate products and distribute them through a distribution system (Heizer, Render, 2014: 468). Reid and Sanders point out that supply chain management is the process of sharing and coordinating information and financing among all members of the chain that consists of manufacturers, consumers, distributors, and suppliers (Reid and Sanders, 2002). It is also defined as "several methods that work to bring together suppliers, stores, and producers in a way that can be managed to obtain a product in specific quantities, times, and locations while ensuring cost reduction and customer satisfaction (Levi & Kaminsky, 2007). It is also a group of members that meet customer demand directly or indirectly and includes logistics, production, finance, delivery, and marketing (Chopra, S., & Meindl, P., 2007, p. 1).

At the end, we can define SCM as a comprehensive process of planning and coordination between all necessary units, implementation and control of the movement of services & products from raw materials to the last customer.

### 2.1.2 The importance of SCM in business

Organizations seek to achieve efficiency in their work through supply chain management, as effective management of the supply chain leads to delivering the product on time and reducing costs, thus achieving a competitive advantage.

Also, the supply chain is important in building relationships with a large number of suppliers and continuous communication with them, thus making important decisions through relationships with the best suppliers (Al-Arfaj, 2002: 156).

In addition, supply chain management identifies risks that may occur and develops solutions. possible to overcome it or mitigate its effects (Yiyi Fan and Mark Stevenson, 2018:205–230).

The supply chain achieves a competitive advantage for companies that build strong partnership relationships with each other within the chain (Ross, 1998, p. 103)

The researcher believes that the importance of the supply chain goes beyond borders to reach a major shift in business and flexibility in the procedures required for production and delivery. Accordingly, in our current era, supply chain

management has facilitated the way to reach the customer with the necessary speed and thus the companies' success.

### 2.1.3 Objectives of supply chain management

There are several goals that the supply chain seeks from us:

1- Providing the right product at a good price and on time, in an attempt in turn to reduce inventory (Hamid, 2019: 266)

2- Building harmonious relationships between business units of suppliers, producers, retailers, and others that are necessary for success supply chain (Jawad and Al-Shammout, 2008: 63)

3- Participation in efficiency: The company bears large costs resulting from inventory management, logistics services, transportation, etc., if it works without participation or connections, while if it works in harmony with other companies, this will lead to efficiency and effectiveness for all cooperating companies, as all operations will be easier for each company. Within the supply chain (Alex Muheesi, 2022:4)

4- Through the continuity of information, products and services between chains, a reliable category of suppliers can be obtained (Turgut, 2019:123).

5- Every company in the same chain must have its most important goal as improving quality, i.e. the best value for the product, which must be set as a final goal. This is done through cooperation between partners within the chain (Alex Muheesi, 2022:4)

6- Through successful integration into supply chains, the organization can reduce time and costs, increase efficiency for workers, and respond quickly to consumer requests (Sezen, 2008:233).

We can summarize the objectives that the supply chain aims to achieve a competitive advantage by providing right product at right time, reducing costs resulting from transportation and inventory, and providing a high-quality product through cooperation between partners that achieves the desired goals.

### 2.1.4 Elements or components of supply chain management

Supply chain is a group of elements. supply chain varies depending on the industry, but we will discuss the common elements in supply chains

1- Suppliers: Attracting consumers by producing or modifying products to suit consumer demands to compete with other suppliers (Theilmann and Hukauf, 2014). Suppliers must know the customers they deal with because this knowledge leads to knowing the quality that suits the customer. Supplier contribution has an important place in innovation as an external source (Henke and Zhang, 2010) ( Jajja et al, 2017).

2- Manufacturers: They are the members who bring materials from nature, process them, and turn them into finished or semi-finished products. Many companies seek to respond quickly to market requirements and convert materials into products in order to reduce time in supply chain (Görçün, 2013:33).

3- Distributors: It is the transfer of completed products to customers at the appropriate place, time, and lowest cost (Blanchard, 2010). This element is important in the supply chain as it is directly linked to customers and thus affects customer satisfaction and profitability. Distribution links the customer with the supplier (Cooper et.al, 1997).

4- Retailers: They receive products from distributors or wholesalers and deliver these products to consumers (Görçün, 2013). They are one of the members of the supply chain & logistics and warehousing have an effective role here (Vernie and Sparks, 2009).

5- Customers: All companies in supply chain are customers except for the beginning of the chain, where manufacturers are the ones who start production from raw materials, and all companies in supply chain are suppliers except the end of the chain, where the last consumers are, where each company imports from a previous company (Fernie et al., 2010). Customers are the most important thing in the chain because the chain begins based on customer expectations and a decision is made based on the customers (Mentzer et al., 2001).

6- Logistics service providers: It is one of the components in supply chain that seeks to serve other companies in exchange for a sum of money (Görçün, 2016 p.36). There are many supply chains that rely on a third party, such as a service

company, that provides a solution to companies' needs and affects the entire chain (Sheikh and Rana, 2014).

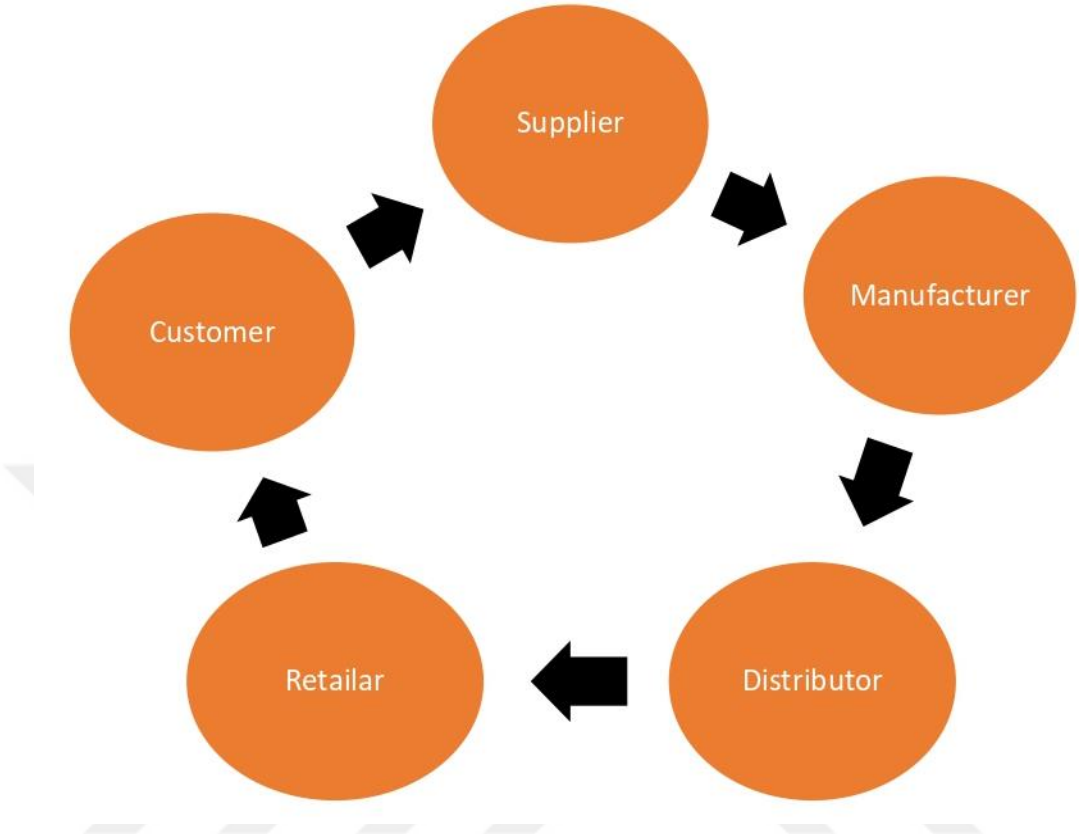


**Figure 2.1: Elements or Components of Supply Chain Management**

### 2.1.5 Dimensions of measuring supply chain performance

he goal of operations is to achieve distinguished performance that can be measured by looking at cost, quality, flexibility, and time, where excellence is achieved through delivery and production on time, quick response to the customer, and low cost. Researchers have agreed on these standards to measure performance (Slack et al, 1998:35).

- **Cost**: It represents everything related to the product, from the cost of materials needed for production, workers, and manufacturing to the costs of delivering the product to the customer

- **Time**: It is all the time that is consumed during responding to the request, manufacturing, and delivering the product

- **Quality**: It is the conformity of product specifications with the customer's request. Therefore, the customer is the one who determines the quality of the product

- **Flexibility**: is the ability to change or deal with business quickly and with high efficiency, which ensures response to urgent matters or business and thus enhances supply chain efficiency.

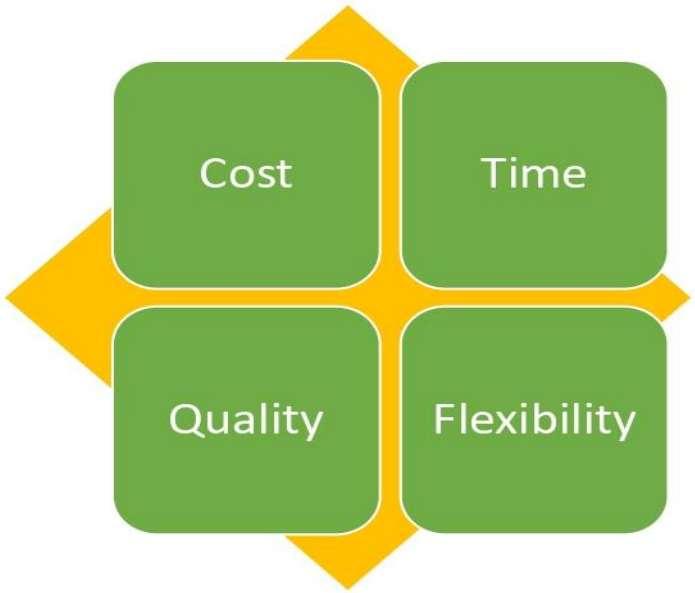


**Figure 2.2: Dimensions of Measuring Supply Chain Performance**

# 3. INNOVATIONS IN SUPPLY CHAIN MANAGEMENT (SCI)

## 3.1 What is innovation

Innovation is the introduction of any new work, such as developing or producing a commodity, new production or marketing methods, or organizing relations with external parties in a new way (Kenzi, Mel, eds, 2009:5). Or as defined by Peter Drucker, it is creating new and different tasks using knowledge (Aisha Sheta,2019: 14). In addition, it is new techniques or strategies which the organization adopts to achieve the provision of everything new (Demircioglu,2016:1). Schumpeter considered that innovation throughout history is the essence of economic change (Schumpeter, 1934). It has also been defined as "a collection of complex processes which lead to meeting customer requirements when implemented and using new techniques to reach better organizational processes" (Lee et al., 2011).

Innovation can be said to be the introduction of new technologies or ideas that lead to tangible results or great efficiency in a particular thing. Which means the optimal use of resources to reach a lower cost production.

**Innovations in supply chain**: Innovations in supply chain have brought about a major technological revolution that has led to improved production, reduced costs, and achieved customer satisfaction due to the speed of order execution and high accuracy, which has led to companies achieving a competitive advantage because the customer prefers companies that provide him with the products he wants and there is speed in delivery. The concept of innovations in supply chain was initially developed based on traditional innovation theory which states that innovation has a commercial, economic meaning (innovation is accomplished in the first commercial transaction involving a new product, process (Freeman and Dosi, 1988; Flint et al, 2005). Supply chain innovations extend to all stakeholders, including customers, suppliers, and others who have an interest in it, creating value for each of them (Gao et al., 2017, p. 27).

**The concept of supply chain innovations:**

It is the changes and improvements in technology, services and processes which lead to customer satisfaction (Roy et al., 2004; Seo et al., 2014)

It is a complex set of processes that meet the desires and requirements of customers using new technology and techniques in the implemented processes (Lee et al., 2011)

Lin (2008) pointed out that supply chain innovation is the set of tools that use to improve the company's operations by integrating seamlessly with customers, suppliers, distributors and manufacturers

Supply chain innovations were also defined by (Arlbjorn et al., 2011, p. 8) as a change that occurs in the supply chain, its operations, or the technology it contains, and the change is radical or gradual, leading to the creation of value for stakeholders.

It has also been defined as a mixture or combination of technological information development & technology that runs alongside logistics services and marketing operations, which aims to improve profits (Bello et.al.2004).

Wong and Ngai (2019) indicated that supply chain innovations are the innovative set of actions that include innovation activities directed towards both (marketing, technological development and logistics) and that have an intentional or unintentional impact on the supply chain, and this impact is positive.

The researcher defines it as all changes that occur, whether in operations, technology or logistics, which lead to the development or enhance of the company’s performance and return to consumer satisfaction.

### 3.2 The importance of innovations

The importance of innovations is highlighted in supporting competitive advantage, as innovation acts as a driving force towards economic development and strategic change through cooperation and generating new opportunities (Talegeta, 2014:85). The success and continuity of institutions depends on converting innovations into products and presenting them to the market, and thus innovation has become a source of competition between Institutions and the state developed in the economy (Abdul Wahab, 2012: 36). Through Schumpeter's concept, we see that the

relationship of the economy to innovation has made innovation of great importance, as companies achieve a short-term monopoly position upon the success of new innovations, and also that technological innovations lead to increased productivity, per capita income, and economic development (Najm, 2003: 223) Thus, innovations are primarily directed towards the goal of improving supply chain performance (Shah, 2009).

### 3.3 Types of Innovations

One of the most widely used and common types of innovations are:

1- Product innovation: It is a set of technologies that are used to meet the markets & customers needs (Montero, et al., 2017:7) As for marketing, there are those who said that it is a process that includes research and development and all commercial activities related to marketing, technical design, and management (Bozian, 2018: 430) While it is defined as introducing changes to existing products or introducing new products that meet customer desires (Mohieddin, 2011: 4).

2- Market innovation: This innovation is related to marketing, where different methods and approaches can be applied, such as changing the product packaging or changing display methods, to attract the customer by reaching his desires with these methods.

(Boachie-Mensaha, 2015:80) While (Vargas, et al., 2017:223) sees that marketing innovation focuses on increasing sales by opening a new market or a new product to meet customer’s needs, where the customer’s desires are the goal.

3- Process innovation: using new elements in the organizational processes necessary to produce products, such as equipment, specifications, and inputs (Kogabeyev & Maziliauskas, 2017:64). (SeferSener, et al., 2011:816) pointed out that process innovation relates to new methods of production and implementation using technologies, programs, and equipment after major changes have been made to them.

4- Administrative innovation: It is new administrative procedures that seek to enhance performance, motivate employees, and change the administrative structure (Zhang, 2019:3), while (Kim, et al., 2012:296) emphasized that administrative innovation is the process of applying new ideas effectively. Which works to

improved organizational processes. (Al-Shaar, 2014: 227) sees it as a set of behaviors and processes that improve the administrative and organizational structure by applying innovations in solving problems, making decisions, and motivating employees.

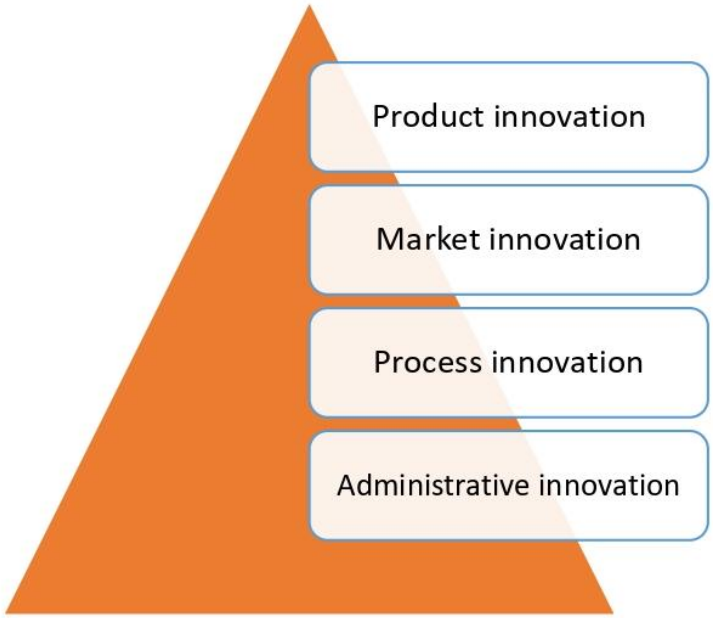


**Figure 3.1: Types of Innovations**

### 3.4 Classification of Supply Chain Innovations into Several Activities

(Bello et al., 2004) (Wong and Ngai, 2019):

**Marketing-oriented activities:** creating services that are related to marketing and meet customer demands (Desbarats, 1999; Chen and Paulraj, 2004)

These activities include both:

- Customer orientation: It is the ability to understand customers sufficiently to provide what is useful and distinctive at all times (Wang et al., 2016)

Also, understanding customer expectations and developing the necessary processes to satisfy customers is done through this approach, i.e. customer orientation (Allred et al., 2011).

- Acquiring marketing knowledge: This knowledge comes from the external market from competitors and customers and it is important to absorb it (Jean et al., 2012). Acquiring this knowledge and integrating it with previous knowledge leads to product development in several fields (Jayaram and Pathak, 2013).

- Product innovation: It is the ability that a company has to enhance new products & services that lead to meeting customer expectations (Damanpour & Gopalakrishnan, 2001). Products innovation is a positive contribution that improves manufacturing flexibility Zhang et al. (2002)

**Innovation activities directed towards technological development:** It is the second activity that is classified as innovation activities in the supply chain

It has been defined as creating new technical skills which lead to the advancement of new services & products for customers (Lee et al., 2011).

By applying innovations and using technologies and information systems, the cooperating parties will benefit (Storer et al. 2014)

This activity includes:

- Information management: the ability to provide timely information that is relevant to the company's work and that is accessed through big data analysis, evaluation and exploration of information (Kache and Seuring, 2017).

Through information technology, companies have access to a huge amount of internal & external information Prajogo et al. (2018)

- Innovation orientation: A company's openness to new things through its love of change and the use of new technologies, skills, and resources (Chen et al., 2011).

(Golgeci & Ponomarov., 2013) found that the adoption of innovation and its outcomes should be taken into consideration when approaching innovation.

- Flexibility of IT infrastructure: It is the combination of existing resources in the company to work on rapid development and provide the use of information technology in the future (Cheng et al., 2014).

**Logistics-oriented innovation activities**: It is the third innovation activity that relies on intensive and coordinated information exchange between supply chain partners to ensure the necessary quantity of goods and the right time & place (Chen and Paulraj, 2004).

This activity includes the following:

- Logistics flexibility: is the ability to respond quickly to customers in terms of service, support and delivery (Zhang et al., 2002).

It includes management between the company and its partners in terms of the flow of materials and information in supply chain (Yu et al., 2017)

Jin et al. (2014) indicated that logistics flexibility plays a major role in competitive performance and enhances innovation in interactions between suppliers.

- Logistics innovation: Explaining the mechanisms through new designed interventions to achieve specific goals, where logistics services are relied upon in this innovation and provide economic value by spreading it to other parties outside the creators (Tanskanen et al., 2015)

As technologies become understood and routine, logistics innovations improve dramatically, as noted by Claycomb et al. (2005).

It has been suggested that there is a connection between logistics innovation and overall company performance and this relationship was classified as positive Flint et al. (2008)

- Logistics Social Responsibility: It is a management that embraces the social responsibility of supply chain from a cross-functional perspective (Ciliberti et al. 2008)

It has been previously noted that to significantly develop sustainable logistics services, logistics service providers must use their expertise in logistics CSR practices Gruchmann and Seuring (2018)

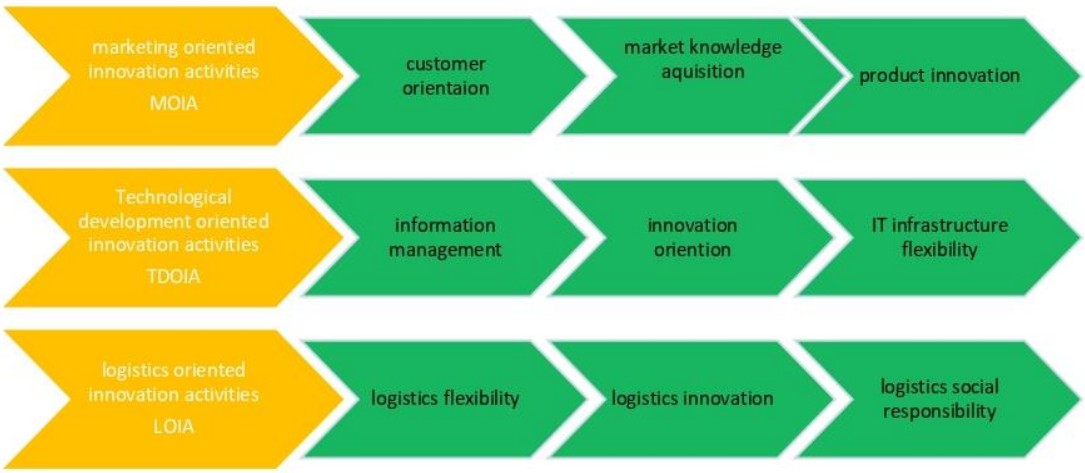


**Figure 3.2: Classification of Supply Chain Innovations**

### 3.5 Supply Chain of Technological Innovations

The development that occurred in technology led companies to use these technological innovations in their operations so us to remain competitive in the global market (Wadho and Chaudhry, 2018), as the adoption of technologies leads to an increase in the production capabilities of companies (Al-Sa'di et al., 2017) Therefore, companies seek to increase their dynamic capacity by investing in new technologies (Akhtar et al., 2018; Tan et al., 2017).

#### 3.5.1 Artificial intelligence

The first person to develop artificial intelligence was John McCarthy in 1956 at an academic conference on this subject, and he defined it as creating intelligent programs for computers (Bringsjord, S., Govindarajulu, N.S., & Sundar, N., 2020). It is also known as "a machine or device." The source of control is the computer, as this device or machine is capable of understanding and completing work (Özen, Z., Kartal, E., & Gülseçen, S., 2017, p. 523). It is also known as the electronic mind, as it creates algorithms that make the machine It simulates the human mind by making decisions and developing alternatives (Ahmed, 2023). It is also known as "analyzing external data using a specific system and obtaining new rules and the possibility of using these rules to achieve certain goals" (Mohamed, 2001). Or it is one of the branches of computer science which works to solve Symbols to solve problems (Farghaly, 1993:13)

One of the things that cannot be neglected these days is artificial intelligence, such as robots, smart cameras, and many devices that help save time and improve accuracy in work, which leads to great progress in business and company performance.

##### 3.5.1.1 Characteristics of artificial intelligence

There are many characteristics that (AI) has (Russel & Norving, 2010:28-29).

The ability to adapt and learn, as artificial intelligence systems are designed to develop themselves over time in order to adapt to changing circumstances and learn from data to become more accurate.

Computer vision: It has the ability to analyze visual data to extract meaningful information, such as in facial recognition

The ability to make decisions: Artificial intelligence systems analyze data and make decisions based on the information

Natural language processing: Processing and understanding human language through these systems, which leads to natural interaction with people

### 3.5.2 Internet of things (IOT)

The phrase “Internet of Things” was first mentioned in 1999 by British businessman Ashton (Gubbi et al., 2013). It is possible to connect any device anywhere and at any time via the Internet of Things (Vermesan et al. (2011). IOT connects detection devices with devices and things, creating a networked system composed of smart devices (Bandyopadhyay et al., 2013). IOT forms a network that collects data through sensors, processes, analyzes and transmits it. M. Thibaud, H. Chi, W. Zhou, and S. (2018: 79–95).

#### 3.5.2.1 Internet of things (IOT) components

Sensors: They are an important element in the Internet of Things. They can be simple or complex, as they aggregation data from devices that have a protocol (IP), and these sensors can be placed in many environments (S. Khan, A.P. Shah, S.S. Chouhan, 2020)

Communication: Using Wifi, Lan, Bluetooth, and others, sensors and devices are connected to the cloud, and the protocols are used by IOT devices to communicate with each other (B.D. Deebak, F. Al-Turjman, M. Aloqaily, O. Alfandi, 2020).

Data processing: After collecting the data & storing it in the cloud, its analyzed to be useful, as the data will be large and collected via the Internet of Things, so it will be classified using artificial intelligence techniques, for example, and the raw data will be identified and transformed into data that can be used (B. Shang, S. Liu, S. Lu, Y. Yi, W. Shi, L. Liu.,2020).

User interface: Users are alerted through the data collected, as it is possible to alert them to the temperature in cold storage, and after the alert, the user sends

information to control and regulate the temperature. In addition, in some matters, it is possible to dispense with waiting for information to be entered by the user, so instead, automation is possible For these procedures (Al-Turjman, J.P. Lemayian, 2020)

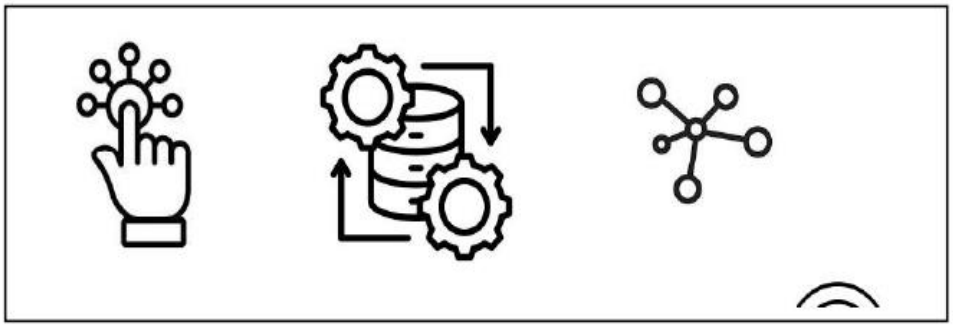

**Figure 3.3: Components of IOT**

### 3.5.2.2 Characteristics of internet of things (IOT) technology

Intelligence: In an intelligent way, IoT devices interact with specific situations so that the devices interact with each other or between the devices and the user ((K Patel & M Patel, 2016: 6123)

Wide-scale: The collected data is exchanged across a wide network. This network consists of many devices connected to each other, and this exchange of information leads to solving many problems (Attiya et al., 2013:9).

Unique identity: Each Internet of Things device has a different identity from the identity of the other device, and this is done by the device makers, and the user has the ability to control the device and monitor its status (Xu et al., 2014:2235).

Sensing: It is the superior element in the IOT, through which the environment is perceived and information is collected by recording it or after interacting with the environment. It is known as analog inputs, which are the signals that are transmitted from one device to another containing images, information, etc. (Wahiba, 2018: 67), and the device can manage itself. By adjusting the device for itself and setting it itself, such as adjusting the time on the phone when traveling from one country to another, according to the country's time (Vasilomanolakis et al., 2015:3).

#### 3.5.2.3 Benefits of using IOT technology

There are many benefits that the Internet of Things seeks in many fields, but I will limit myself to mentioning some of them:

- Good warehouse management at retail, the ability to track customers, provide them with smart services, and determine the location of the item (Yu and Wang, 2016)

- In the field of manufacturing, IOT has a role in monitoring operations and communications between operations, distribution, and personal purchases (Roblek et al., 2016)

- The ability to avoid accidents, secure homes, and know the danger (Khan et al., 2012)

- Booking airline tickets and checking bags easily, as IOT has a major role in improving airline services and facilitating procedures (Alghadeir and Al-Sakran, 2016)

We can summarize the benefits as seeking to reduce time, protect and secure, and obtain the largest amount of data by relying on automation.

#### 3.5.2.4 Internet of things techniques

There are techniques for disseminating goods and services in IOT, which are:

- Radio frequency identification: The use of radio waves, readers, and tags allows for identification and data collection (Lee and K. Lee, 2015:431-440).

- Cloud: It is essential in big data as the cloud expresses the use of web-based memory and programming (AG., 2017)

- Internet of Things application devices: Two types can be mentioned: D. Kotha and V. M. Gupta (2018: 891-896).

a- Wearable devices: Mostly for individual use, such as wristwatches when designed to track physical fitness and receive calls

b- Integrated system boards: The ability to choose any application program by the user to program and run any application

- Wireless sensor network: It is a network made up of many small, low-cost sensor nodes that create specialized networks when they work together.

### 3.5.3 Block chains

It is a wide-scale technology that stores digital data in a decentralized manner, which is a secure method (Buterin, 2017). It was known by Holotescu as a network that stores various confidential transactions securely (Holotescu, 2018), or it is a system consisting of an interconnected group of components that work to preserve and verify of information and transactions (Chouli et al., 2017).

The connection of any individual in block chains is called a node, and the verification of the validity of transactions and the formation of blocks by assembling them is done through these nodes (Vukolic, 2015). It is also known as a digital ledger that records and encrypts transactions in the form of blocks (Pradhan, 2018). It is also known as "a technology that records various data by forming partnerships from different regions and for more than one market" (O'Sullivan, 2018).

#### 3.5.3.1 Elements of block chain technology

The elements of blockchains consist of the following (Puthal et ai., 2018:2), (Janusz et al., 2017:243)

- Block: It contains data for several transactions, and the block is the storage center, and previous blocks are linked to the current block

- Database: This database features security, immutable storage, and decentralized control, and represents a ledger of all transactions for all users within the blockchain network.

- Transactions: It is the unit that is stored in public records and after being verified by users in the chain, it is stored in the blockchain

- Hash function: Its goal is to achieve security and identification. It is the tool through which data is searched in the database, and there is no identical hash for two different messages.

Central Processing Unit: It is known as the miner and works to discover a new block by solving computationally intensive problems

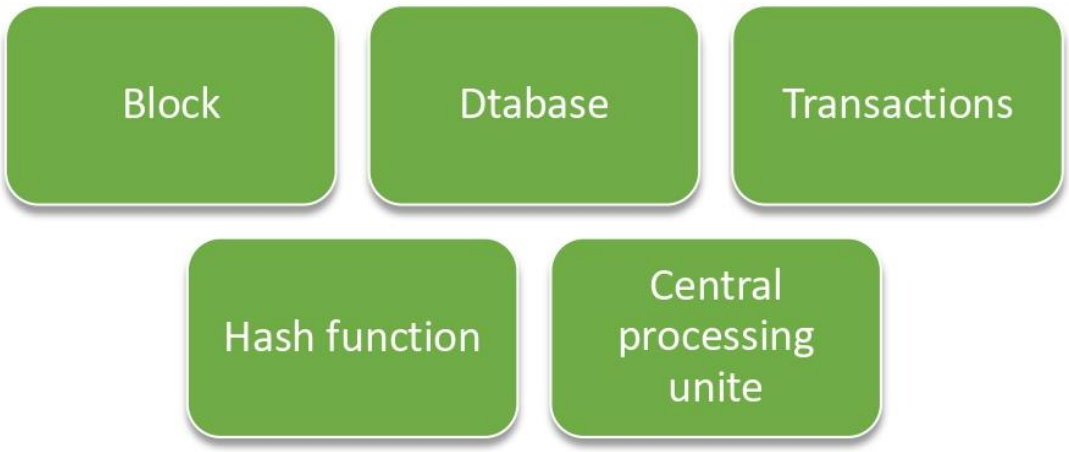


**Figure 3.4: Elements of Block Chain Technology**

### 3.5.3.2 Characteristics of block chains

Block chains contain many characteristics, the most important of which is:

- Not subject to modification and change: The transactions recorded in the ledger cannot be deleted or changed because the block chain technology is encrypted, so nothing can be tampered with or changed, and when wrong transactions are entered, they are rejected (Singh et al., 2018).

- Decentralized: Block chain technology does not require a central authority as it does not work with a third party. All participants in the block chain verify that data that users desire is added (Lin and Liao, 2017).

- Transparency: Block chains are reliable and reliable, as users can see all the details related to transactions, data, and the latest updates in the network (Lin and Liao, 2017).

- Hidden identity: The user's true identity is not revealed, as the user appears under a pseudonym and nickname in front of everyone, as he has a personal and public key that is his real identity, and the second is a code linked to the personal key that makes others see him under the pseudonym (Zheng et al., 2017).

- Real time: The transactions carried out by the user are recorded in real time, that is, the time at which the same transactions are completed in the distributed ledger, for example, "invoices, payment transactions, etc., where they are automatically" recorded at the same time (Bansal et al., 2018).

#### 3.5.3.3 Types of block chains

(Ahmed, 2018: 8-9) and (Al-Shater, 2019: 131-132)

- Public Blockchains: Entering and exiting this distributed database does not require approval. Anyone can enter, verify, update and view information.

- Private block chains: These chains are similar to public chains in principles and mechanisms, but they differ in that they do not allow entry and exit for people in general, but rather entry occurs with the permission of specific people who can add data and verify transactions.

- Dual chain: That is, it combines public and private chains, and to achieve credibility with users, it offers technological solutions that differ from private blocks, as they are characterized by speed, low cost, control, and privacy.

#### 3.5.3.4 How block chains work

Centers & Fanning explained the steps for making block chains as follows

- Transaction definition: The sender begins by preparing the transaction containing the data, transaction value, receiver's public key, and sender's encrypted digital signature.

- Authenticating the transaction: The second step is to verify the validity of the message received by the nodes in the network by decoding the code related to the digital signature and temporarily freezing the message until it is used in the block.

- Block: A new block is formed or transactions are added to an existing block and updated by one of the nodes in the network using the frozen transactions and then published after a period of time to the nodes in the network to verify their validity.

- Block validation: The nodes managed by the people (miners) responsible for verifying the block's validity in the network receive the transactions in the new block or added to old blocks to ensure their validity. Approval is requested from the rest of the nodes in the network, and approval rate must not be less than the number of users. In the network about 51%

- Block Chaining: An modernization version of the block is propagated to the rest of the chain by linking new blocks to existing ones

#### 3.5.3.5 The impact of using block chains in supply chain

Improving tracking ability within the supply chain: Block chains are important in supply chain in terms of the possibility of using block chains for tracking in supply chains (Francisco & Swanson, 2017), as block chains collect data for each element in the network and at a specific time that proves ownership of this information to its elements. In the supply chain, therefore, this data will be secure, and through this data stored in the block chains, the history of the product will be known and the possibility of tracking it quickly in the event of any risk to the product. Therefore, this will give confidence to customers and stakeholders in the quality of the product (Zhang, 2019).

Improving transparency: Block chains show the parties who is performing the actions, the place and time at which these actions take place, and the location of the information that is stored and shared in distributed ledgers so that stakeholders can access them easily. This improves transparency, supports the decisions of the people involved, and improves predictions (Zhang, 2019)

Enhancing efficiency: The use of block chains in supply chain reduces human errors & eliminates the need for intermediaries by using digital means instead of paper means, and the validity of the data is verified by all parties, as the ledger provides data to each party, thus maintaining data quality (Zhang,2019).

Security: Block chains are not susceptible to hacking because the blocks are linked to each other, meaning that when you try to hack a block, it cannot be linked to all previous blocks, so it is safer to keep transactions (Zhang, 2019).

Enhancing confidence: By collecting data and timings on product-related procedures in the supply chain and sharing them among the concerned parties in real time, this leads to enhancing confidence among stakeholders in the supply chain (Zhang, 2019).

### 3.5.4 Green supply chain management

The concept of Green supply chain management

It is the practices practiced by the organization internally and externally that lead to making the supply chain more sustainable in terms of environment, economy and society (Hong et al., 2018).

The goal of GSCM is to rise profits & reduce waste and carbon emissions (Esmaeilian, B., Sarkis, J., Lowes, K., Behdad, 2020) and includes all supply chain operations from purchasing, manufacturing, distribution and storage (Rahman, T., Ali, S.M.A.,&Kusi-Sarbong,s,2020) Green supply chains use information technology to improve operating areas and quality of activities (Liu, S., Eweje, G.,He,Q.,& Lin, Z, 2020)

Dimensions of Green Supply Chain Management:

1- Green information technology: The organization uses devices and information technology equipment according to the policies for green use (Mohammed, 2017).

2- Green manufacturing and packaging: Green manufacturing refers to the exploitation of materials, reducing energy consumption & decrease waste resulting from manufacturing process (Lui & Xue, 2012).

As for packaging, it refers to packaging products with environmentally friendly materials that are biodegradable or recyclable, or at least have less harm to the environment (Rehman et al., 2016).

3- Green storage: These are activities related to storage that work to reduce negative effects of surrounding environment through the good use of raw materials and final products and using less energy (Gyu, 2016).

4- Green purchasing: These are practices that work to renew purchased materials and reduce waste, and that the purchased materials are environmentally friendly and have little harm to the environment in terms of components and are recyclable and reusable multiple times (Foo et al., 2019).

5- Marketing Green: It is anticipating the needs of society and the customer and satisfying them by preserving the environment and the resources of society, which leads to preserving the future of future generations (Nathan & Mathi, 2013)

**Benefits of green supply chains**

Green supply chains include many benefits, as will be mentioned below (Rifai, 2016).

Reducing the incidence of diseases leads to improved productivity

Reducing waste and the fine you incur as a result of waste disposal leads to efficiency

Relying on clean technology through innovation and waste reduction leads to competitive advantage

Controlling product quality by maintaining relationships between buyers leads to improving quality

A reputation for environmental performance improves the public image as consumers, workers, and investors respond to companies with a good environmental reputation

### 3.5.5 Augmented reality

It is the combination of the virtual environment with the real environment in real time (Azuma, 2001:356) Augmented reality technology plays an important role in marketing, as its use in marketing leads to enhancing customer participation and awareness of the brand (Carmigniani et al., 2011) and thanks to developments in devices Programs have begun to use (AR) in many fields, including education, industry, and engineering (İçten and Bal, 2017).

#### 3.5.5.1 The impact of AR on logistics operations

**(Linda, 2019:5-6)**

- Warehouse operations: It is possible to read codes, collect information, know things, and move around using computers and wearable cameras. In real time, inventory can be updated and the worker can be directed to the location of the item and verify its arrival, as augmented reality works to ensure that everything is appropriate and in its place.
- Improving transportation: By wearing 3D depth sensors, workers can detect damage to goods, determine the correct routes, and decorate the goods faster.
- Reducing delivery time and damage to the goods, as using augmented reality, the driver can receive information about each package, the space that is suitable for it, and the location of delivery, which makes it easier to find the package and deliver it quickly.

- Assembly and repair: This service seeks to train employees in warehouses to ensure quality standards and assemble products, thus reducing the cost to customers and reducing repair time.

### 3.6 Competitive advantage

#### 3.6.1 The concept of competitive advantage

Competitive advantage is defined as the characteristics that distinguish one organization from other organizations that compete with it, making it a leader in a specific field GoldSmith, 2013:

Or as (Wang, 2014) indicated, it is the improved performance of the company that leads to its distinction from other companies by taking certain measures that lead to its competition with other companies

#### 3.6.2 Dimensions of competitive advantage

- Cost: Companies that seek a low cost for their products compared to their competitors' products will lead to them obtaining a larger market share, and this is for companies that compete based on cost, but also other companies that rely on other dimensions of competition also seek low cost (Slack, et.al, 2004: 44)
- Quality: The success of organizations depends on meeting customer needs by providing a product with characteristics that are from customer expectations, and thus this dimension leads to the company's survival in the competitive market (Krajewsky & Rizman, 2005, 62) (Assaf, 2015: 31)

Flexibility: It is one of the most substantial dimensions of competitive advantage. Where the volatility in demand and the flexibility of response to it is main factor so us to the success of institutions, and as indicated by (Krajewsky & Rizman, 2005, 49) (Assaf, 2015: 31-32) that flexibility is in size, product, mix and delivery, where in size flexibility is through offering different sizes of products, i.e. the change in the level of output relying on the ability of operations in that, as for product flexibility, it is the possibility of offering new products and means mix flexibility, i.e. offering a mix of products, and in the end we can define delivery flexibility as the ability to deliver at different times Delivery: Achieving competitive advantage and

increasing profits through fast delivery, as fast delivery affects the purchasing decision (Xiand, et.al, 2012: 288). The time required for the commodity to be delivered is the delivery time (Hill & Jones, 2001: 132) (Abdul Qader & Muhammad, 2020: 627)

### 3.6.3 The importance of competitive advantage

The importance of competitive advantage was indicated by (Saleh, 2017: 158) as follows:

- The company has a leading position among competing companies through its competitive advantage
- Confronting potential and current competitors, as competitive advantage is the most powerful weapon that an organization can use
- The success of organizations depends on competitive advantage as an important criterion
- The study of strategic management depends on competitive advantage as a fundamental pillar
- The competitive advantage of organizations is the focus of their work

## 3.7 Business operations

Are activities that lead to outputs of value to the customer (Cooper MC, Lambert DM, Pagh JD, 1997)

It is a set of calculated and organized activities designed to mould a specific output for the customer (TH (1993) Process innovation,p:5)

### 3.7.1 The relationship between business processes and innovations in supply chains

Innovations in supply chains lead to improved performance and lower costs (Franks, 2000) Thus, innovations lead to maintaining the company's rank in the market by offering the latest products (Lee et al. 2011). When companies practice one or some innovations in technology, it will affect the company's value network (Teece, 2010). When we take an example like Dell, we will see that in the 1990s, this company caused an industrial revolution as it relied on the Internet, enabling the

customer to order the product directly from the company instead of using external distribution channels (Thomke et al., 1998). Ordering and receiving with the click of a button is a new business model that relies on the Internet for ordering and receiving between the customer and the supplier (Beck and Rygl, 2015). The adoption of technologies, innovations and the entry of technology have led to major changes in supply chains, as mentioned above, as blockchain technology supports transparency and security, & IOT technology is important as it is possible to know the location and condition of the product, thus reducing losses and providing the optimal product (Koçoğlu et al., 2011). Each technology has its role, as mentioned, which leads to the advancement of trade and its optimal growth.

# 4. BACKGROUND AND METHODOLOGY OF THE STUDY AND HYPOTHESIS TESTING

There chapter deals with the techniques used in the research to verify the relationship between innovations in the supply chain and their impact on trade transfer by knowing the extent to which innovations affect competitive advantage and reduce cost. The research sample will be Leader Cosmetics Company. We will also see the importance and objectives of the study, hypotheses & methods of collecting and analyzing data to reach an intensive investigation.

## 4.1 Background of the study

Previous studies and research have a great impact on scientific research

The opinion of the company's employees who are knowledgeable about innovations in the supply chain, their importance in the work, and their impact on cost and competitive advantage in general was taken.

### 4.1.1 Limitations of the study

The employees were cooperative with the research subject and the researcher obtained the answers despite the length of the questionnaire, as the company's employees sought to answer the questions despite the heavy workload on them. Some matters were discussed through interviews with some people to find out the extent to which this company seeks innovation and what capabilities it currently possesses, and the necessary data was collected at the appropriate time.

## 4.2 The Methodology

It refers to the study methodology that included the impact of innovations on reducing costs and increasing competitive advantage, thus reaching development in business and its transformation through studying this topic for a Turkish cosmetics company (lider). The size of the study sample and the plan used depend on the company’s data.

### 4.2.1 Study design

Quantitative methodology was adopted in this research because it is the method that is effective for determining the impact of innovations in supply chain in terms of activities on competitive advantage as well as cost and proving it through statistical analysis, which makes the quantitative methodology stronger.

### 4.2.2 Study community and sample

The study focused on a Turkish cosmetics company, Leader Cosmetics, and the study sample was selected from this company because it is a company that provides products to consumers and benefits from research and development to innovate high-quality products and works to keep pace with developments in advanced technologies in order to produce high-quality products that meet market needs and strive for environmental sustainability as it produces products that are safe for the environment and for human use. The company has a wide distribution network around the world. Data was taken from this company because it has modern technologies after we learned that through interviews. Lider Cosmetics Turkey embarked on its journey in 1978, beginning in the aerosol industry. Initially, the company concentrated on producing high-quality aerosol products for the local market. As Lider Cosmetics built a reputation for quality, it expanded its product line to include a variety of personal and home care items. This growth was part of a strategic vision to diversify and meet the increasing demands of consumers both domestically and globally.

In the late 1990s and early 2000s, Lider Cosmetics made significant investments in research and development (R&D) and upgraded its production facilities. These efforts were aimed at enhancing product quality and ensuring adherence to international standards. By continuously advancing its technology and production processes, Lider Cosmetics introduced innovative products that set new standards in the fast-moving consumer goods (FMCG) sector.An important employee in sales and marketing in the company was interviewed before the questionnaire was prepared for all employees with experience or knowledge. We asked him about the company's innovations and the answer was optical camera, infrared scanners, gram control, IOT, RFID.Therefore, through these innovations, important results can be reached after testing the hypotheses and the possibility of reaching the study

objectives. The questionnaire was distributed to the firm's employees and (273) responses were obtained.

### 4.2.3 Data collection, survey and measurement method

**Data collection:**

The researcher used several methods and techniques to access information and collect data to reach the results. As for the theoretical aspect, by reviewing many books, scientific theses and research, information was collected from its scientific sources, as well as reviewing some websites via the Internet. The researcher used the questionnaire to collect information only and did not allow it to be used for anything else, as it was tested on individuals in one of the companies in Turkey/Istanbul.

## 4.3 Data analysis

In order to verify the hypotheses and their validity, a test or statistical analysis is used, and based on the Cronbach's alpha coefficient, reliability is examined, and through the Bartlett test of sphericity to determine the connection between the variables, and through simple regression analysis, the extent of the model's suitability is evaluated, and the results appear through the SPSS program in the form of tables.

### 4.3.1 Demographic information (Frequency tables)

In terms of gender, the distribution of contributors to filling out the survey forms is very balanced, with numbering of female a little higher (7; 2.6%) than numbering of male.

**Table 4.1: Frequency Gender**

| Gender: | | | | | |
|---|---|---|---|---|---|
| | | **Frequency** | **Percent** | **Valid Percent** | **Cumulative Percent** |
| Valid | Male | **133** | 48,7 | 48,7 | 48,7 |
| | Female | **140** | 51,3 | 51,3 | 100,0 |
| | Total | 273 | 100,0 | 100,0 | |

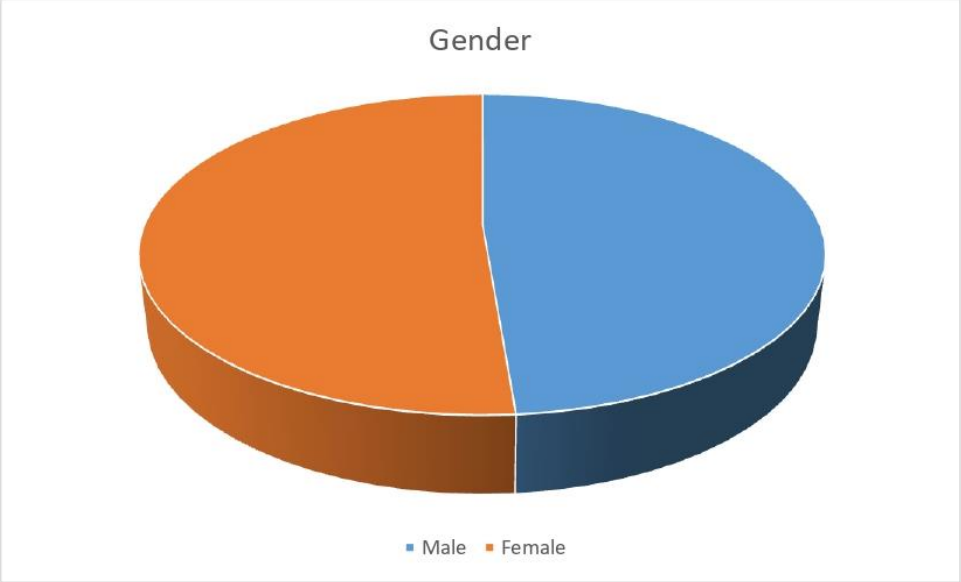


**Figure 4.1: Frequency Gender**

So us to classify the data in a statistically significant way, the categories 36-45, 46-55, and over 55, which had few participants, were combined to over 35, and the number of categories was decreased to three. In spite of five age categories were specified in the questionnaire questions, the allocation of categories became more balanced. As a result, while the highest participation was in the 26-35 age group (116; 42.5%), the lowest participation was in the age category less than 26 (77; 28.2%).

**Table 4.2: Frequency Age**

| Age: | | | | | |
|---|---|---|---|---|---|
| | | **Frequency** | **Percent** | **Valid Percent** | **Cumulative Percent** |
| Valid | Less than 26 | **77** | 28,2 | 28,2 | 28,2 |
| | 26-35 | **116** | 42,5 | 42,5 | 70,7 |
| | More than 35 | 80 | 29,3 | 29,3 | 100,0 |
| | Total | 273 | 100,0 | 100,0 | |

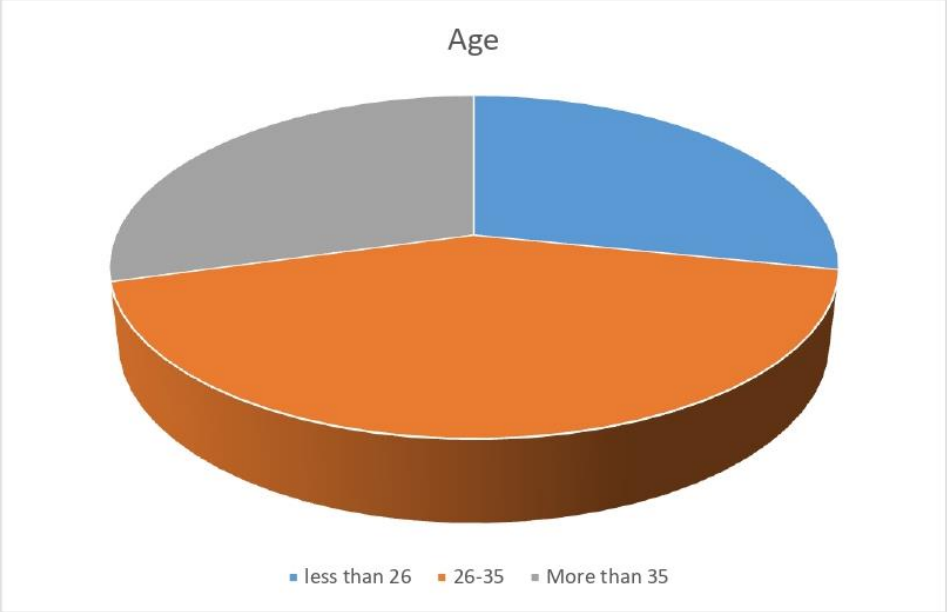


**Figure 4.2: Frequency Age**

**Education:**

Although there are five diploma categories in the questionnaire; as in the age range category; In order for the categories to be statistically significant and comparable, BSC and diploma categories were combined as university degree category, master's and doctorate categories were combined as postgraduate degree category, and as a result, the number of categories was decreased to three. In this context, the highest participation was in the university degree category (124; 45.4%); the lowest participation was observed in the postgraduate degree category (73; 26.7%).

**Table 4.3: Frequency Education**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | High School Degree | 76 | 27,8 | 27,8 | 27,8 |
| | University Degree | **124** | 45,4 | 45,4 | 73,3 |
| | Post Graduate Degree | **73** | 26,7 | 26,7 | 100,0 |
| | Total | 273 | 100,0 | 100,0 | |

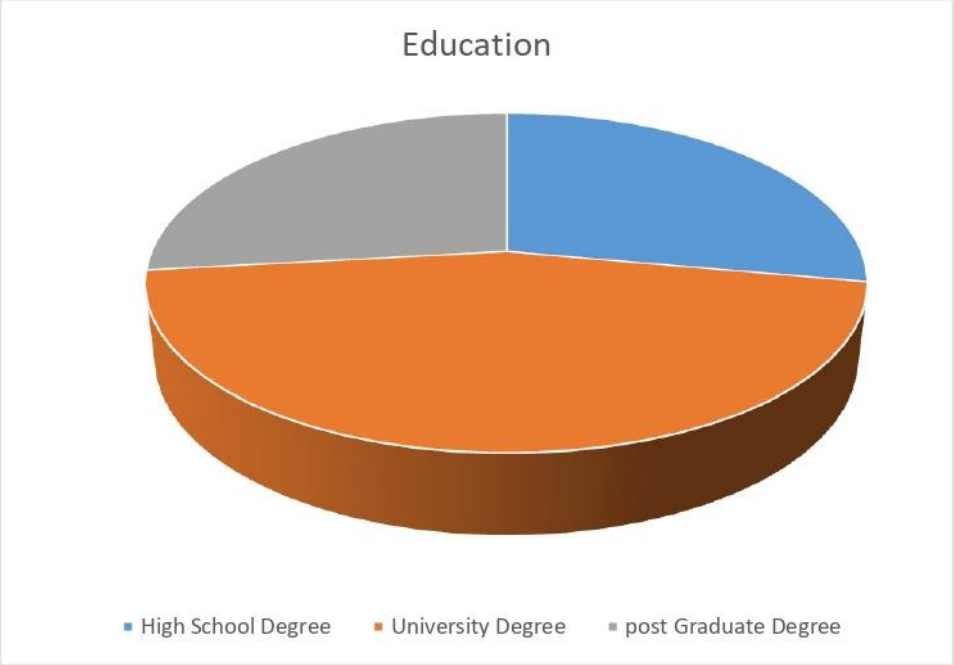


**Figure 4.3: Frequency Education**

**Work experience:**

so us to classify the data in a statistically significant way, the categories 11-16, 17-20 & over 20, which had few participants, were combined to become over 10 and the number of categories was dicreased to three. In spite of five total work experience categories were identified in the survey questions, Thus, the distribution of categories has been made more balanced. As a result, while highest participation was in the 0-5 years of work experience group (110; 40.3%), the lowest participation was in the category more than 10 years (78; 28.6%).

**Table 4.4: Frequency Work Experience**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | 0-5 years | 110 | 40,3 | 40,3 | 40,3 |
| | 6-10 years | 85 | 31,1 | 31,1 | 71,4 |
| | More than 10 years | 78 | 28,6 | 28,6 | 100,0 |
| | Total | 273 | 100,0 | 100,0 | |

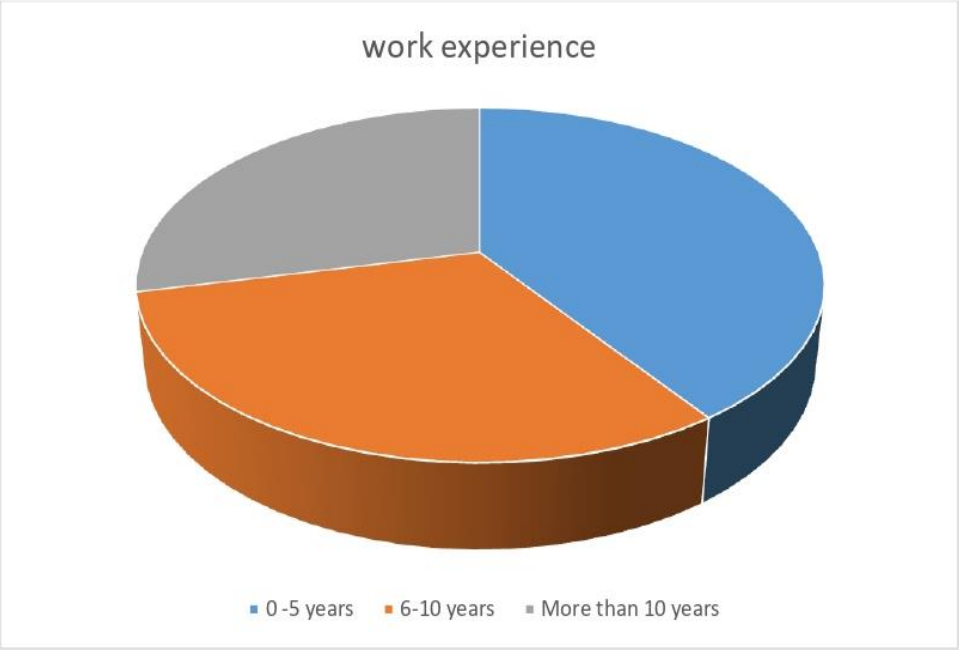


**Figure 4.4: Frequency Work experience**

### 4.3.2 Characteristic values

This section of this research will present the characteristic values of the indicators in addition to their sub-dimensions. These values are categorized to three main types: measures of central tendency, measures of variance, and measures of distribution. The measures of central tendency include the arithmetic mean (X), median (Me), and mode (Mo), which will be applied in this study.

The primary aim of computing measures of central tendency, or averages, is to identify a single value that best represents the entire dataset. The mode is defined as the most frequently occurring value in the dataset, while the median is the value that separates the dataset into two equal halves (Turanlı & Güriş, 2015, pp. 49–82). Conversely, measures of variance describe how spread out the values in the series are. These measures reflect how closely the values are clustered around the mean (Turanlı & Güriş, 2015, p. 100). The standard deviation (σ) will be the measure of variance used in this research.

Measures of distribution address the skewness and kurtosis of the dataset. Skewness refers to the degree to which a distribution deviates from being symmetrical. A distribution is negatively skewed if it leans to the left, and positively skewed if it leans to the right. Kurtosis, on the other side, describes the sharpness or

flatness of the data distribution in relation to a normal distribution. If a distribution has more flatness than a normal distribution, it is termed platykurtic, whereas if it is sharper, it is described as leptokurtic (Yolsal, 2020, p. 136).

### 4.3.3 Variables of the study

In this study, we have five variables. Three of them are independent whereas two of them are dependent.

**Marketing Oriented Innovation Activity (MOIA)**: ***Independent Variable*** is comprised of a single dimension with 10 items.: MOIA1, MOIA2, MOAI3, MOIA4, MOIA5, MOIA6, MOIA7, MOIA8, MOIA9 and MOIA10.

**Logistics Oriented Innovation Activity (LOIA)**: ***Independent Variable*** is comprised of a single dimension with 10 items: LOIA1, LOIA2, LOIA3, LOIA4, LOIA5, LOIA6, LOIA7, LOIA8, LOIA9 and LOIA10

**Technology Oriented Innovation Activity (TOIA)**: ***Independent Variable*** is comprised of a single dimension with 11 items: TOIA1, TOIA2, TOIA3, TOIA4, TOIA5, TOIA6, TOIA7, TOIA8, TOIA9, TOIA10 and TOIA11.

**Cost Reduction (SR)**: ***Dependent Variable*** is comprised of a single dimension with 5 items: CR1, CR2, CR3, CR4 and CR5.

**Competitive Advantage (COMPADV)**: ***Dependent Variable*** is comprised of a single dimension with 12 items: COMPADV1, COMPADV2, COMPADV3, COMPADV4, COMPADV5, COMPADV6, COMPADV7, COMPADV8, COMPADV9, COMPADV10, COMPADV11, COMPADV12.

**Table 4.5: Characteristic Values**

| | N | Mean | Median | Mode | Std. Deviation | Skewness | Kurtosis |
|---|---|---|---|---|---|---|---|
| **Marketing OIA** | 2733,98 | | 4,10 | 4,50 | 0,735 | **-,789** | **-,320** |
| **Logistics OIA** | 2733,95 | | 4,20 | 4,60 | 0,792 | **-,707** | **-,778** |
| **Technology OIA** | 2733,94 | | 4,18 | 4,45 | 0,762 | **-,764** | **-,636** |
| **Cost Reduction** | 2733,99 | | 4,20 | 4,40 | 0,774 | **-,745** | **-,440** |
| **Competitive Advantage** | 2733,95 | | 4,17 | 4,58 | 0,753 | **-,769** | **-,652** |

1) When the mean values of the variables are looked at, the largest mean value is Cost Reduction dependent variable (3.99). On the other side, the smallest

mean is Technology Oriented Innovation Activities independent variable (3.94). **The most important finding observed at this point is that the means of all variables are very close to each other**, since The variation between the largest mean & the smallest mean is only 0.05 points (3.99 – 3.94). All **these findings indicate that the participants filled the items of variables with similar attitudes**.

2) The dark pink values indicate whether the data distribution conforms to a normal distribution. A distribution is considered normal if most of these values are within the range of +1,500 to -1,500. All variables fall within this range.

3) Additionally, to verify the normality of the distribution, the Kolmogorov-Smirnov/Shapiro-Wilk test is employed at a 95% confidence level. This test helps determine whether the data distribution is normal. When the size of the sample is smaller than 50 (N < 50), the Shapiro-Wilk test findings are used. However, as the size of the sample in this study is 273 (N = 273 > 50), the Kolmogorov-Smirnov test results are considered. For a distribution to be classified as normal, the significance (Sig.) values of the variables should be smaller than 0.05. As demonstrated below, all p-values are indeed smaller than 0.05, confirming that the distribution is normal.

**Table 4.6: Test of Normality – Kolmogorov- Smirnov a. Lilliefors Significance Correction**

| Tests of Normality | | | | | | |
|---|---|---|---|---|---|---|
| | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
| | Statistic | Df | Sig. | Statistic | Df | Sig. |
| Marketing Innovation | ,118 | 273 | **,000** | ,915 | 273 | ,000 |
| Logistics Innovation | ,161 | 273 | **,000** | ,894 | 273 | ,000 |
| Technology Innovation | ,149 | 273 | **,000** | ,892 | 273 | ,000 |
| Cost Reduction | ,168 | 273 | **,000** | ,908 | 273 | ,000 |
| Competitive Advantage | ,147 | 273 | **,000** | ,889 | 273 | ,000 |

### 4.3.4 Factor and reliability analysis

**Initial Clarifications for Interpreting the Analysis Findings**

- KMO Fit Value: The appropriateness of the scales for factor analysis relies on satisfying two fundamental criteria., the initial of which is the Kaiser-Meyer-Olkin (KMO) examination, which verifies if the sample dimension is

adequate for factor analysis.Data are not suitable for factor analysis when the KMO value is less than 0.50. Although it is sufficient for the KMO value to be higher than 0.50, it is better to be 0.70 or higher.

- **Bartlett Test of Sphericity (Sig. value):** The second condition is that there exists a correlation among the measures, and Bartlett's test of sphericity is used to test the existence of this relationship. This test depends on rejecting the null hypothesis (H0) ($p < 0.05$), which claims that there is no association between the measures (Cohen et al., 2007, p. 570).

- **Cronbach's alpha coefficient ($\alpha$) for reliability testing:** Cronbach's alpha coefficient ($\alpha$) ranges between 0 and 1, which demonstrates the internal consistency of the elements forming the scales and their sub-categories. The internal consistency of the scales increases, and consequently, the dependability of the scales and sub-sections enhances as the ratio approaches 1; otherwise, it diminishes. (Yulsal, 2020, p. 137). The reality that the internal consistency coefficient Cronbach's alpha is minimal suggests that the items are not homogeneous among themselves, and that the scale evaluates multiple attributes simultaneously. (Tavshansel, 2014, p. 29). The explanation of Cronbach's alpha figures is as outlined below (Gleim and Gleim, 2003, p. 87).

**Table 4.7: Interpretation of Kaiser Mayer Olkin Which Evaluates Whether Number of Observations Are Enough To Make Related Analysis Or Not**

| Range Value | **COMMENT** |
|---|---|
| > 0.900 | Perfect |
| 0.800> | Quite Well / Pretty Good |
| 0.700> | Good & Acceptable |
| 0.600> | Acceptable Upon Inquiry |
| 0.500> | Insufficient Acceptable Under Specific Circumstances |
| 0.500 < | Unacceptable |

**Mean Inter-Item Correlation Values**: Another method to test the internal consistency of the scales and their sub-dimensions is by examining the average connection values between the scale elements and their sub-dimensions (Yulsall, 2020, p. 138). As per researchers, a value less than 0.10 suggests that the elements are inadequate to measure the scale, and a value higher than 0.50 indicates that some of the elements that make up the scale are unnecessary because they measure the

same thing (Piedmont & Hyland, 1993, p. 370). As such, it is mandated that this value ought to range between 0.10 and 0.50.

**Total Variance Explained**: When analyzing the results of factor analysis, another factor must be taken into account, which is the proportion of variance explained by each measure to the overall amount of variance In current studies, we see that a percentage of 40% or greater is considered acceptable (Aksu et al., 2017, p. 59).

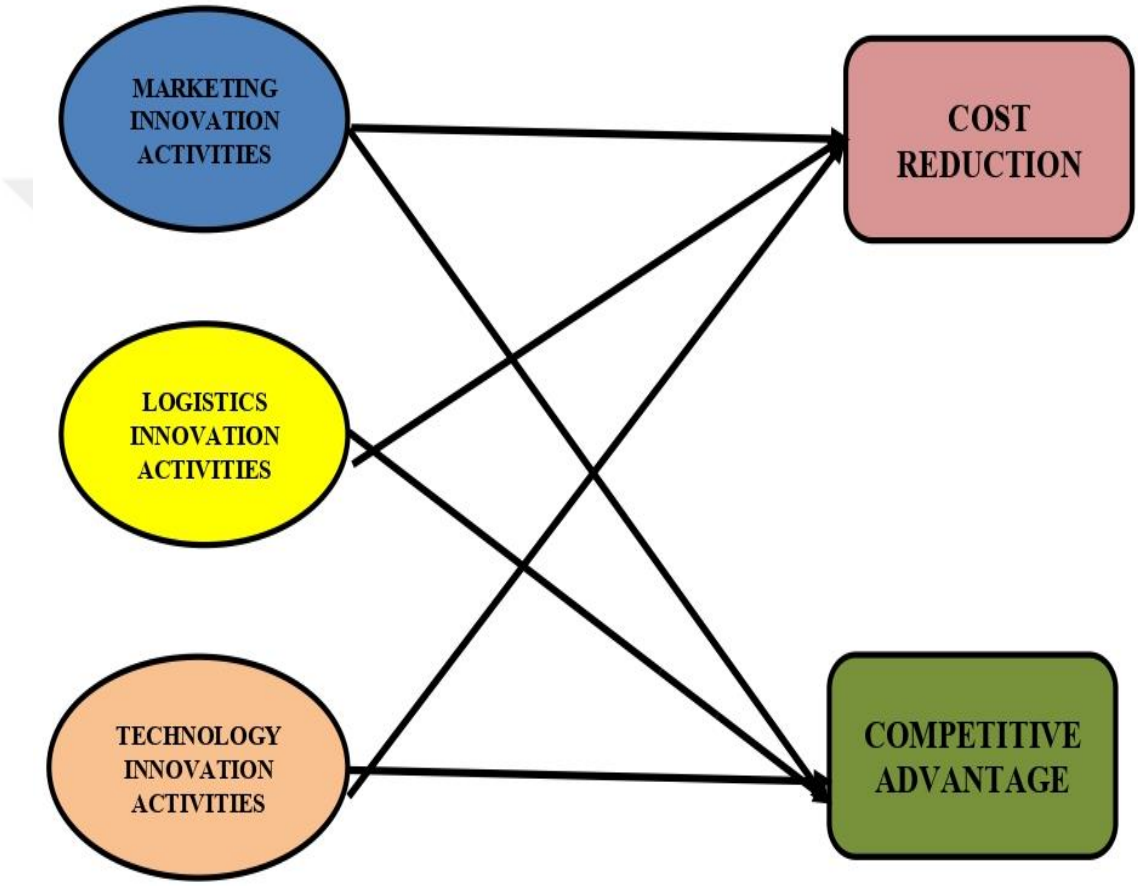


**Figure 4.5: Step 1: Initial Model Before Factor Analysis**

**1. Factor & Reliability Analysis For Marketing Oriented Innovation Activities (MOIA)**

**Table 4.8: Factor & Reliability Analysis MOIA**

| Component Matrix | |
|---|---|
| | **Component** |
| | **1** |
| MOIA1 | **,778** |
| MOA2 | **,739** |
| MOIA3 | **,759** |
| MOIA4 | **,804** |
| MOIA5 | **,831** |
| MOIA6 | **,698** |
| MOIA7 | **,794** |
| MOIA8 | **,753** |
| MOIA9 | **,785** |
| MOIA10 | **,804** |
| **KMO Fit Value** | **0,932** |
| Bartlett Test of Sphericity (p<0,05) | 0,000 |
| **Cronbach's Alpha Reliability (α)** | **0,926** |
| Mean Inter – Item Correlation | 0,440 |
| Total Variance Explained (%) | 60,12 |

As expected under one factor all items were clustered, and the factor loadings were very high. The KMO-Fit value and Cronbach Alpha reliability are ideal. In addition, the overall expected variance is very satisfactory and the average correlation between items is within acceptable limits.

**2. Factor & Reliability Analysis For Logistics Oriented Innovation Activities (LOIA)**

**Table 4.9: Factor & Reliability Analysis (LOIA)**

| Component Matrix | |
|---|---|
| | **Component** |
| | **1** |
| LOIA1 | **,789** |
| LOIA2 | **,824** |
| LOIA3 | **,725** |
| LOIA4 | **,864** |
| LOIA5 | **,806** |
| LOIA6 | **,821** |
| LOIA7 | **,799** |
| LOIA8 | **,803** |
| LOIA9 | **,757** |
| LOIA10 | **,821** |
| **KMO Fit Value** | **0,947** |
| Bartlett Test of Sphericity (p<0,05) | 0,000 |
| **Cronbach's Alpha Reliability (α)** | **0,938** |
| Mean Inter – Item Correlation | 0,475 |
| Total Variance Explained (%) | 64,28 |

As expected under one factor all items were clustered, and the factor loadings were very high. The KMO-Fit value and Cronbach Alpha reliability are ideal. Additionally, the overall expected variance is very satisfactory and the average correlation between items is within acceptable limits.

**3. Factor & Reliability Analysis For Technology Oreinted Innovation Activities (TOIA)**

**Table 4.10: Factor & Reliability Analysis (TOIA)**

| Component Matrix | |
|---|---|
| | **Component** |
| | **1** |
| TOIA1 | **,764** |
| TOIA2 | **,770** |
| TOIA3 | **,819** |
| TOIA4 | **,818** |
| TOIA5 | **,720** |
| TOIA6 | **,712** |
| TOIA7 | **,795** |
| TOIA8 | **,793** |
| TOIA9 | **,753** |
| TOIA10 | **,817** |
| TOIA11 | **,827** |
| **KMO Fit Value** | **0,952** |
| Bartlett Test of Sphericity (p<0,05) | 0,000 |
| **Cronbach's Alpha Reliability (α)** | **0,936** |
| Mean Inter – Item Correlation | 0,475 |
| Total Variance Explained (%) | 61,12 |

As expected under one factor all items were clustered, and the factor loadings were very high. The KMO-Fit value and Cronbach Alpha reliability are ideal. Moreover, the overall expected variance is very satisfactory and the average correlation between items is within acceptable limits.

### 4. Factor & Reliability Analysis For Cost Reduction (CR)

**Table 4.11: Factor & Reliability Analysis CR**

| Component Matrix | |
|---|---|
| | **Component** |
| | **1** |
| CR1 | **,803** |
| CR2 | **,807** |
| CR3 | **,800** |
| CR4 | **,816** |
| CR5 | **,831** |
| KMO Fit Value | **0,832** |
| Bartlett Test of Sphericity (p<0,05) | 0,000 |
| Cronbach's Alpha Reliability (α) | 0,870 |
| Mean Inter – Item Correlation | 0,475 |
| Total Variance Explained (%) | 65,83 |

As expected under one factor all items were clustered, and the factor loadings were very high. The KMO fit value and Cronbach's Alpha reliability are also very good. Also, the aggregate expected variance is very satisfactory and the average correlation between items is within acceptable limits.

**5. Factor & Reliability Analysis For Compatitive Advantage (COMPADV)**

**Table 4.12: Factor & Reliability Analysis Compad**

| Component Matrix | |
|---|---|
| | **Component** |
| | **1** |
| COMPADV1 | **,769** |
| COMPADV2 | **,748** |
| COMPADV3 | **,777** |
| COMPADV4 | **,818** |
| COMPADV5 | **,808** |
| COMPADV6 | **,726** |
| COMPADV7 | **,751** |
| COMPADV8 | **,778** |
| COMPADV9 | **,806** |
| COMPADV10 | **,687** |
| COMPADV11 | **,817** |
| COMPADV12 | **,788** |
| **KMO Fit Value** | **0,958** |
| Bartlett Test of Sphericity (p<0,05) | 0,000 |
| **Cronbach's Alpha Reliability (α)** | **0,939** |
| Mean Inter – Item Correlation | 0,387 |
| Total Variance Explained (%) | 59,85 |

Under one factor as expected, all items were clustered, and factor loadings were very high. KMO-Fit value and Cronbach Alpha reliability are ideal. In addition, the aggregate expected variance is very satisfactory and the average correlation between items is within acceptable limits.

### 4.3.5 Multiple regression analysis & power of model ($R^2$)

**For Cost Reduction**

**Table 4.13: Multiple Regression Analysis & Power Of Model ($R^2$) for CR**

| ANOVA[a] | | | | | | |
|---|---|---|---|---|---|---|
| **Model** | | **Sum of Squares** | **Df** | **Mean Square** | **F** | **Sig.** |
| 1 | Regression | 150,735 | 3 | 50,245 | 1114,644 | **,000[b]** |
| | Residual | 12,126 | 269 | ,045 | | |
| | Total | 162,861 | 272 | | | |

a. Dependent Variable: Cost Reduction

b. Predictors: (Constant), Technology Innovation Activities, Marketing Innovation Activities, Logistics Innovation Activities

**Hypothesis H0 (absence):** The independent variables model selection, compensation and career planning, training and performance evaluation are not statistically significant in explaining cost reduction as a dependent variable. If Sig(p) < 0.05, the null hypothesis is disproved, meaning that at least one or more of the independent factors is statistically significant in explaining the dependent factor. In this pattern, it appears that all or some of the three independent factors or at least one factor explains the dependent factor.

**Table 4.14: Coefficients - a. Dependent Variable: Cost Reduction - It Shows That Logistics Innovation Activities Have No Impact on Cost Reduction**

| Coefficients[a] | | | | | | |
|---|---|---|---|---|---|---|
| | | | **Unstandardized Coefficients** | | **Standardized Coefficients** | | |
| **Model** | | | **B** | **Std. Error** | **Beta** | **T** | **Sig.** |
| 1 | (Constant) | | -,117 | ,072 | | -1,623 | ,106 |
| | Marketing Activities | Innovation | ,794 | ,035 | ,755 | 22,866 | ,000 |
| | **Logistics Activities** | **Innovation** | **,036** | **,039** | **,037** | **,922** | **,358** |
| | Technology Activities | Innovation | ,202 | ,044 | ,199 | 4,629 | ,000 |

At this stage, the significance value (sig = p) is checked for each independent variable expected to explain the dependent variable. Variables with a significance (p) value of smaller than 0.05 significantly explain the dependent variable; and it is determined that the variables that do not have a statistically significant effect on the dependent variable are the variables with a value greater than 0.05. Looking at the

results, marketing oriented and technology oriented innovation activities have a statistically significant impact on cost reduction whereas logistics oriented innovation activities do not have.

p marketing innovation activities = 0.000 < 0.050 (Acceptance of H1)

In this context, ***hypotheses $H_1$ is accepted, since marketing oriented innovation activities have a statistically significant effect on cost reduction***

$p_{\text{logistics innovation activities}} = 0.358 > 0.050$ (Rejection of $\mathbf{H_2}$)

In this context, ***hypotheses $H_2$ is rejected, since logistics oriented innovation activities not have a statistically significant effect on cost reduction***

$p_{\text{technology innovation activities}} = 0.000 < 0.050$ (Acceptance of $\mathbf{H_3}$)

In this context, ***hypotheses $H_3$ is accepted, since technology oriented innovation activities have a statistically significant effect on cost reduction.***

Two independent variables were included in the model as a result of repeated regression analysis, as their Sig. (p) values were less than 0.05. (Logistics innovation activities were excluded from the model).

In this context, we arrived at the last model of the study, where the last model assumes that the two independent variables, which are (marketing-oriented innovation activities and technology-oriented innovation activities), have an impact on reducing costs.

Power Analysis (R2 Interpretation): (R2 is a statistic that will inform us some details about how well the model fits and fits. In regression, the factor of determination R2 is a statistical measure of how closely the regression expectations approximate the true data points. An R2 value of 1 indicates that the regression expectations fit the data perfectly. The table related to the interpretation of the R2 value obtained as a result of the regression analysis is as follows:

**Table 4.15: Interpretation of the R2 Value Resulting From the Regression Analysis**

| Comment | $R^2$ Value (Chin) (1998) | $R^2$ Value (Hair et al.) (2011) |
|---|---|---|
| Very Weak | $R^2 < 0,19$ | $R^2 < 0,25$ |
| Weak | $0,19 \leq R^2 < 0,35$ | $0,25 \leq R^2 < 0,50$ |
| Moderate | $0,33 \leq R^2 < 0,67$ | $0,50 \leq R^2 < 0,75$ |
| Substantial (Strong) | $R^2 > 0,67$ | $R^2 > 0,75$ |

Combining the observations of from both studies that have a place in the literature on the interpretation of $R^2$, then $R^2$ can be understood as follows:

**Table 4.16: The Interpretation of the $R^2$ Value Depend On Two Studies That Have A Place in the Literature**

| Combined Comment (Chin, 1998 & Hair et al., 2011) | $R^2$ Value |
|---|---|
| Very Weak | $R^2 < 0,19$ |
| Quite Weak | $0,19 \leq R^2 < 0,25$ |
| Weak | $0,25 \leq R^2 < 0,33$ |
| Weak – Moderate | $0,33 \leq R^2 < 0,50$ |
| Moderate | $0,50 \leq R^2 < 0,67$ |
| Substantial )StrongModerate - | $0,67 \leq R^2 < 0,75$ |
| Absolute Substantial (Strong) | $R^2 > 0,75$ |

**Table 4.17: Model Summary[b]**

**Model Summary[b]**

| Model | R | **R Square ($R^2$)** | Adjusted R Square **($R^2$)** | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | ,962[a] | **,925** | ,925 | ,21225 |

a. Predictors: (Constant), marketing innovation activities, technology innovation activities

b. Dependent Variable: cost reduction

Looking at the model summary, the R2 value is 0.925 which represents the explanatory power of the independent variable on the dependent variable. This value shows that the explanatory power of the model is very strong. The independent variables of marketing-oriented innovation activities and technology-oriented innovation activities explain the dependent variable of cost reduction very strongly.

**Table 4.18: Coefficients**

| Coefficients[a] | | | | | | |
|---|---|---|---|---|---|---|
| | | | Unstandardized Coefficients | | Standardized Coefficients | | |
| Model | | | B | Std. Error | Beta | T | Sig. |
| 1 | (Constant) | | -,114 | ,072 | | -1,586 | ,114 |
| | Marketing Activities | Innovation | ,803 | ,034 | **,763** | 23,961 | ,000 |
| | Technology Activities | Innovation | ,229 | ,032 | **,225** | 7,076 | ,000 |

a. Dependent Variable: Cost Reduction - Demonstrates the Influence of Marketing and Technological Innovation Activities on Cost Reduction

The contributions of the model to the independent variables are understood with the help of the standardized beta coefficient values presented in the coefficients table. When we examine these coefficients, ***it is seen that marketing oriented innovation activities*** ($\beta_{marketing\ innovation\ activities} = 0.763$)***, have a huge & very salient impact on cost reduction.***

***On the other hand, technology related innovation activities*** ($\beta_{technology\ innovation\ activities} = 0.225$) ***have also a moderate effect on cost reduction.***

### 4.3.6 Multiple regression analysis & power of model ($R^2$)

**For Competitive Advantage**

**Table 4.19: ANOVA**

| ANOVA[a] | | | | | | |
|---|---|---|---|---|---|---|
| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
| 1 | Regression | 147,139 | 3 | 49,046 | 1913,431 | **,000**[b] |
| | Residual | 6,895 | 269 | ,026 | | |
| | Total | 154,035 | 272 | | | |

a. Dependent Variable: Competitive Advantage

b. Predictors: (Constant), Technology Innovation Activities, Marketing Innovation Activities, Logistics Innovation Activities

In this way, we see that it may be that all or some of the three independent variables explain the dependent variable.

**Table 4.20: Coefficients**

**Coefficients[a]**

| Model | | | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|---|---|
| | | | B | Std. Error | Beta | T | Sig. |
| 1 | (Constant) | | ,055 | ,054 | | 1,004 | ,317 |
| | **Marketing Activities** | **Innovation** | **,068** | **,026** | **,067** | **2,607** | **,110** |
| | Logistics Activities | Innovation | ,251 | ,030 | ,264 | 8,486 | ,000 |
| | Technology Activities | Innovation | ,666 | ,033 | ,674 | 20,251 | ,000 |

a. Dependent Variable: Competitive Advantage- It shows that marketing innovation activities have no impact on competitive advantage

The significance value (sig = p) is checked at this stage for each independent variable that is anticipated to explain the dependent variable. Variables with a significance (p) value of smaller than 0.05 explicate the dependent variable significantly; variables with a value bigger than 0.05 are determined to have no statistically significant effect on the dependent variable. Looking at the results, logistics oriented & technology oriented innovation activities have a statistically significant impact on competitive advantage whereas marketing oriented innovation activities do not have.

$p_{\text{marketing innovation activities}} = 0.110 < 0.050$ (Rejection of $\mathbf{H_4}$)

In this context, hypotheses $H_4$ is rejected, since marketing oriented innovation activities does not have a statistically important impact on competitive advantage.

$p_{\text{logistics innovation activities}} = 0.000 < 0.050$ (Approval of $\mathbf{H_5}$)

In this regard, ***hypotheses $H_5$ accepted, since logistics oriented innovation activities have a statistically significant effect on competitive advantage.***

$p_{\text{technology innovation activities}} = 0.000 < 0.050$ (Approval of $\mathbf{H_6}$)

In this framework, ***hypotheses $H_6$ accepted, since technology oriented innovation activities have a statistically significant effect on competitive advantage.***

Two independent variables were included in the model that had Sig.(p) values smaller than 0.05 as a result of repeated regression analysis (marketing innovation activities were excluded from the model).

Thus, the last model of this study was attained, as the last model assumes that two independent variables have an effect on competitive advantage, which are (innovation activities directed towards logistics services and innovation activities directed towards technology).

**Table 4.21: Model Summary**

**Model Summary[b]**

| Model | R | R Square ($R^2$) | Adjusted R Square ($R^2$) | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | ,977[a] | **,954** | ,954 | ,16181 |

a. Predictors: (Constant), logistics innovation activities, technology innovation activities

b. Dependent Variable: competitive advantage

The model summary indicates that the value of R2 is 0.954, which reflects the explanatory power of the independent variable on the dependent variable. This value indicates that the model's explanatory power is both complete & exceptionally strong.. ***Independent variables of logistics oriented innovation activities & technology oriented innovation activities, explain the dependent variable of competitive advantage very strongly.***

**Table 4.22: Coefficients**

**Coefficients[a]**

| Model | | | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|---|---|
| | | | B | Std. Error | Beta | t | Sig. |
| 1 | (Constant) | | ,099 | ,052 | | 1,904 | ,058 |
| | Logistics Activities | Innovation | ,271 | ,029 | **,285** | 9,408 | ,000 |
| | Technology Activities | Innovation | ,703 | ,030 | **,712** | 23,474 | ,000 |

a. Dependent Variable: Competitive Advantage

b. Illustrates the extent to which logistics and technological innovation activities impact competitive advantage.

The standardized beta coefficients presented in the coefficients table emphasize the contributions of the model to the independent variables. Upon examining these coefficients, **it is seen that technology oriented innovation activities ($\beta_{\text{technology innovation activities}}$ = 0.712), have a huge & very salient impact on competitive advantage.**

**On the other hand, logistics related innovation activities ($\beta_{\text{logistics innovation activities}}$ = 0.285) have also a moderate effect on competitive advantage.**

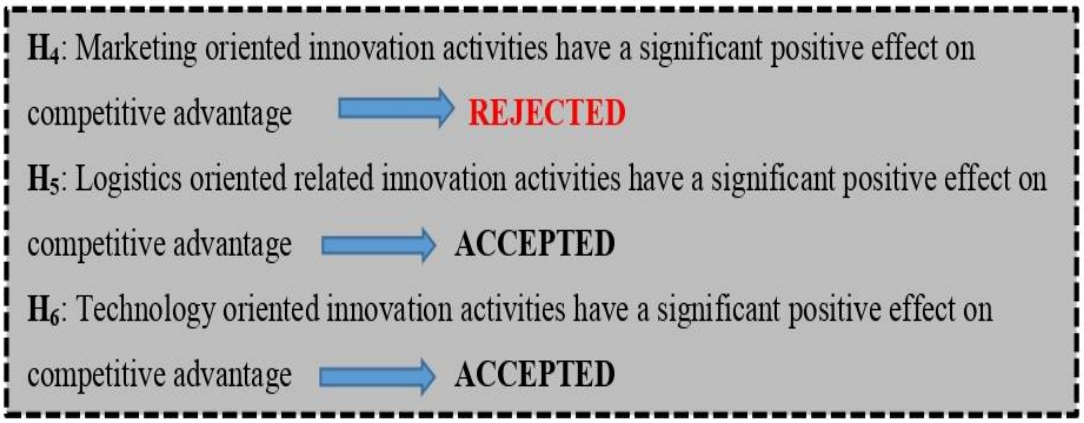


**Figure 4.5: Final Model after Multiple Regression Analysis**

# 5. CONCLUSIONS AND RECOMMENDATIONS

## 5.1 Conclusions

The aim of this study is to know the extent of the impact of activities related to supply chain innovations on reducing costs and achieving competitive advantage and thus transferring trade to the Turkish company Leader Cosmetics. To achieve this goal, the researcher examined the connection among innovation activities & reducing costs on the one side and achieving competitive advantage on the other hand by taking a sample of the study community and distributing the questionnaire to them and taking the results and analyzing them.

The results showed after multiple regression analysis:

The clarity of the positive impact of innovation activities directed towards technology, which is the strongest impact on the dependent variables. Whereas innovation activities directed towards technology have a moderate impact on reducing costs and a very absolute (strong) impact on competitive advantage.

As for innovation activities directed towards marketing, they have a huge impact on reducing costs on the one hand and are not effective on competitive advantage on the other hand.

As for innovation activities directed towards logistics services, they are very doubtful as the results demonstrated that they do not have any notable statistical impact on reducing costs on the one hand and have a limited to moderate effect on competitive advantage

### 5.2 Recommendations

The results showed the need to rely on innovations, especially technological ones, to achieve competitive advantage and reduce costs, thus improving or moving business operations to a higher level.

Companies must rely on supply chain innovations in their business operations, which leads to reducing their costs, especially companies that still rely on traditional methods in supply chains.

Companies must adopt technological techniques in supply chains to a large extent to achieve competitive advantage, as technological innovations are necessary and are the basis for transferring trade.

As for Leader Cosmetics, it must adopt more innovations and technologies to facilitate its operations more, in less time and at a lower cost.

Using robots in the company's laboratories, which reduces time, effort and cost and leads to accuracy in work.

Using the necessary IOT and block chain technology in the tracking and transparency process.

Knowing the customer and meeting his needs quickly and skillfully

### 5.3 Recommendations for Future Studies

These results can be generalized to all companies, especially the primitive ones, to work on supply chain innovations that would move trade to a great position and put the company in a distinguished position from other companies.

The researcher recommends using these activities and knowing the extent of their relationship to delivery time, i.e. testing the positive relationship between reducing time and these activities related to supply chain innovations.

Using these activities in the same test for companies in several countries for each researcher from his country and comparing the results.

Different results can be reached by adding other variables that would improve business processes

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## APPENDIX

Questionnaire:

**(INNOVATIONS IN SUPPLY CHAIN MANAGEMENT TRANSFORMING COMMERCE WITH LIDER KOZMETIK TURKEY)**

I kindly ask you to answer this questionnaire for the purposes of conducting the necessary research to complete the master's thesis, which aims to reveal the importance and impact of innovations in supporting competitive advantage and thus transferring and growing trade in Leader Cosmetics Company to demonstrate the value of innovations used by your company and how the use of innovations has led to the advancement of trade. I hope for accurate answers, as the study depends on your credibility.

With sincere appreciation

**Personality questions**

1. Gender:

   Male Female

2. The age

   25-30 30-45 45-50 50 -55 55-60

3. Years of experience

   1-5 5-10 10-15 15-20 20-25

**Competitive advantage Questions**

| | **Statement** | **Strongly** | **Agree** | **Neutral** | **Disagree** | **Strongly** |
|---|---|---|---|---|---|---|
| **A** | **cost** | | | | | |
| **1-** | The cost of the services provided by the company is lower than competing companies. | | | | | |
| **2-** | The company uses different means of control in designing its services In order to keep the cost low. | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **3-** | The company carries out periodic monitoring of the services provided in order to reduce costs. | | | | | |
| **4-** | The company uses its available resources economically and rationally to reduce costs. | | | | | |
| **5-** | The company uses research and development in order to modernize its services and reduce costs. | | | | | |
| **B** | **Quality** | | | | | |
| **1-** | The company has a clear and documented quality strategy and policies. | | | | | |
| **2-** | The company always seeks to reduce the percentage of defects in its services. | | | | | |
| **3-** | The company is constantly working to improve the qualitative awareness of its employees to improve quality. | | | | | |
| **4-** | The company seeks to make its service specifications conform to national and international specifications and standards. | | | | | |
| **5-** | The company is keen to design its services in a distinct way to obtain the highest level of quality in its services | | | | | |
| **6-** | The company uses multiple methods and standards to control quality. | | | | | |
| **C-** | Flexibility | | | | | |
| **1-** | The machines and equipment used by the company are characterized by multiple purposes. | | | | | |
| **2-** | The company's workers possess multiple skills that make them capable of performing more than one important job. | | | | | |
| **3-** | The company has the ability to respond quickly to various environmental changes in designing its services, which serves the desires of customers. | | | | | |
| **D** | Time | | | | | |
| **1-** | The company constantly adheres to the delivery dates specified with customers. | | | | | |
| **2-** | The company has the ability to deliver customer orders faster than competitors. | | | | | |
| **3-** | The company uses the latest systems in warehouse management in order to ensure rapid response to changes in customer requests. | | | | | |

**Supply Chain Innovations Questions**

| | **Statement** | **Strongly agree** | **Agree** | **Neutral** | **Disagree** | **Strongly** |
|---|---|---|---|---|---|---|
| **A** | Marketing oriented activities | | | | | |
| **1-** | We produce products that meet or exceed our customers' expectations. | | | | | |
| **2-** | The company meets customers' special requests flexibly | | | | | |
| **3-** | The main goal of our work is to meet customer needs | | | | | |
| **4-** | Information is often collected about our international customers' operations and our business (purchasing, research and development) | | | | | |
| **5-** | The expected impacts of changes in the business environment that could potentially impact our international business management practice are reviewed | | | | | |
| **6-** | Information about international customers' products and services is collected using multiple methods on an ongoing basis | | | | | |
| **7-** | Information about competitors' products and services is collected regularly | | | | | |
| **8-** | Information about competitors' products and services is collected regularly | | | | | |
| **9-** | We have the ability to develop unique features for products | | | | | |
| **10-** | We have the ability to develop new features | | | | | |
| **11-** | We have the ability to develop new products | | | | | |
| **B** | Technological-development-oriented innovation activities | | | | | |
| **1-** | We would like to be at the forefront in experimenting with new information technologies | | | | | |
| **2-** | Expect increased emphasis on integrated computer systems for exchanging data with customers and suppliers | | | | | |
| **3-** | We have made great progress in integrated computer systems | | | | | |
| **4-** | We are constantly looking for new system applications | | | | | |
| **5-** | We use new or existing technologies to develop new products and services competitively | | | | | |
| **6-** | Rapidly respond to changes in our supply chain | | | | | |
| **7-** | Employees are willing to share new knowledge | | | | | |
| **8-** | Encouraging employees to adopt new technologies | | | | | |
| **9-** | Information systems between our key partner and our company are designed to respond to changes and | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | business requirements quickly | | | | | |
| **10-** | We and our major partner have established rules for devices and operating systems to ensure platform compatibility | | | | | |
| **11-** | Together with our main partner, we have consolidated data to ensure it is shared across business units | | | | | |
| **12-** | We have the ability to create items with unique properties | | | | | |
| **13-** | Our new goods are the first in the market (early entry into the market) | | | | | |
| **14-** | We are competitive in terms of technology | | | | | |
| **15-** | Using modern technologies in operations | | | | | |
| **16-** | The rapid development of our company's processes, procedures and technologies | | | | | |
| **C** | Logistics-oriented innovation activities | | | | | |
| **1-** | We adjust delivery capacity to meet volume for delivering | | | | | |
| **2-** | We adjust storage capacity if demand fluctuates | | | | | |
| **3-** | We make flexible use of multiple transportation modes to meet the schedule for delivering | | | | | |
| **4-** | We address reverse logistics issues mainly with technologies we have developed (customization) | | | | | |
| **5-** | Logistics planning is well coordinated with the overall strategic planning process in our firm | | | | | |
| **6-** | Our speed in new product development is fast enough/ competitive | | | | | |
| **7-** | We include environmental consideration in our selection criteria for key suppliers | | | | | |
| **8-** | We include business ethics consideration in our selection criteria for key suppliers | | | | | |
| **9-** | We emphasize honesty business operations | | | | | |
| **10-** | We encourage our employees in compliance with the code of professional ethics | | | | | |