



School of Social Sciences

Supply Chain Management

Postgraduate Dissertation

“Logistics in E-commerce and the Last Mile problem”

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Thessaloniki, Greece, July 2024

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“I would like to thank my family for supporting and my supervisor Mr. Komisopoulos for valuable guidance. ”

Abstract

We could all agree that nowadays we live in a world with developed technology in all sectors and it is proven by our daily routine. Especially, the networks and the internet have changed the way that we manage the operations such as the purchases, the financial transactions and so on, this happens both personal and professional field. Thus, the traditional trade has been converted to electronic commerce, reorganizing the whole strategy of supply chain. The demands of consumers are becoming higher and businesses are continually looking for ways in which will attract more customers. So, new methods are applied in e-commerce in order to meet the demands of consumers and some of these are discounts, more payment ways and alternative transport ways. With respect to transport ways the last mile is a significant stage in the delivery procedure. The last mile is the last step in the supply chain that the product reaches to consumer. In this stage new methods are created in order to satisfy the consumers such as the way of receipt. In both cases e-commerce and last mile there are benefits for customers such as the convenience, ease and speed. However, there are also challenges and risks in which we will deal in this study through literature and phenomenological research. The study applies two in-depth questionnaires to courier companies and consumers respectively in order to be extracted an overview of the phenomenon through this investigation. Hence, executing a qualitative analysis in the answers of respondents, we extract some conclusions which we will detailly discuss below.

Keywords

E-commerce, last mile, risks, transportations, supply chain

“Διακίνηση στο ηλεκτρονικό εμπόριο και το πρόβλημα στο τελευταίο μίλι”

“Χρυσαφένια Εφραιμίδου”

Περίληψη

Όλοι θα μπορούσαμε να συμφωνήσουμε ότι στις μέρες μας ζούμε σε έναν κόσμο με αναπτυγμένη τεχνολογία σε όλους τους τομείς και αυτό αποδεικνύεται στην καθημερινότητά μας. Ειδικά, τα δίκτυα και το ίντερνετ έχουν αλλάξει τον τρόπο που διαχειριζόμαστε τις λειτουργίες όπως τις αγορές, τις οικονομικές συναλλαγές και άλλα, αυτό συμβαίνει τόσο στον προσωπικό όσο και στον επαγγελματικό τομέα. Έτσι, το παραδοσιακό εμπόριο έχει μετατραπεί σε ηλεκτρονικό εμπόριο, αναδιοργανώνοντας ολόκληρη τη στρατηγική της εφοδιαστικής αλυσίδας. Οι απαιτήσεις των καταναλωτών γίνονται πιο υψηλές και οι επιχειρήσεις συνέχεια ψάχνουν τρόπους με τους οποίους θα προσελκύσουν περισσότερους πελάτες. Οπότε, νέες μέθοδοι εφαρμόζονται στο ηλεκτρονικό εμπόριο για να ανταποκριθούν στις απαιτήσεις των καταναλωτών και μερικές από αυτές είναι οι εκπώσεις, οι περισσότεροι τρόποι πληρωμής και οι εναλλακτικοί τρόποι μεταφοράς. Όσον αφορά στους τρόπους μεταφοράς το τελευταίο μίλι είναι ένα σημαντικό στάδιο στην διαδικασία της παράδοσης. Το τελευταίο μίλι είναι το τελευταίο βήμα στην εφοδιαστική αλυσίδα που το προϊόν φτάνει στον καταναλωτή. Σε αυτό το στάδιο νέες μέθοδοι δημιουργούνται για να ικανοποιήσουν τους καταναλωτές, όπως είναι ο τρόπος παραλαβής. Τόσο στο ηλεκτρονικό εμπόριο όσο και στο τελευταίο μίλι υπάρχουν οφέλη για τους πελάτες όπως είναι η άνεση, η ευκολία και η ταχύτητα. Ωστόσο, υπάρχουν προκλήσεις και κίνδυνοι με τους οποίους θα ασχοληθούμε στην μελέτη μέσω βιβλιογραφικής και φαινομενολογικής έρευνας. Η μελέτη εφαρμόζει σε βάθος δύο ερωτηματολόγια σε εταιρίες ταχυμεταφορών και στους καταναλωτές αντίστοιχα για να εξαχθεί μία σφαιρική εικόνα του φαινομένου μέσω της έρευνας. Ως εκ

τούτου, διεξάγοντας ποιοτική ανάλυση στις απαντήσεις των ερωτηθέντων, εξάγουμε κάποια συμπεράσματα τα οποία θα συζητήσουμε λεπτομερώς παρακάτω.

Λέξεις – Κλειδιά

Ηλεκτρονικό εμπόριο, τελευταίο μίλι, κίνδυνοι, μεταφορές, εφοδιαστική αλυσίδα

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List of Abbreviations & Acronyms

e-commerce	electronic commerce
e-CRM	electronic Customer Relationships Management
e-SCM	electronic Supply Chain Management
CEOs	Chief Executive Officers
3PL	Third-Party Logistics
B2B	Business-to-Business
B2C	Business-to-Consumer
C2C	Consumer-to-Consumer
C2B	Consumer-to-business
B2A	Business-to-Administration
C2A	Consumer-to-administration

1. Introduction

1.1 Introduction & Importance of the logistics in e-commerce and the last mile problem

The electronic commerce is used daily for marketing purposes, such as financial transactions, sales, purchase and so on, and it happens due to the development of the internet. In recent years the speed of internet has become extremely high thus, the use of internet has become necessary more and more. In addition to this, wi-fi is one more reason that makes the e-commerce easier and more convenient for its users. So, the internet created a strong marketing channel which is the e-commerce.

E-commerce includes individual and company users. The company users manage activities of production, supply, staff and sales. The individual user has access to information and shopping of goods. E-commerce has transformed the business operations and logistics activities because these are executed online, especially in the pandemic period. The majority of businesses uses e-commerce and invest on it, in order to take competitive advantage in the market place. In this way, there is an increase of productivity, financial efficiency and a reduction of operation costs. However, this procedure is multifactorial and requires an expert approach. There are many issues in e-commerce that it is proper to be considered such as, technology infrastructure, online marketing, online systems of sales and payments, website usability, e-CRM (customer relationships management) / e-SCM (supply chain management). The study reviews the impact of e-commerce on the retail process. (Joong-Kun Cho J. et al., 2008)

Due to the increase of e-commerce has also increased deliveries so, the last-mile delivery as well, which is the last stage of a supply chain that is considered the most inefficient. It is a complicated part because it should combine an effective distribution with delivery time deadlines. There are large quantities of different goods from diverse suppliers that have to be delivered to customers via distribution channels. This situation is more frequent in urban areas due to the increase of e-commerce so in this way is generated a nuisance that has impact on multiple fields such as environmental, social, economic, operational impacts.

With respect to environmental impacts, there is air pollution and noise that have social impacts such as low quality of life due to health problems, illnesses, injuries from traffic

accidents and so on. Moreover, there are operational impacts that are related to congestion, traffic disruptions and parking, which produce economic impacts due to the inefficient freight transport. So, it is important to deal with this topic and with new methods of delivery vehicles that improve business performance and mitigate the impacts of transport. (Slabinac M., 2015)

1.2 Research questions

The research questions are extracted from questionnaire, which is the research tool in this case. Hence, we report below the research questions about courier companies and consumers.

About courier companies

Which are the most important problems/risks in the last mile delivery?

Which delivery method do they prefer to perform?

About Consumers

Is traceability of the parcel in the last mile helpful?

In case they buy on-line, which is the preferred way of payment?

In case they buy on-line, which is the preferred way of delivery?

1.3 Methodology

The purpose of the study is to understand how logistics are operated in e-commerce, the last mile and their impacts on the market. For this reason, the research was conducted in two fields, which are courier companies and consumers. More specifically, the participants were six chief executive officers (CEOs) from six courier companies and ten consumers.

In the case of CEO interviews, they were executed individually inside the courier companies, each interview lasted about 15 to 20 minutes and the interviews were recorded by note-taking. In the case of consumers interviews, they were also executed individually and each interview lasted about 10 minutes approximately. Four of these interviews are conducted outside the courier companies and six of these ones are conducted outside a retail store. Also in this case, the interviews were recorded by note-taking.

Confidentiality was existed during the interviews maintaining the anonymity of interviewers and concealing identification information. Moreover, participants were

informed about the purpose of research before their participation and the process was conducted with their consent.

Continuing, the answers were transcribed and were discussed in the study. So, taking information for the issue from both sides courier companies and consumers, an overall viewpoint is generated about the e-commerce, last mile and their effects in the market.

1.4 Structure of the dissertation

The structure of dissertation starts with an overall view of the subject and then it is shown a detailed analysis of logistics and last mile, and of e-commerce and last mile, through literature review which defines the last mile, its costs and problems, e-commerce and challenges, and anything of supply chain is related to these. In this section it is explained the importance of last mile and it examines the challenges of this. Moreover, it analyses the evolution of e-commerce and its technologies. In addition, it is described methodological choices, research tool and research ethics which were followed during the study and the research. Continuing, the part of interviews is reported that were applied the prementioned research tool and research ethics. Therefore, follows a discussion on the responses of the participants and finally the thesis is completed with the conclusions and the limitations of the research.

2. Logistics and Last mile

2.1 Logistics and supply chain

There is no doubt that supply chain affects our daily life, taking into account how many products we buy and consume every day. Determining the supply chain, it is a complex of fields, which are connected between them directly or indirectly through operations having as a target the consumer satisfaction. It means that supply chain includes all stages from suppliers to customers.

With the passage of time, the companies follow many business improvement models in order to achieve the best performance for them. In the 1960s, the majority of manufacturers focused on the methods of mass production in order to reduce the production cost. However, the product flexibility was restricted. The evolution of supply chain management started in the 1980s, due to the global competition and the companies had to provide products in low-cost and high-quality with design flexibility. So, businesses have adopted Just-In-Time (JIT) strategy in order to improve the cycle time. In the 1990s, manufacturers continued the evolution, following further improved strategies in resource management. They included strategic suppliers and logistics function to improve the supply chain efficiently. (Rajendra Kumar Shukla et al., 2011).

There is usually a confusion between “logistics” and “supply chain management”. However, the terms are different according to the industry and we will define the logistics management below.

Logistics comes from Greek term *lógos* that means “order” and according to the prevailing definition it is the process that include functional activities, which related to materials management and distribution. Regarding the origin of logistics, it is known that comes from military. This process emerged due to the need of efficient troops supply with foods, ammunitions, fuel and everything was necessary. Generally, it was very important to ensure that armies could effectively cope in conditions of moving and fighting. Historically, in 20th century BC, the Babylonians created a military board that was specialized in the supply, storage, transport and distribution of equipment of soldiers. Until the end of Second World War, only military applied logistics. Afterward, it broke in manufacturing sector in order to ensure the correct materials management and distribution. (Ghiani G. et al., 2013)

According to business model, logistics is something more than functional activities that related to flow the materials and distribution. It is whole system that consists of infrastructures and equipment in order to support effectively the storage and distribution operations. As it is shown in the following Figure 2.1, a schematic is depicted that represents a logistic system. Thus, finishing the manufacturing process of products, these are transferred in the warehouse. There, the goods are received, are checked then either are loaded for shipping or are placed in the warehouse for storing. Subsequently, when a consumer will buy this product then, it will be picked and packed in order to be shipped to the customer, who can be dealer or retailer. Finally, there is also the option of the product return from customer to department of receiving in the warehouse. (Wang G., 2011) (Ballou, R. H., 2006)

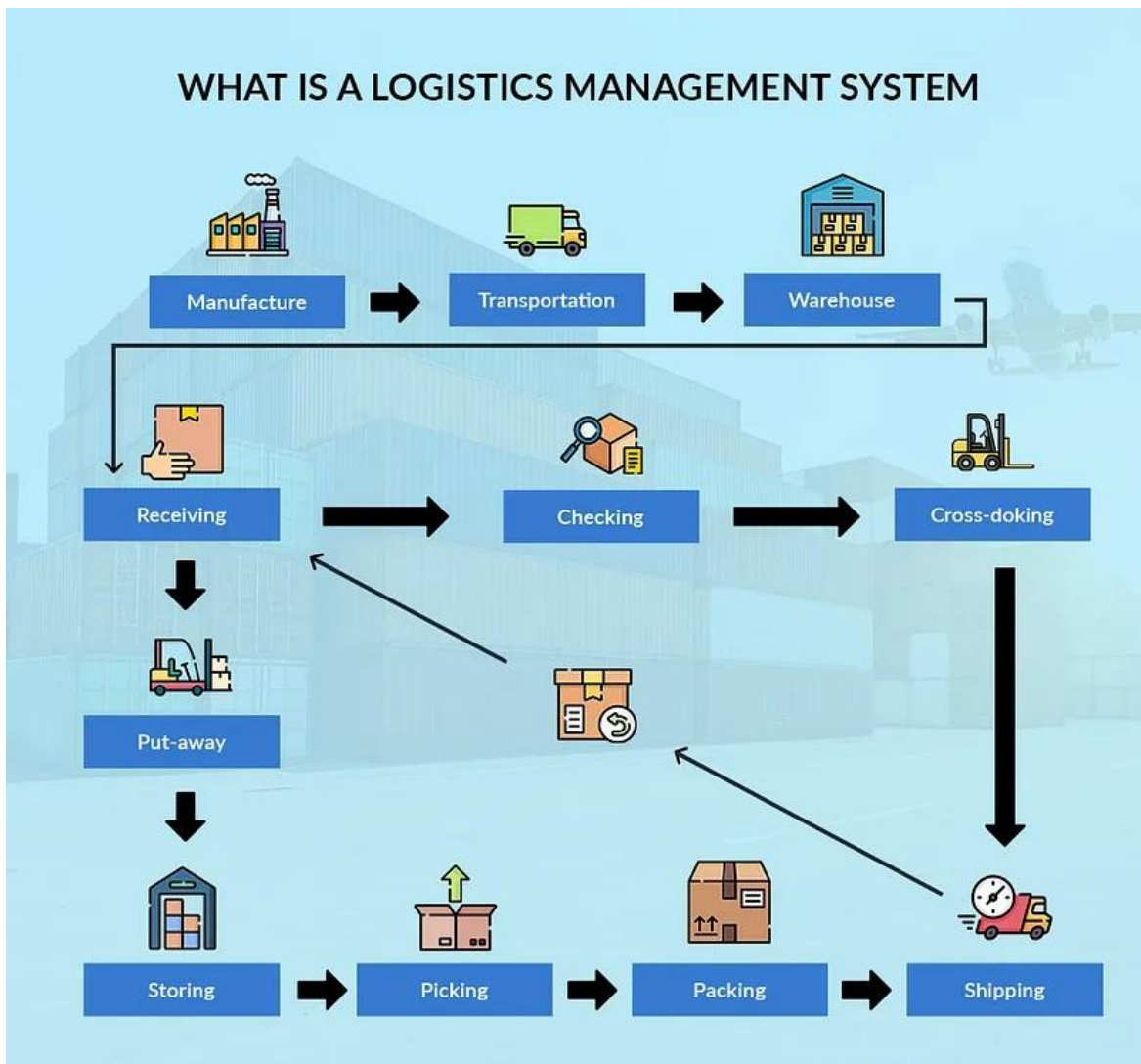


Figure 2.1 Example of logistics system (Phoenix Bizz Staff Writer, 2023)

With respect to logistics activities, that are executed in a logistic system, are categorized according to their location regarding the production and the distribution process. Particularly, *Internal logistics* are the activities that are finished into the manufacture, such as receiving and storing materials, picking them to supply the production line in order to finish the product. On the other hand, the *distribution logistics* or *external logistics* are the activities that are conducted after the finished product such as, transportation to warehouse, receiving, checking, storing, picking, packing and shipping. Moreover, there is *reverse logistics*, this field of logistics is related to unsold products or returns from the final destination to the facilities. (Ghiani G. et al., 2013) (Larson, P. D. et al, 2004)

Storage and distribution of finished goods are the primordial logistics operations, which can be executed by the business itself or may be assigned to a third party (3PL, or *Third-Party Logistics*). As well, the warehouse can operate as a Central Distribution Center that feeds the market or it can operate as a two-level distribution system, it means that there is a Central Distribution Center which feeds more than one Regional Distribution Centers. However, professionals of business make the decision which model is more appropriate for the company performance according to the costs of logistics activities. (Baisya, R. K., 2024).

2.2 Last mile of the supply chain

Taking into consideration the growth of on-line sales, the growth of urbanization and population, the changed consumer behavior, the innovation and focus on sustainability, it is worth dealing with last mile logistics. Over the past five years, last mile logistics is a new research area that marks increasing interest from researchers. There is the option that last mile often is one of the most expensive, ineffective and polluting stages of the supply chain. Researches have shown that the cost of last mile can reach up to 75% of total supply chain cost. There are many factors that affect the efficiency, such as the number of consumers, time windows and scheduling of deliveries, categorization and dimensions of products, and traffic issues. (Copacino, W. C., 2019)

Last mile has many definitions but, a common version is related to last stretch of the supply chain from the last distribution center to the receiver's preferred delivery point. However, there is an overall framework of last mile logistics that consists of five parts.

These parts are last mile logistics, last mile distribution, last mile fulfillment, last mile transport and last mile delivery, and we will explain below. (Olsson J. et al, 2019)

As it is shown in the following Figure 2.2, the framework consists of five parts which are last mile logistics, last mile distribution, and three central parts: last mile fulfillment, last mile transport and last mile delivery. The main body of the framework based on the three distinct and sequenced parts, the philosophy of these components is operational with a short-term planning horizon and unites under last mile distribution. Afterwards, last mile distribution extends the main body by mid-term planning horizon. In finally, the philosophy under the broad umbrella of last mile logistics is long-term planning issues and gives an overview of the system and its environment. Moreover, the framework can be explained from other view, such as both back-end and front-end options. The back-end is the field of the system which deals with sender, while the front-end of the framework deals with receiver. In the following sentences, we describe the components of framework.

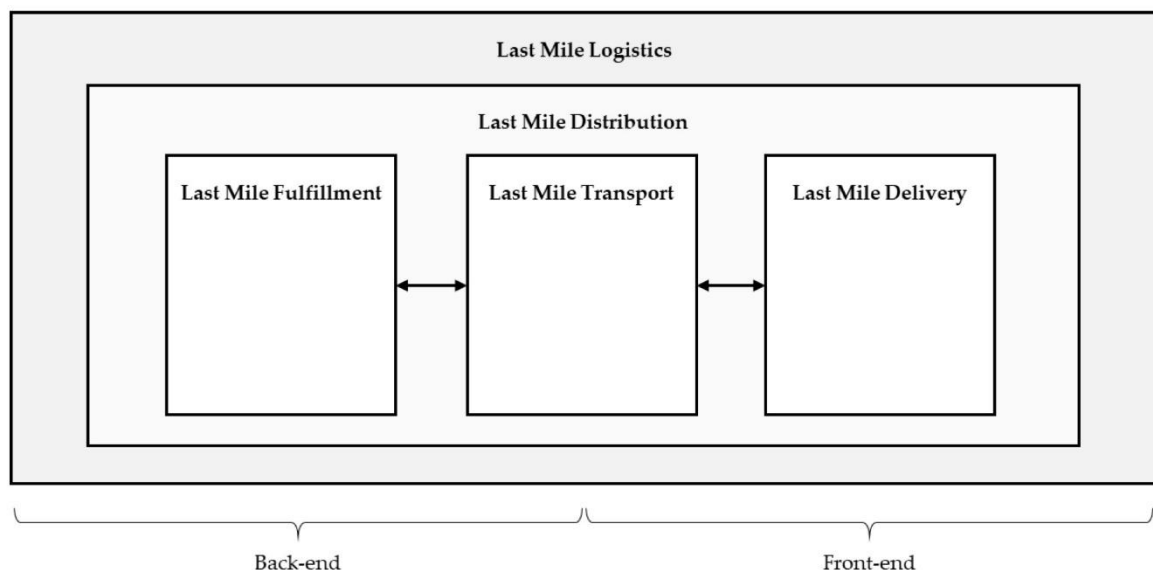


Figure 2.2 Overall framework of last mile logistics consists of five components (Olsson J. et al, 2019)

The *last mile logistics*, as the basis of literature, can be considered the procedure of planning, implementing, effective controlling and efficient transportation, and storage of products, from the order entry point to the final consumer. This part plays a vital role in the strategic coping because, it focuses on horizontal collaboration, e.g., drivers, service

quality. Moreover, the business methods investigate the use of large amount of logistics in the last mile. (Olsson J. et al, 2019)

The *last mile distribution* is dealing with the managing, movement and storage of items to the point of consumption through multiple channels. The last mile distribution is related to multiple issues, it includes an operational optimization and the most times touches more than one of the three central parts. For instance, if a travelling salesman faces a problem with drones, that trucks collaborate with these, then it is possible to change the distribution system. (Olsson J. et al, 2019)

The *last mile fulfillment* is the one of the three central parts of the last mile distribution. It is the procedure of conducting an order by making it ready for delivery. Last mile fulfillment and last mile transport are extremely relational so, are often researched together. In this case, there is focus on cargo terminals and distribution centers. An example could be the study of re-engineering the order fulfillment procedure of on-line orders in distribution centers. Therefore, it would be effective an improved order managing, which aligns logistics service providers with online retailers. (Olsson J. et al, 2019)

The *last mile transport* is the one of the three central parts of the last mile distribution, as well. It is related to movement of items in the last mile and can be execute through multiple means, such as heavy products vehicles, light products vehicles, electric vehicles, bicycles, tricycles, drones. Last mile transport is between last mile fulfillment and last mile delivery so, last mile transport plays a vital role in the last mile logistics system. In this case, the operational optimization is related to routing. For instance, this part includes routing problems with electric vehicle, drones and other types of ones. Therefore, a propose could be the integration of different vehicle types according to energy consumption, emissions and cost. (Olsson J. et al, 2019)

The *last mile delivery* is the third central part of the three centrals ones. It is related to the necessary activities for physical delivery to the final point selected by the receiver. Provided that this part deals with receiver, it can be considered as the front-end, as well. Last mile delivery and last mile transport are extremely relational so, are often researched together. In this case, the priority is technologies and innovations with respect to products reception solutions. An example could be self-service technologies, intension of consumers to use a new technology, location of pick point and spread of innovation. So,

some ways to manage these issues could be the acceptability from customers about the goods collection of lockers, greenhouse gas emissions and strategy of network operators. (Olsson J. et al, 2019)

2.3 Cost of last mile

As we referred above, there is a growth of items delivery, due to globalization and online sales, in the last case the covid-period played an important role, and this is expected to be larger in the next future. So, it is a significant challenge for researchers to improve the logistics activities related to freight transportation, through new technologies and innovative techniques. Because, there are both financial and environmental reasons such as, congestion and pollution, and the reduction of costs. The costs of last mile logistics are the inefficient financial operations or the funding of logistics activities. (Ranieri L. et al., 2018). (Balcik, B. et al, 2008)

With respect to the last mile delivery is created cost due to the development of Information and Communication Technologies (ICT), Information Transport Systems (ITS), Industry 4.0 and new transport vehicles. The adjustment to the new trends requires financial support and the appliance of these has high costs. Last mile includes up to 28% of the total delivery costs. In addition, in the last mile delivery the most common freight transport is road and it is the major responsible for the externalities because, it generates traffic volume in the city, it reduces the efficiency of service in citizens and spreads system costs. (Ranieri L. et al., 2018). (Janjevic, M. et al, 2020)

The transport sector is one of the main causes of the externalities costs, which are generated by human activities that will increase as the population increase. According to the EU definition *“the externality cost is a cost arising when the social or economic activities of one group of persons have an impact on another group and when that impact is not fully accounted, or compensated for, by the first group”*. (Ranieri L. et al., 2018). Movement costs have to be considered, the congestion of vehicles produces traffic in the city and extremely reduces the efficiency of the transport system, it means that loss of time and money. Moreover, the most vehicles need oil in order to power the engine. If we take into account that the majority of nations have to import oil, the strong negotiations of producers and the wars are caused due to the control of territories, then the oil becomes very costly. (Ranieri L. et al., 2018). However, in the case of maritime shipping there are

also costs such as, port mooring charges, costs of port agencies, canal transit costs and so on. Furthermore, the process of goods loading and goods uploading requires the appropriate equipment, indispensably. In addition to this, there is also the cost of rental for the appropriate equipment, if it is not available. As well, the fixed costs of vehicles are considerable such as, insurance costs, engineering control costs and costs of taxes. (Melkonyan, A. et al. 2020) (Seghezzi, A., et al. 2022)

In the part of last mile fulfillment following the new methods and apply innovative technologies, there are also costs of activities, such as the acquisition cost of an equipment of new technology, the cost of its maintenance in order to operates effectively the logistics activities, the insurance cost, anything else can be arisen related to engineering error and the cost of obsolescence. Moreover, the human resources are necessary both in last mile delivery, in last mile transportation and in last mile fulfillment. Therefore, wages are fixed costs while, anything else cost can be emerged, such as a compensation. There is no doubt that the lack of human resources produces costs because, the necessary processes cannot be executed and, in this way, financial burdens are created. One more kind of costs could be packaging ones as, some operations have to be conducted in order to be ready the product for delivery. (Ghiani G. et al., 2013) (Wang, X et al, 2014)

2.4 Problems and challenges of the last mile

First of all, customer expectations create constant challenges to professionals in the last mile. It means that consumers want both fast order delivery and at a specific moment because it is most convenient for him or her. (Virtua, 2023)

Continuing, the dimensions and the type of an item also affect the delivery ways and it is possible to emerge additional services. Goods which are heavy and large, or have non-standard shapes should be counted out from the express delivery, because the express delivery version is executed by bicycles or scooters. For instance, a product can be fragile and it needs a proper packaging and managing thus, this product neither cannot be put in standard boxes nor to be express delivered by bicycle or scooter. In the case of furniture, consumers desire not only the good to be transferred into the house, but also to be assembled. Some courier companies have available this service with the corresponding cost. But who will cover the charge, the store or the customer? It is common the couriers to be blamed for delays in delivery however, consumers have the tendency to provide

wrong address or to be absent from the home. As well, there is problem with the lack of parking space. (Virtua, 2023) (Tilk,C. et al. 2021)

A problem we often encounter is damaged goods and returns of ones. Especially, if the product is fragile, as we mentioned above, the possibilities to be damaged are many. But we take into account that here is pressure of time and large number of items in the delivery vehicle. In addition, sometimes the couriers do not take care properly the transported products due to the time pressure and the tiredness. With respect to returns, it creates a complication in logistical activities and negatively affect the smooth flow of operations. (Liu, W. 2020)

Last mile delivery has impact on the environment due to the increase of online sales and after the pandemic it has become more apparent. Some of the problems that are arisen are the air pollution, climate change, noise pollution, congestion, accidents and so on. (Cardenas, I. et al. 2017)

The transport air pollutant emissions have impact on human health, by causing diseases, and on environment, by causing environmental damages. Epidemiological studies show that the most dangerous air pollutants in cities are: Particulate Matter (PM), Nitrogen Oxides (NO_x), Carbon Monoxide (CO), Aliphatic and aromatic hydrocarbons, Sulfur Dioxide (SO₂) and heavy metal. The impacts on humans and the ecosystem have to be estimated. The air pollutant emissions are responsible for human illness, like allergies, cardiovascular diseases and problems in the respiratory system. The most important is that these health problems are non-reversible and incurable. The absorption of carbon dioxide to the atmosphere and the throwing of goods packaging into the garbage have extremely impact to the environment. The Greenhouse Gas (GHG) emissions into the air cause climate change. The freight transport is responsible for about 20-25% of emissions and it will be increased by about 30% in comparison with the levels of 1990. A vital role also plays the increase of e-grocery popularity, which increases the refrigerated emissions, because these goods need refrigerated conditions in order to transfer. This not only includes the consumption of more energy but the chemicals used in the refrigeration industry destroy the ozone layer. (Ranieri L. et al., 2018) (Penna, P. H., et al. 2017)

Moreover, the noise pollution generates problems on human and animal life such as, acoustic problems, sleep disorders and hypertension.

One more big deal is the accidents that in the worst-case human lives are lost, otherwise the health condition reduced, producing pain, grief and suffering. There are medical and material costs and expenses.

Of course, among all these is the congestion, which increase the traffic so, driving time increases, as well. There is more fuel consumption and generally the efficiency of public transportation becomes poorer. (Ranieri L. et al., 2018).

3. E-commerce and the last mile

3.1 E-commerce

As we have realized, our lives have affected by use of Internet and it has dominated both in personal and professional sector. Especially, the business models are replanned based on e-commerce in order to take advantage the companies in the market place. Because, in this way the services costs reduce and the product efficiency increase. Thus, people have the potential to sell and buy products services online.

From the customer viewpoint, the most significant benefit is the convenience to access from anywhere you are and anytime you want. So, the consumer can sell or buy products or services online and, in this way, there is the potential for time saving. Moreover, there is the flexibility the purchases to be executed 24 hours a day and 7 days a week, without physical contact with the store. The same is also applied to transactions. Furthermore, for customers-members of a company additional discounts are applied. One more advantage is to move to other site of a store, if the operation of the company is unsatisfactory. In addition, the customer has access to details of a product by clicking on corresponding button such as material composition and country origin. As well, the customer has the option to see the comments of other customer that had bought the same product and to evaluate the item before making a final purchase. (Jain V. et al., 2021) (Joong-Kun Cho J. et al., 2008)

From the viewpoint of sellers, the most important benefit of e-commerce use is increased sales and decreased costs so, it generates income. In this way, it reduces the costs related to operation, maintenance, and the costs that is spend on purchase and procurement. Thus, the selling process is speeding. In addition to this, the costs of products transportation significantly reduced. Moreover, through e-commerce the image of any brand is promoted, the external and internal communication become better and it helps to raise relationships between consumer and supplier. (Jain V. et al., 2021) (Yu Y. et al., 2016)

Traditionally, logistics activities were the flow of goods, information and cash. This aligned interaction has been broken by the e-commerce. There were the brick-and-mortar stores and the client could take the product himself while in the case of e-commerce, logistics channels for delivery is a separate part in supply chain and huge facilities have installed for distribution of the goods. As e-commerce has grown, logistic activities have

also developed in order to service the demands of consumers. The growing of online sales has eliminated the intermediaries, who were prevalent in traditional supply chain and manufacturers prefer to sell direct to consumers in order to decrease delivery time and costs. It means that business should focus on last-mile of the online shopping. E-commerce, especially the type of B2C, is related to large numbers of small orders, which require a different distribution method compared to the method that is applied on larger orders. Therefore, e-commerce opens the road to third-party logistics (3PL), which will be continued with the growth of e-commerce. As well, there are risks in e-commerce that have to be considered because play a vital role in sustainability of business. (Ramanathan U. et al., 2014) (Sandhaus G., 2018)

3.2 Evolution and Challenges

E-commerce or electronic commerce is the transaction of products and services via electronic communications. It has been advancing since the 1990's and its evolution is directly related to the development of information technology. At the beginning, e-commerce was limited to the simple spread of items and services through Internet and it has been improved as an interaction between vendors and customers via Internet. The users can conduct transactions 24 hours a day, including weekends and holidays. This convenience is the most important reason that the e-commerce use of consumers has increased and it is applied to six basic types of e-commerce, which we will study below. (Valdeci Ferreira dos Santos et al., 2017) (Delfmann W., 2002)

1. Business-to-Business (B2B):

Electronic commerce B2B is related to electronic transfers of goods or services between companies. Generally, this approach is applied by producers and industrial firms. (Jain V. et al., 2021)

2. Business-to-Consumer (B2C):

This type of e-commerce is the transactions between firm and consumer, and it is the shopping part, where retail business typically occurs. In this case, it has expanded significantly due to the coming of Internet with many online shops, which offer any kind of products to consumers such as, clothing products, food, accessories, cars, books, computers and so on. In this way, the consumer makes the appropriate choice, having

compare the prices of goods and knowing the content of products. Thus, the process becomes easier. (Jain V. et al., 2021)

3. Consumer-to-Consumer (C2C):

Electronic e-commerce C2C is related to trade interactions of products and services between consumers. In this case, there is an online transaction form as a third party in which the exchanges are conducted. (Jain V. et al., 2021)

4. Consumer-to-business (C2B):

In this case, the basic action between consumer and business is the returns of products, which is widely known in firms. A return can happen from consumer to business, when a product does not meet the expectations of customer, it is defective, or in order to be recycled. (Jain V. et al., 2021)

5. Business-to-Administration (B2A):

Type of B2A is related to online transactions between companies and the government. This e-commerce type is used in many cases such as, taxes, health and social care, legal documents and so on. In recent years, e-government has developed so, these modes of services have been remarkably extended. (Jain V. et al., 2021)

6. Consumer-to-administration (C2A):

In the type of C2A, the electronic transactions are related to government and consumers. This model is applied to education, such as learning from distance and spread of information. Moreover, it is used for management of taxes filing tax returns, payments, and for social security. As well, it is important for health issues for instance, appointments, payment of health services and information about illnesses. (Jain V. et al., 2021)

Despite of the benefits of e-commerce, it also faces multiple challenges, which are about the buyer and the vendor, who make transactions via Internet. A challenge could be the cyber security which is the most significant problem for web sites. It is very important the system protection and protocols of reliability because, if an e-commerce web site will be hacked, the buyer loses his money. Moreover, the collaboration of private and public is required in order to develop the industry of electronic commerce. For this reason, both of sides have to gain the trust, which is the key of e-commerce. Financial institutions and banks play a vital role in supporting the e-commerce market in developed countries. Retailers want the banks to participate in e-commerce in order to mitigate thefts. However, financial institutes are a target for theft. Furthermore, a challenge in e-commerce is the improvement of facilities in networks due to the negotiating deals that are conducted with

suppliers in developed nations. One more e-commerce challenge is the reduction of internet prices because the bandwidth costs are not applied. But, the costs of service and network delivering are not kept at a low-cost level. (Jain V. et al., 2021)

3.3 Technology

Attracted by potential opportunities provided by the Internet for market, any kind of businesses apply information and communication technologies, hoping to better performance for them. So, there are multiple e-commerce facilitators, which are widely used.

Of course, the first one is Internet and because of expanded use of it the e-commerce has increased. The Internet and the smartphones have dominated in our lives and these are easy to use without requiring specialized knowledge and intelligence. The supply chain is smart, as digital networks can quickly link to customers. Many new markets have helped by Internet and its services. In the 1980s the number of Internet users was low. Until 1994 there was a gradually increase and then remarkable increase was reported. The population of Internet users jumped out with the coming of the World Wide Web. The United Nations International Telecommunication Union (ITU) counted 3.2 billion users online in 2015 and inhabitants were 7.2 billion. While in 2000 the Internet users worldwide were only 400 million. (Jain V. et al., 2021)

Moreover, the payment gateway is important e-commerce facilitator because it is used for online sales and payments. The main element in online transactions are payment ways which include credit and debit cards, and online banking purchases. In order to secure the sustainability of e-commerce in future, payment transfers are required shifting from cash into digital coin. (Jain V. et al., 2021)

One more facilitator of e-commerce is analytics, which is a qualitative method of transforming data into decision-making intelligence. In this way, business have the opportunity to collect, regulate, review and comment on their customers. Companies based on research in order to study the consumer profile because of huge amount of data. Retailers should have real-time access to knowledge and basic analytics to be available for e-commerce members. (Jain V. et al., 2021)

Furthermore, social media is a remarkable facilitator due to advertising of products and services. In this way, companies constantly advertise their goods via blogs, applications of computers or smart phones and spread information online. Social media play a significant role in advertisement of a product and remind consumers of different deals. Social networking is a tool of creating a trustworthy group of consumers and word of mouth. (Jain V. et al., 2021)

In addition, autonomous vehicles can work without the human interference using artificial intelligence and sensors. These will have much time to work on internet, open and read emails and buy new products. These engines of shopping and search can be detected, so companies are benefited in order to plan the marketing strategy. Big data will be adjusted and predictive in the close future, that nothing can be changed again. (Jain V. et al., 2021)

The last but not least is 3D printing, which belongs to category of electronic devices and can build a digital model of 3 dimensions. The “additive manufacturing” technique looks like a laying of colors of an ink-jet printer on a flat sheet of paper. 3D printing creates companies of prototypes that the customers is expected to print. The final product is not available in the market, but the concept is sold and a printable license. Talented artists from all over the world present their printing plans either at house or at work via internet. (Jain V. et al., 2021)

As it is provided, e-commerce has potential in the modern market even for small-scale producers, who encounter barriers to entry in foreign markets. The industry of e-commerce has been expanded to many fields, in contrast to how it was in the beginning. The market of e-commerce in our days is not just an online platform for purchases and sales, it is much more. It focuses on consumer services by processing of data, logistics, artificial intelligence, personalization and space for the next generation of e-commerce plans. (Jain V. et al., 2021)

3.4 E-commerce and the last mile

Over the last years it has reported a growth in e-commerce because of the economic and employment development, the population and households’ growth, the increase of online sales and the growth of technology. Therefore, e-commerce has impact on the last mile and it is daily proved by the increase of vehicles for package deliveries in cities due to

growth of e-commerce. The online sales increase in future because of some possible reasons such as, older people become more familiar with the use of internet and online shopping, young people, who are the larger portion of retailing, have grown up with the internet, the physical stores will close because of competition, the increase use of smart phones will make online shopping more convenient and easier, and so on. (Janjevic, M., et al., 2019) (Escudero-Santana, A. et al, 2022)

The growth of online shopping creates profitability for retailers and carriers. However, there are multiple factors that have impact on profitability, some of these are discussed below:

1. Peak pressure: The retailers boost sales in order to take sustainable competitive advantage in market place launching concepts such as “Black Friday” and “Cyber Monday”. However, during these periods there is a peak demand pressure and it requires an appropriate infrastructure which is able to support the corresponding operation activities. (Allen J. et al., 2017)

2. Complex customer demands: Clients constantly demand faster, easier and more convenient deliveries. So, transporters provide services such as, timed delivery windows, package traceability, alternative delivery location options, alternative collection points and locker boxes. These operations require investments and all courier companies cannot afford these expenses. Studies have shown that the choice of consumer, related to who retailer is chosen, is affected by delivery service. For instance, if a consumer has negative experience with a delivery service, he will choose another retailer in the next time. (Allen J. et al., 2017)

3. Overcapacity in the sector: The new logistics business strategies in last-mile exacerbate the capacity in the package market and generate overcapacity, which is increased in fast rate. In this way, the total package industry capacity could also increase in the short-term. However, it could be kept and be continued in the long-term if competitors could afford to respond in these circumstances. But it would require facilities in order to handle the logistic operations and would generate pressure on delivery prices. (Allen J. et al., 2017)

4. Demand for B2C and C2C deliveries: Although, B2C and C2C deliveries has significantly increased, the profits for transporters are much higher in the case of B2B deliveries. Moreover, the first case contributes to make delivery less effective in contrast

to B2B case, because there is first-time failure in delivery, distribution of single-packages, more suburban and ex-urban delivery locations with distances. (Allen J. et al., 2017)

5. The impacts of “free” delivery: In recent years, the “free” delivery option is offered by retailers in order to attract more customers and it has as a result better deals with transporters. In 2016 research showed that of 350 online retailers the 16% provided free delivery anyway, the 55% provided free delivery when the threshold of value is completed. The government service of London reported that 56% of adults supports that the cost of delivery is remarkable factor when choosing a retailer and that 55% had not finished an order due to the high-cost delivery. (Allen J. et al., 2017)

6. Traffic conditions: In urban areas there is difficulties in road because of the absence parking space and the road conditions are worse in peak hour. Over the last years, this situation becomes more pressing because the average of traffic in cities has extremely increased. So, couriers have to park more far from the delivery point, covering distances on foot and risking of parking penalties. (Allen J. et al., 2017)

7. Available logistics infrastructure: Because of the rising land values, the parcel couriers are forced to relocate the central supply warehouse and distribution facilities to suburban areas, which have costs at a lower level. However, it affects the efficiency due to distance from the warehouse to the first delivery point, and from the last delivery point back to the warehouse. In this way, the kilometers of vehicle are increased. (Allen J. et al., 2017)

4. Methodology

4.1 Methodological choices

In this section we deal with procedure of research and its stages through the “research onion”, it a method which is created by Saunders et al in 2007. As it is shown in the Figure 4.1 are depicted layers like an onion, each layer is each stage of the research and it consists of 6 levels: Gradcoach, Jansen D. (October 2023)

1. Research philosophy
2. Research approach
3. Research strategy
4. Choices
5. Time horizon
6. Techniques & procedures

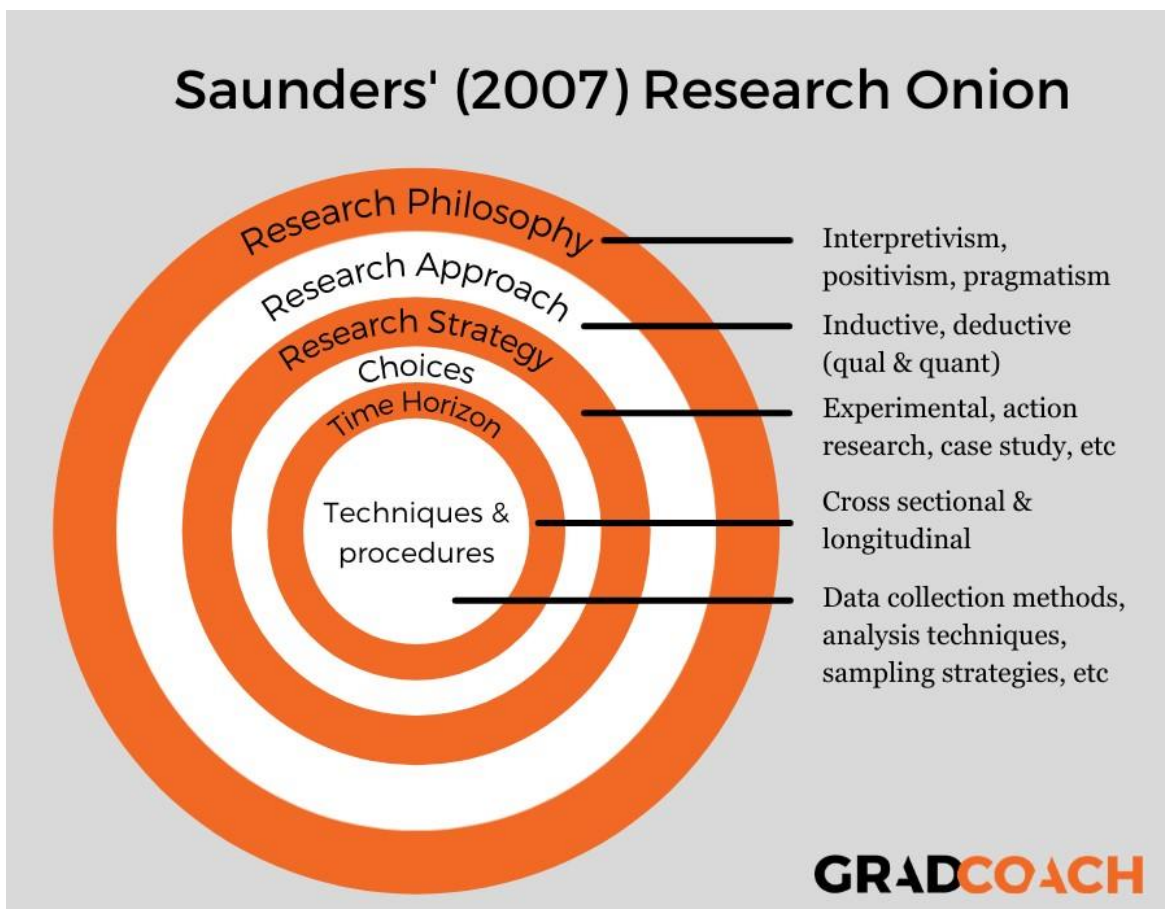


Figure 4.1 Saunders' Research Onion, Gradcoach, Jansen D. (October 2023)

1. Research philosophy

The first level, which is the cover of the onion, is the research philosophy. It is the set of views that the research is based on this. There are many research philosophies but the most common are three: positivism, interpretivism and pragmatism.

According to positivism there is only one reality, which is objective and there are not personal opinions, and the researcher operates only as an observer, they don't define. In this case, the knowledge is extracted through measurement and observation, and it can only be true, false or meaningless.

On the other hand, the interpretivism focuses on the impact of social and cultural coefficients that have on an individual. So, the researchers have to be active in the research outlining an overall view of the participant, such as their actions, beliefs and attitudes.

In the case of pragmatism, the knowledge is not standard and is constantly questioned and interpreted. The approach of study is executed from a practical point of view. There is an involvement of researcher and subjectivity.

2. Research approach

In the next level toward the middle is the research approach. At a more general level, there is the inductive approach and the deductive one. The inductive approach produces theories from research in order to apply a project based on these theories. On the other hand, the deductive approach maintains a condition as a given and then it is tested through research if it is valid or not. At a more specific level, there are two approaches of research, the qualitative and the quantitative one. The qualitative is based on textual, visual or audio data. The inductive approach is usually applied with qualitative research. The quantitative research is based on numerical data and it is used in the deductive approach.

3. Research strategy

Moving toward the middle, we reach out the third layer that is the research strategy, it means that how the research can be executed. There are many strategies but the most common are the following:

- Experimental research
- Action research
- Case study research

- Grounded theory
- Ethnography
- Archival research

The experimental research is related to evaluation the relationship between variables. There is an independent variable which is handled and the dependent variable that we observe the effect from another variable. This procedure is a scientific method and it has to be executed into a controlled environment. In this case, a theory is considered as a given and it is tested in order to generate new theories. With respect to philosophy, experimental research is positivist with deductive approach.

The action research focuses on the problems or weaknesses in the real world and it is executed in practical settings such as a hospital, a classroom, a workspace, these environments are not controlled such as a laboratory. So, the action research focuses on the participants.

The case study is a detailed research in-depth study of a single subject, such as person, company, issue. So, the aim of this research is the in-depth understanding issues in real-life settings.

The grounded theory research is typically qualitative with inductive approach, because the data inform the development of a new theory. In other words, the developed theory is “grounded” in the data.

Ethnography research as Creswell (2013) says it: *“Ethnographers study the meaning of the behavior, the language, and the interaction among members of the culture-sharing group.”* The aim of the ethnography is to capture the subjective experiences of observing people in their natural environments. It is usually qualitative approach and interpretivist philosophy.

The archival research is more appropriate for historical research and are used manuscripts and records that already exist.

4. Choices

This stage is called choices, which are three, mono, mixed and multi-method. The mono method is when you only use one type of data, either quantitative or qualitative. The mixed-method is when you use both quantitative and qualitative data. The multi-method is

when you use a broader range of approaches. It means that it is used more than only one quantitative and one quantitative method.

5. Time horizon

The time horizon is the points in time that you set in order to collect the data. There is the cross-sectional and longitudinal time horizon. The cross-sectional time horizon refers to a certain point in time, for instance, in 2024, and focuses on the time of collection, not the data type. The collected data could be quantitative, qualitative or mix of both. The longitudinal time horizon refers to collection of data over multiple points in time, for instance weeks, months, years. It is used for studying changes and progressions over time.

6. Techniques and Procedures

This stage is the center of the onion that the techniques and procedures are specifically defined.

- Decide what data you will collect and in which collection methods, for instance survey or interviews
- Decide which sample of population you will ask, for example random or convenience
- Determine the type of data analysis, for example content analysis or statistical one
- Set up the material for the study, such as the questions for the survey or interview

It is important to there is alignment among the techniques and procedures with all other layers of the research onion.

After a broad investigation over web scholar sources, it was found that there is very few research on the subject concerning Greece. There is no knowledge from the “last mile” actors concerning Greek reality.

So, unavoidably, the proposed research is profoundly phenomenological. That implies that the researcher was looking to ponder the members involvement on the subject. Hence, the investigation was taking a qualitative approach (Neubauer B. E., et al., 2019).

Using the Saunder’s Onion, the researcher’s methodological choices are justified.

The philosophy followed is pragmatism, it means that the meaning of conclusions and 'facts' captured are surveyed through examination.

Since there is little information on the particular case, an inductive strategy was utilized, meaning that the analyst attempted to draw conclusions going from specific to general. That is why a qualitative strategy is applied.

The investigated technique that was taken after, is a case study, meaning that the case of “Logistics in E-commerce and the last Mile problem” was considered all through the thesis, in order to get a deeper understanding of the subject. It is mono-method research, it means that only the qualitative approach was utilized. The survey ran in a certain point of time.

The methods utilized: The collection strategy is one-on-one interviews utilizing semi-structured survey. The sampling criteria are two. To begin with a criterion-based sample technique was utilized so all the accessible actors were reached to take part in the survey. At that point a convenience sampling strategy was used, meaning that the sample comprised the most accessible industry specialists. (Seuring S., et al., 2021)

The test consists of 16 individuals, all actors in the final mile of e-commerce supply chain. Separated in two cohorts, 10 consumers and 6 experts from the courier industry, both sample sizes were chosen after thought of two variables. Sample homogeneity and the analyst’s wish to cover all viewpoints. As experienced analysts propose: *“taking sample heterogeneity and research objectives under consideration 6-8 interviews are enough for a homogeneous sample and 12 to 20 when trying to achieve maximum variations.”* (Bekele W. B., et al., 2022)

4.2 The research tool (questionnaires)

In this section we will refer the research tool that is the questionnaire for the interviews, which is the base of the thesis, because it is related to the objectives of the research. As we mentioned in the chapter 1, we conducted the study based on qualitative analysis applying questions in two sectors, which are six courier companies and ten consumers, in order to eavesdrop both sides. The questions for two sides are the following:

6 Courier companies: 6 Chief Executive Officers (CEOs)

Question 1: Has e-commerce affected the profitability of the company? If yes, how much?
Is it reflected in logistic activities or investments?

Question 2: Which delivery method do you prefer, delivery to the client place, to a locker or receipt from the store, and why? Or in which classification and why?

Question 3: Which are the most important problems/risks in delivery? How do you manage these and what can make these smoother?

Receiver: 10 Consumers

Question 1: Do you prefer to buy from physical store or online, why? In which criterion do you choose the online store that you make the purchase: the way of payment, the transportation cost, the service or environmental awareness? Why?

Question 2: Which receipt method do you prefer: delivery to your place, receipt from the store or from locker, and why? Or in which classification and why?

Question 3: Do you think that traceability of the parcel in last mile is helpful, why? Do you consider that the follow-up of the company from which you buy online and of the courier company is helpful? Why?

4.3 Research ethics

The participants were all adults and they were informed about the subject of the study, it is very important to ensure their privacy and confidentiality so, the protocol was followed during the interviews of qualitative research applying the following steps:

- 1) I took into consideration if there is possibility to be created a problem and I tried to manage the interview process with the best potential manner in order to avoid emerging unwanted effect.
- 2) I provided all the necessary information to the participants and they were fully informed about the procedure of the research. It means that they knew the process of the data collection and its managing.
- 3) I had to keep and ensure the consent from all participants. However, there was the possibility of opting out of the research but, it didn't happen.
- 4) I had to ensure the confidentiality of all participants and their data that provided to me.

5) With respect to collecting of data from the participants, the collected data are used only for the purpose of research. The personal and corporate data are collected and managed with authorized use.

6) The participants were fully informed about the method of processing the data. This procedure was executed anonymously regarding the names of individuals, locations, brand of companies, and information deleted which could reveal the identification of informants.

Therefore, the participants in my research were volunteers and I ensured them that the research data will never be leaking outside of this academic study. All collected material during the study were managed confidentially so, informants are not recognizable due to the anonymity.

5. Interviews and discussion

5.1 Interviews

6 Courier companies: 6 Chief Executive Officers (CEOs)

Question 1: Has e-commerce affected the profitability of the company? If yes, how much? Is it reflected in logistic activities or investments?

Answers:

CEO 1

Of course, loads of work has increased due to e-commerce, especially during the pandemic period that e-commerce has extreme rate. However, the sales of e-commerce have still remained at a high level. Therefore, e-commerce contributes in our profitability and it is proved by monthly reports of assignments for delivery. As it is shown in these reports, the average of delivery assignments has increased by 38,25% compared to ones before the pandemic period. In the covid period it is reported a peak by 73,56% because the physical stores were closed and the only way in order to buy something was via online.

Yes, we have done some activities such as to add more transportation means, cars and scooters, in the procedure of distribution. We had started adding a scooter, which was very helpful for the carriers and the procedure of deliveries became more effective. In subsequent, we bought one more scooter in the next year and in this year, we bought one more car. So, deliveries are executed more quickly without delays waiting the first available car or scooter. We have seen a difference for the better in related to comments of clients, they say that they are very satisfied by our immediate response.

CEO 2

Yes, we have benefitted by e-commerce. If we take into consideration that for 3 years the consumers were buying only online, the volume of our work had extremely increased. So, our profitability had also increased. Due to the pandemic people have been more familiar with technology because all transactions were necessarily executed electronically. Thus, this practice is still applied and our deliveries have increased compared to these before the pandemic period and these will continue to increase. For this reason, we pursue collaboration with large online stores which exclusively have online sales.

Of course, we want to become better so, we make investments in order to meet the demands of consumers and to provide better service. The profits from the deliveries in the covid-period were invested in installation of 2 lockers, it was a great opportunity and this activity has given benefits to us. Such as, reduction of delivery time on road, more quick delivery and income. We observe that consumers more and more prefer this way of delivery, because it is convenient for them. Therefore, we are planning to install one more locker the next month. Our strategy is to support the innovation and to apply it when it is possible, because when you make an investment, it returns to your profit. Of course, all possibilities should be considered and the risk should be relatively controlled.

CEO 3

As it is obvious, both the number of carriers has increased on roads and more courier companies are established in recent years. So, our courier company has affected and the work has increased. I think that e-commerce has played a significant role in this increase. The technology is improved and people follow this. The deliveries have increased by 41,3% is compared to these in 2019, the period of covid was not a normal period so I don't consider this. The profitability has increased but the costs have also increased such as taxes, rents, gas, insurances and so on.

Yes, we had done some investments. Although, the pandemic period was not a normal period as I said before. We had profitability that period and we bought a locker and a scooter. People prefer the locker because it is easy for them and it is proved by their preference, it is shown that we made a good decision. With respect to scooter, it was necessary in order to carry the light parcels. The deliveries with scooter are done more quickly than these with car and it is more convenient for carriers.

CEO 4

Yes, e-commerce has affected our profitability. Day by day we report that the number of deliveries is increasing and the rate of income is a very compensatory. We are a startup store and we have not reported from years before covid. However, taking into account the profits of 2 years that the store operates, we see that an increase is remarked and the high seasons there is a peak. I think that e-commerce will be continued so, our role will be also continued.

We have not made an investment yet, because the profits are used to cover the fixed and operational costs of the company. I consider that we can't make an investment for the next 3 years at least. However, if I could make a decision for now, I would choose to install a locker. I see that many courier companies provide this option to the receivers and they use it.

CEO 5

Yes, there is an increase of receipts and deliveries so, it means that there is a profitability as well. A reason that it occurs is definitely the e-commerce. There is no doubt that the online purchases have increased the last years and it is very beneficial for us. Trying the online stores to attract more consumers and to increase their sales, they continually offer discounts thus, the consumers are constantly buying from the online stores. So, the increase of e-commerce has increased our profitability. Moreover, we have made exclusive deals with three big online stores and in this way, we are more increasing our profitability.

With respect to investments, we bought a locker and a car. In the case of locker, it is very convenient for us because we have the chance to route the delivery whenever it is easier without limitations and meetings with consumers. The same thing happens in the case of consumers as well. They prefer to receive from lockers because it is very convenient for them. They can take their package any time without limitation of hour. Regarding the car investment, it is very helpful for us because we can load many parcels for delivery and it is more effective because the carrier saves more effort and time without back-and-forth routes.

CEO 6

The e-commerce has certainly increased the last years especially the covid period, from then the consumers have been more familiar with online shopping. Generally, we observe that consumers prefer this way of purchases because it is very easy, quick and hassle free. Hence, we have benefitted from e-commerce because our profitability has increased. Although there are many couriers' companies and there is competition, the increase of e-commerce has benefitted all of us but it generates more needs in order to satisfy the consumer demands.

Therefore, we bought two cars the year before last and we hired an employee the same year. We also bought a scooter the last year. These procedures were necessary for us because we had receipts and deliveries, and we couldn't meet our obligations. The cars are necessary because we can load many and big packages. The one car is for receipts and the other is for deliveries. We had to hire the employee for carrier duties mainly. Furthermore, the scooter is very helpful because it carries the small packages and lightens the cars.

Question 2: Which delivery method do you prefer, delivery to the client place, to a locker or receipt from the store, and why? Or in which classification and why?

Answers:

CEO 1

Each option both has benefits and disadvantages. The first option that we delivery to the client place is the traditional one. This way has its difficulties such as traffic congestion, limited parking space, wrong addresses or we cannot find the receiver. Although, it has these disadvantages, we support this option and we prefer it, because it has the less expenses. Thus, we have invested in car and scooters, as we mentioned in the first question.

Subsequently, it is convenient for us the receipt from our store, because in this way it is not necessary to have means of delivery, which have movement expense, fixed costs and these need more human resources. On the other hand, it would have many stores in order to be close distance with customers and they can be serviced. This option also has high costs due to expense of building such as purchase or rent, expense for taxes and for hiring more human resources.

The third option of delivery to a locker is convenient for us as well, because we have not limitation of hour and we are not looking for neither addresses nor the clients, who don't answer the calls most of the time. Moreover, we have the opportunity to select more than one delivery only in a locker so, we gain time. But the lockers have costs related to the selection of location, construction and technological infrastructure. This procedure has many expenses and depreciation is not going to be in the near future because this way is still spreading.

CEO 2

Obviously, we support the delivery to locker, after all for this reason we made the locker investment and we will make one more, such as we discussed in the previous question. I prefer this way and I think that it is the future. In this way consumers are serviced more effectively and they more and more choose this option. Therefore, it has benefits for us because, we gain very much time on roads so, we can move on next deliveries without delays, and it is not required to call receivers and to ask them if they are on their place or when it is more convenient for them to receipt their parcel. Moreover, although the first cost of installation of locker, which is at a high level, then there are the fixed costs, which are manageable.

Subsequently, we prefer the option of delivery on the place of consumer, because there are a big portion of population who have movements difficulties and we have to make their life easier. So, as soon as innovative delivery ways will be added in our distribution plan, we will always provide this option. This one is stable and it is not damaging if the deliveries are not based only on this way.

I don't prefer the option of receipt of our store, because the coming of customers creates a disruption and a chaos in our work. Because, the most of consumers are hasty so, they demand quick service, some of them are rude and it has a negative influence to us.

CEO 3

Firstly, I prefer the option of locker. I believe in this option of delivery because I see that people choose it and it is helpful for us, as well. People are very busy nowadays and it is difficult to coordinate with them so, the locker allows to us and to the receivers to operate separately without binding one to the other. Customers can receive their package whenever they want. Regarding us, it is easier to deliver the parcel to the locker because we don't loss time until to find the receiver and we have the advantage to delivery to only one locker more than one parcels.

Secondly, I prefer the receipt of our store because movement is not required. So, the carrier can execute other duties in the store or out of it thus, we gain time. Moreover, in this way costs of further movement are avoided.

Finally, in the last position is the delivery to the place of customer. I think that it is the most confused way and less effective for us. Every time the carrier has to find the receiver, who the most of times doesn't respond to calls, many times addresses are wrong and other times the customer changes the place of delivery at the last minute while the carrier is at the first selected place of delivery. All of these create delays and generate a confused situation.

CEO 4

We have not the option of locker. I firstly prefer the receipt from our store because we have not enough means for delivery. As well, it is more convenient for us this way because we avoid the further movements, costs and the carrier can help my assistant in heavy packages.

The option of delivery to the receiver place is more complicated for us because we have to call the customer in order to ensure that he or she is at its place but the most of time the calls have not good end. Many times, we have to return the parcel because we had not managed to find the receiver so, we enter a procedure without a result and it is waste of time and money.

CEO 5

I observe that the option of locker is more preferable for consumers and the same thing valid for us, the courier companies. Yes, I also prefer this way of delivery because it is very convenient both for us and for consumers. It is an option that let us to schedule the transportations whenever it is convenient for us. After all, we installed the locker for this reason and we observe that consumers constantly select this delivery option.

Moreover, the receipt of the store is easy for us because we avoid to deal with procedure of delivery and we have more time to do duties in the store. However, there is a disadvantage with this option, when some consumers come to store the same time and it generates a disruption of our operational activities.

The last option of delivery to the customer place I would say that is more complicated because the carrier has to communicate with the receiver in order to ensure the address and the time of delivery. It isn't so easy due to the absence of customers from the delivery

place and not answering the calls. Moreover, the congestion is a significant problem in the urban areas and the cost of gas.

CEO 6

I certainly prefer the choice of locker because it is very convenient and easy for us. In this way the carrier can delivery many packages in only one locker of a region and in this way, we can save time and money, because the time is money. In addition to this, the carrier doesn't need to contact the receiver and this is important because this process wastes time.

I would choose as a second option the receipt of the store; it is convenient for us because in this way we save transports. It is very important due to the congestion in cities and the lack of parking place. Furthermore, the carrier can help in other works in the store, such as loadings.

So, for last option I would say the delivery to the consumer place. I don't prefer this option because it is difficult to schedule the deliveries in a such way that all consumers to receive whenever they want. It is also difficult to contact the receivers and to find them. Many times, the addresses are wrong and they are not in their place but for these deliveries the carrier had already wasted time without a result.

Question 3: Which are the most important problems/risks in delivery? How do you manage these and what can make these smoother?

Answers:

CEO 1

The traffic congestion is a very important problem, for this reason we have added more scooters in our distribution system. Moreover, the absence of parking space is a big problem, I think that it would be very helpful to be provided parking space exclusively for carrier cars and there are not penalties for them from police. As well, if lockers were less expensive, we could afford this investment and would exist lockers of our company.

CEO 2

A significant problem is the sensitivity of the components in the electronic boards. Unfortunately, some of these are often damaged, because these are exposed to weather conditions and the construction of the locker is not proper in order to protect them. Although, the cost of purchase of electronic components and of its repair is not high, it is generated a damage related to financial part. However, the most important issue is the disruption, which is created in our distribution system and in our receivers, as well.

CEO 3

The financial problems are the most important. Even if there is development of technology, e-commerce and our profitability, the costs are huge and it is difficult to manage these. It should decrease taxes, prices of realty, gas and insurance in order to invest to more activities and to flourish the economy of the market. Moreover, the issue of traffic is high of importance because the congestion is a big problem. In addition to this, the parking space is also a big problem. For this reason, we invested in the locker in order to collect all regional packages to one locker. So, in this way we save individual routes for each receiver.

CEO 4

There are high taxes and in general the costs are high. We are 3 people that we are working in the store and it is difficult to manage all the operations and to provide effective service to the customers. On the other hand, we cannot afford to hire more human resources and that is what is holding us back. So, it should be reduced the taxes in order to be kept the stores.

CEO 5

The most important problem is the traffic and the lack of parking space. There is a huge waste of time when the carrier has to deliver a package and he stucks in traffic for two hours. It is not effective at all for us. As well, the lack of parking space is a huge problem, either the carrier has to stop the car far away from the delivery point or he has to stop the car near to delivery point with risk of penalty. In the case of congestion is difficult to mitigate the traffic so, we decided to install the locker and it is very effective because we

save more time. In the case of parking penalties, I would suggest to not valid for the carriers.

CEO 6

There are many problems but the most serious are the traffic, the lack of parking space and the expenses such as gas, insurance, taxes and so on. The population is constantly increasing, so the cars are increasing as well. It is difficult to deal with traffic and the lack of parking place for couriers. The option of locker is very helpful for us. With respect to expenses, it is a big deal because the cost of gas is expensive, the taxes and insurance are at a high level. Hence, it would be more proper to be minimized these costs.

Receiver: 10 Consumers

Question 1: Do you prefer to buy from physical store or online, why? In which criterion do you choose the online store that you make the purchase: the way of payment, the transportation cost, the service or environmental awareness? Why?

Answers:

Consumer 1st

I prefer to buy from physical stores in order to help the local financial statement. I choose an online store taking into account as a first criterion the service, because I want to receive the product as soon as possible and I want to have the option of the product return that I had bought, if it doesn't meet my demands. Moreover, the cost of transportation and of product is very important, because I have the opportunity to directly compare the prices via online.

Consumer 2st

I buy from online shops because it is easier for me, I have limited time and it is difficult to find time in order to buy from physical stores. The most important criterion for my choice is the way of payment, I used to pay in credit card, so I firstly see if the online store provides this way of payment and then I make the order. Second criterion is the cost of transportation, because I don't want to pay many moneys for this. For this reason, I try to reach the value that I have free cost of transportation.

Consumer 3st

I usually choose to buy from online store because it is easier for me. I don't need to move and I can compare the prices more quickly. The cost of transportation is important criterion for me and I try to choose stores with low transportation cost, especially when the total cost of my order is low.

Consumer 4st

I buy from online stores because it is more convenient and quicker for me without movements. The most important criterion is the cost of transportation, when a platform has high cost of transportation, then I will look to find a store with the lowest transportation cost. After this, it is important for me the way of payment when a store is unknown for me, I choose to pay on delivery.

Consumer 5st

I prefer to buy online. I will buy more quickly something via internet than I buy something from physical store. It is more difficult the second way because I have to find time in order to do this and always something emerges so, the shopping loses the priority. The most important criterion is the cost of transportation. For this reason, I try to make orders with high total cost in order to have free transportation costs or I look to find the online store with the lowest transportation costs.

Consumer 6st

Due to I have a local store, I prefer to buy from physical stores in order to buy from me as well, one supports the other. However, sometimes I buy from online stores because it is very easy and convenient. Firstly, I give an importance to the service and if I have the potential to return a product, this criterion is more important for me than the others. Secondly, when I buy online, I look to the platform with lowest cost transportation.

Consumer 7st

Generally, I prefer to buy online because it is easier and more convenient. In many cases it is more economical because I have profile in some platforms and I take advantages as a member of these, such as I have bonus, discounts, free cost of transportation so, it is beneficial for a consumer. The most important criterion is the cost of transportation and

the way of payment. I choose the platform with the lowest cost of transportation and the platform with the option of credit card and the option of payment in installments.

Consumer 8st

I prefer to buy from physical store mostly clothes because I have to try on the clothes and it is not possible in an online store. When I am going to buy electronic products such as mobile, television, I prefer to buy from an online store. If the product that I am going to buy has a high value, the first thing which has importance is the service of the store. Because I want to be sure that I will have a good after sale service in any case.

Consumer 9st

I prefer to buy from online store because I have made purchases from my home without losing my time and troubles. It is very convenient in the case of super market, because I don't need to carry the shopping especially the heavy products such as bottles of water. I choose online stores with a good service because it shows that this store is reliable and I can buy from it. After, I check the cost of transportation and I choose the online store with the lowest one.

Consumer 10st

I choose the online stores because I can make an easy and quick search related to prices and the quality of products. This procedure is difficult to be done in physical stores. I am familiar more and more with online shopping and only in the special cases I prefer to buy from physical store. Firstly, I check the service of the store and if this is reliable, then I check the ways of payment. It is important for me to there is the option of pay on delivery, especially when I buy for first time from a platform. In this way I am ensure that I will not lose my money.

Question 2: Which receipt method do you prefer: delivery to your place, receipt from the store or from locker, and why? Or in which classification and why?

Answers:

Consumer 1st

I firstly choose the option of locker, because I can receive anytime that I want without limitation of hour and it is not required to be in the delivery place at a specific time. As a second option I would choose the delivery on my place, because in this way it is not

necessary to be moved. Final, as an ultimate solution I would choose the receipt from the store.

Consumer 2st

I prefer to pick my parcel from a locker because as I said before I am very busy and I am on road all day so, it is convenient for me this way, due to a locker is available every day and all day without limitation of time. If there isn't this option, I choose the receipt from the store because it is difficult to coordinate with carrier at a specific time in order to delivery on my place.

Consumer 3st

I prefer the delivery on my place because I don't need to move. I am usually at home so it is easy for the carrier to find me. If it is not possible for some reason, then I prefer to receive from the locker whenever I want and it is convenient for me. If there is not possible this way, then I will necessarily receive from the store of courier.

Consumer 4st

I prefer delivery on my place because it is easier for me and I needn't to move. Usually, I am at home the afternoons so I choose hours of delivery after 4 p.m. If it is not possible, I necessarily go to the store of courier, because I have not a locker in my region. Otherwise, I think that I would choose the locker and then the receipt from the store of courier.

Consumer 5st

I prefer the receipt of a locker, because I have locker in my region and I have easy access to this at any time. As a second way I would choose the delivery on my place because I don't need to move and as a third option the receipt of the courier store.

Consumer 6st

I choose the option of delivery on my place because it is more convenient for me and in this way, I can save time. After, I would choose the option of receipt of locker because I can take my parcel whenever I want and it is convenient for me.

Consumer 7st

I prefer the option of delivery on my place, it is more convenient and I don't waste time. However, if I have some benefits in the other ways, such as discount or more quick

delivery, I choose these ways, as a first selection the option of locker, because I have access any time and as a second one the option of receipt from the store.

Consumer 8st

I prefer the receipt from a locker, it is very easy and convenient. I can take my package from the locker in my neighborhood whenever I can. I don't need to wait whole day for the carrier. If the option of locker is not possible, then I choose the receipt of package from the store, for the same reason that I choose a locker.

Consumer 9st

I mostly prefer the receipt of a locker. It is very convenient because there are many in my region and I have easy access to these. This way is very easy, I enter only a code and the door opens, so I can take my package. Moreover, it is always available and I can receive whenever I can. Otherwise, I choose the delivery on my place thus, I have no movements.

Consumer 10st

I prefer to receive from the locker in my neighborhood because it is very near to my house and it is very convenient for me. I can go to the locker anytime I want and the procedure is very easy. If it is not possible for some reason, then I choose the delivery on my home because I don't need to move at all. The receipt of the store is not convenient for me because the courier store is far from my house.

Question 3: Do you think that traceability of the parcel in last mile is helpful, why? Do you consider that the follow-up of the company from which you buy online and of the courier company is helpful? Why?

Answers:

Consumer 1st

Yes, I think that the traceability of the parcel is very helpful for me, because I can monitor the stages of the product and I can count the delivery day. Yes, I think that follow-up of the courier company is important, because they pursue the best service launching new option of delivery and it will help me in long term. So, I help them in order to help me. In the same thought I think that the follow-up of the online company is also important.

Consumer 2st

Yes, I think that the traceability of the parcel is helpful for me, because in this way I have the potential to know where exactly is my package and when I am going to receive. I think that the follow up is important because both courier company and online store collect information in order to work out these and to find new ways for our service.

Consumer 3st

Yes, the traceability of the package helps me because I know where is the parcel and when I will have it. The follow-up also is important for courier company, online store and me. In this way I give information of my experience for both courier and store, such as if I am pleased from their service and how much. So, they try to provide a better service to the customers through this information. Thus, as a consumer I have more options of service.

Consumer 4st

Yes, I think that traceability of my parcel is helpful for me because I have the potential to know every stage of delivery of my parcel. So, I know when I will receive it. The follow-up is important as well. In this way, the courier company shows an interest about its consumers and it tries to service them better. The same thing occurs with the online store that I had made my order.

Consumer 5st

I always look to find my parcel in order to know when I will have it. So, the traceability of the package is very helpful for me. The follow-up is helpful for me because in this way I have better service in the future. For courier company is important because in this way they know which are the preferences of consumers. I would say the same thing about online store as well.

Consumer 6st

Yes, I like the traceability of the parcel because I know in which stage is my parcel and how quickly I can have it. Yes, the follow-up is helpful for me because I can communicate my experience of courier and I can tell my complaints, if there are. For the courier company is helpful because they know my needs. For the online store that I had bought is helpful because I have also the chance to say my complaints and what I would prefer compared to the existing service way.

Consumer 7st

The traceability is very useful and I use it in order to know when I receive and to ensure that everything is ok and it is not required by me to do something. The follow-up of the courier company is important because my experience spreads and other consumers know the level of service of the courier. In this way I have also the opportunity to learn how a courier services the consumers. The follow-up of the online store is also important because I can say my experience of the store. On the other hand, I can see experiences of other consumers for stores and it is helpful for me in order to know if it is better to buy or to avoid this store.

Consumer 8st

Yes, I think that the traceability is very helpful and I constantly monitor the traces of my parcel. In this way I know that the procedure continues and I can know when I will have the package. The follow-up is helpful because the courier company and the online store know if the consumers is pleased or no, so in this way they can improve their services. For me, as a consumer is helpful because I can know if a courier store or an online store is reliable in order to choose it.

Consumer 9st

Yes, the traceability is useful because I can monitor where is my parcel and when I will receive. Thus, this way reassures me that my package will not be lost. The follow-up is helpful for me because many times I had not bought products from an online store due to the negative comments. The follow-up for the courier is useful as well because I can say how I am satisfied and what I would want to change with respect to service.

Consumer 10st

Yes, I think that the traceability is very helpful. I use it every time that I wait a parcel and I know where is exactly my package and when I will receive. In this way I be informed and I don't worry about my order. I like the follow-up because I feel that there is a connection between the courier company and me. In this way I can share my comments and the service can be better in the next time. The follow-up for the online store from which I had bought is equally useful because in the same manner they can improve their service.

Moreover, the follow-up protects the consumers from unreliable online stores and courier company through the comments of consumers.

5.2 Interviews discussion

Playing a vital role in the supply chain the courier companies, it was necessary to conclude these to the research. The courier companies conduct the last mile of the supply chain, which is a demanding and difficult stage. Therefore, their participation in the research is appreciable and their answers are highly considerable for the study.

In the case of courier companies, CEOs ensured that the e-commerce affects the last mile so their work and it is proven from the extreme increase of their deliveries, especially in the period of covid. It means that their profitability also increases and it is revealed by the investments and the logistic activities. The most of them chose to invest or had the willingness to invest on installation of lockers because they can route the delivery transport whenever it is easy without limitations and meetings with consumers. Moreover, they observed that there is a reduction of delivery time on road and the delivery is quicker now. As well, they make this process because consumers more and more prefer this way of delivery. In addition, some of the couriers added to their fleet, cars in order to load many and heavy packages for delivery and scooters in order to carry lights parcels for delivery.

Furthermore, the preference of locker from the couriers is also reflected on the delivery method. As a first selection they desire the delivery to locker because they save time on roads and they can delivery to only one locker more than one parcel. In addition to this, they can move on next deliveries without delays and it is not required to call receivers and ask them if they are on their place or when it is more convenient for them to receipt the parcel so, the service is more effective. Subsequently, as a second selection they prefer the receipt from the store due to movements are not required, they save time and they avoid the traffic on roads. And as a third ultimate selection couriers answered the delivery to the customer place because, the most of time the receivers don't respond to calls, many times addresses are wrong and other times the consumers change the place of delivery at the last minute while the carrier is at the first selected place of delivery. Thus, all of these create delays and generate a confused situation.

Another important issue that was discussed is the problems in delivery and some alternative suggestions in order to mitigate these risks. The majority of courier companies consider as a big issue the traffic on road which provokes congestion and the absence of parking space. Due to the traffic, there is a huge waste of time when the carrier has to deliver a package. For this reason, they installed lockers, in order to collect all regional packages to one locker and to save individuals routes for each receiver, and added more scooters in their distribution system. The case of absence of parking space is also a big problem because either the carrier has to stop the car far away from the delivery point or he has to stop the car near to delivery point with risk of penalty. Thus, they suggested to be provided parking space exclusively for carrier cars and there are not penalties for them. One more issue that they discussed is the financial problems such as taxes, insurances, gas and so on. They claim that although there is a development of technology, e-commerce and their profitability, the costs are huge and it is difficult to manage these. Therefore, they suggest to decrease taxes, prices of realty, gas and insurance in order to invest to more activities and to flourish the economy of the market.

It is relevant to point out here the preferences and opinions of consumers with respect to the traceability of the parcel in the last mile, the preferable way of delivery and of payment. Furthermore, they discussed the process of follow-up and online shopping, and they explained why these procedures are helpful for them.

Regarding the consumers, they mostly prefer online shopping than physical stores because it is easy, quick and convenient due to movements are not required. They claim that in this way they save time and effort such as in the case of the super market, they have the opportunity to make easy and quick research of quality and price without movements. Moreover, in many cases there are advantages for members of an online store and it is beneficial for the consumers. On the other hand, there are some consumers that prefer to buy from physical stores in order to strengthen the local financial statement and one supports the other.

It is remarkable that the majority of consumers take into account the value of transportation costs when they shopping online and they are looking for stores with low transport costs or they make orders with the appropriate value in order to have free transport costs. However, there are many consumers for whom the reliability of the online store plays a significant role in their shopping. Because, they want quick receipt, a good

after sale service and a chance of return if something goes wrong with the product. As well, there are many consumers for whom the payment way is important. Because they want to have the possibility to choose the way of payment that they feel that it is the appropriate in each case. For instance, some consumers prefer to pay on delivery because they feel safe in this way, especially when the online store that they made the order is unknown for them. In additional, some consumers prefer to pay by credit card in order to use the installments and other benefits that the card provides to them.

With respect to the preferable method of delivery, the majority of consumers answered as a first selection the receipt of a locker. They prefer this way of delivery because they have easy access to the locker at any time without limitations of the carrier schedule and it is very convenient for them. Subsequently, they mostly chose as a second option, the delivery on their place due to movements are not required so they save time and effort. Thus, as a third option of delivery method remains the receipt from the store. This way is ultimate solution for the most consumers because it has limitation of hour for the parcel receipt and it is not convenient for them.

Furthermore, all the consumers are agreeing with the significance of traceability of the parcel in last mile due to they have the opportunity to know where exactly is their package and when they are going to receive it. This procedure is very helpful for them and they don't worry about their order in this way. Similarly, all the consumers are agreeing with the importance of the follow-up of courier company and of online retail store that they made the order. They claim that sharing the comments, the service both courier company and online store can become better in the next time thus, the consumers have more options of service. Moreover, many consumers said that the follow-up protects them from unreliable online stores and courier companies through the comments of other consumers so, it is also very helpful.

6. Conclusions, limitations and suggestions for further research

6.1 Conclusions

Combining the literature research and the phenomenological research, a study is generated with some conclusions which will be discussed below.

There is no denying that the technology is almost involved in all sectors in our daily routine. In the same way the increase of technology also influences the supply chain management especially, the use of internet and of networks has changed the administration of logistic activities.

Firstly, the commerce has deeply affected by applying of internet and it is converted to electronic commerce. In this way all operations in the supply chain have redesigned and there is impact on other fields such as the courier companies and consumers. From the research is purely extracted the conclusion that the e-commerce has contributed to the increase of the profitability of courier companies and it is the most preferable shopping way for the consumers.

Another conclusion with respect to last mile is that both courier companies and consumers prefer the locker as a delivery and receipt point respectively. In addition to the last mile, the traceability and follow-up are helpful for both courier companies and consumers.

However, there are some risks of last mile which play a vital role in courier companies such as the congestion and the absence of parking space that are produced by the extreme traffic on roads. Moreover, the high fixed costs are important risk for courier companies and for this reason they are looking for alternatives ways that will be more effective costly.

Furthermore, there are also some challenges in e-commerce that play an important role for consumers, starting mostly from transportation costs and continuing with the service of retail store in which the purchase was conducted. Lastly, the way of payment is a considerable challenge for consumers with respect to e-commerce.

To sum up, it is purely proven that although the risks of last mile and the challenges of e-commerce, these are sectors with high importance in supply chain.

6.2 Limitations of the research

Each research has limitations which are the weak points in a study and can affect the results and conclusions of the research. So, in this case also there are limitations that we will discuss below.

First of all, there is a limitation in the literature. After a broad investigation over web scholar sources, it was found that there is very few research on the subject concerning Greece. Therefore, there is no knowledge for the “last mile” concerning Greek reality. It means that the proposed research is deeply phenomenological. Hence, the investigation was demanding careful selection of participants and it was taking a qualitative approach.

Furthermore, as a limitation could be considered the non-participation of retail stores in the research. Their strategies play a significant role in e-commerce in logistics and the last mile of the supply chain. Thus, this part could provide its own perspective on the subject. In this way, the research would present a more overview.

One more limitation could be the region of courier companies and consumers. Their area was urban thus, they answered taking into consideration their daily routine in the city. This factor plays an important role in their views if we think that the most of times the traffic on roads and the congestion influenced their choice. If the area of courier companies and of consumers was a suburb, it is possible reasons besides the traffic would be significant for their answers and the research would present another view.

Lastly, another limitation could be the age of respondents especially the age of consumers. In this research the age of consumers was from 30 to 45 years. It means that in these ages people are familiar with technologies and by extension with the e-commerce hence, this parameter affected their answers. If the participants were elder, the most possible is that the preferences would be different so, the outcomes of the investigation would be different, as well.

6.3 Suggestions for further research

It will be interesting to review the research in order to be developed a more completed background for the subject. Therefore, we will mention below some suggestions for further research.

The area of investigation could be a suggestion for further study because the research was executed in only an urban area. So, if the research will be conducted in courier companies and consumers in whole country, the study will have a more multiple background.

Moreover, it will be interesting the research in retail stores also. The retail stores are a significant part in the supply chain and in the e-commerce so, their view would be useful in order to be shaped a study based on multiple sample.

Lastly, research in a larger portion of population would a helpful suggestion for further investigation. It means that both more courier companies and consumers will participate in the research. In addition to this, in future research the consumers will participate in a further expansion with respect to the age range.

References

Shukla R. K., Dr. Garg D., Dr. Agarwal A. (2011, March 3). Understanding of supply chain: literature review.

Ghiani, G., Laporte, G., & Musmanno, R. (2013). Introduction to logistics systems management, 2nd Edition (2nd ed.). John Wiley & Sons.

PhoenixBizz Staff Writer. (2023, July 17). Logistic Management Systems: How warehouse, transportation and distribution Software systems work. Custom software Development Company in Phoenix – phoenix Bizz. <https://www.phoenixbizz.com/blog/logistics-managemant-systems-how-warehouse-transportation-and-distribution-software-work>.

Ranieri, L., Digiesi, S., Silvestri, B., & Roccotelli, M. (2018). A review of last mile logistics innovations in externalities cost reduction vision. Sustainability, 10(3), 782. <https://doi.org/10.3390/su10030782>

Olsson, J., Hellstrom, D., & Palsson, H. (2019). Framework of last mile logistics research: A systematic review of the literature. Sustainability, 11(24), 7131. <https://doi.org/10.3390/su11247131>

Logistics in e-commerce and the last mile problem: Virtua Codelab, We Are Virtua. (2023, February 17). <https://www.virtuacodelab.com/logistics-in-e-commerce-and-the-last-mile-problem/>

Jain, V., Malviya, B., & Arya, S. (2021). An overview of Electronic Commerce (e-commerce). Journal of Contemporary Issues in Business and Government, 27(3). <https://doi.org/10.47750/cibg.2021.27.03.090>

Santos, V. F., Sabino, L. R., Morais, G. M., & Gonçalves, C.A. (2017). E-commerce: A short history follow-up on possible trends. *International Journal of Business Administration*, 8(7), 130. <https://doi.org/10.5430/ijba.v8n7p130>

Allen J., Browne M., Cherrett T., Cidell J., Ducret R., Broaddus A., Dablan L., Transport D., Hesse M., & Huschebeck M., (2017, July 29). Understanding the impact of e-commerce on last-mile light goods vehicle activity in urban areas: The case of London. *Transportation Research Part D: Transport and Environment*. <https://sciencedirect.com/science/article/abs/pii/S136192091730305X>

Ramanathan, U., & Ramanathan R., (2014). *Supply chain strategies, issues and models*. Springer.

Jansen, D. (2023, October 26). Saunders' research onion explained (+ examples). *Grand Coach*. <https://gradcoach.com/saunders-research-onion/>

Joong-Kun Cho, J., Ozment, J., & Sink, H. (2008). Logistics Capability, Logistics Outsourcing and firm performance in an e-commerce market. *International Journal of Physical Distribution & Logistics Management*, 38(5), 336-359. <https://doi.org/10.1108/09600030810882825>

Slabinac M. (2015, October 15). Innovative solutions for a “Last Mile” delivery – A European Experience. <https://hrcak.srce.hr/ojs/index.php/plusm/article/view/3876>

Neubauer, B. E., Witkop, C. T., & Varpio, L. (2019). How phenomenology can help us learn from the experiences of others. *Perspectives on Medical Education*, 8(2), 90–97. <https://doi.org/10.1007/s40037-019-0509-2>

Seuring, S., Stella, T., & Stella, M. (2021). Developing and publishing strong empirical research in sustainability management—addressing the intersection of theory, method, and empirical field. *Frontiers in Sustainability*, 1. <https://doi.org/10.3389/frsus.2020.617870>

Bekele, W. B., & Ago, F. Y. (2022). Sample size for interview in qualitative research in Social Sciences: A guide to novice researchers. *Research in Educational Policy and Management*, 4(1), 42–50. <https://doi.org/10.46303/repam.2022.3>

Yu, Y., Wang, X., Zhong, R. Y., & Huang, G. Q. (2016). E-commerce logistics in Supply Chain Management: Practice perspective. *Procedia CIRP*, 52, 179–185. <https://doi.org/10.1016/j.procir.2016.08.002>

Sandhaus, G. (2018). Trends in e-commerce, logistics and Supply Chain Management. *Operations, Logistics and Supply Chain Management*, 593–610. https://doi.org/10.1007/978-3-319-92447-2_26

Joong-Kun Cho, J., Ozment, J., & Sink, H. (2008). Logistics Capability, Logistics Outsourcing and firm performance in an e-commerce market. *International Journal of Physical Distribution & Logistics Management*, 38(5), 336–359. <https://doi.org/10.1108/09600030810882825>

Wang, G. (2011). Supply chain integration based on commerce flow and Logistics. *Contemporary Logistics*, 91–97. <https://doi.org/10.5503/j.cl.2011.02.015>

Delfmann, W., Albers, S., & Gehring, M. (2002). The impact of electronic commerce on Logistics Service Providers. *International Journal of Physical Distribution & Logistics Management*, 32(3), 203–222. <https://doi.org/10.1108/09600030210426539>

- Baisya, R. K. (2024). Global Logistics Value Chain Management. *Supply Chain and Logistics Management*, 233–261. <https://doi.org/10.4324/9781003469063-9>
- Ballou, R. H. (2006). The evolution and future of logistics and Supply Chain Management. *Production*, 16(3), 375–386. <https://doi.org/10.1590/s0103-65132006000300002>
- Larson, P. D., & Halldorsson, A. (2004). Logistics Versus Supply Chain Management: An international survey. *International Journal of Logistics Research and Applications*, 7(1), 17–31. <https://doi.org/10.1080/13675560310001619240>
- Copacino, W. C. (2019). Overview of supply chain management and logistics strategy. *Supply Chain Management*, 5–42. <https://doi.org/10.4324/9780203737859-2>
- Balcik, B., Beamon, B. M., & Smilowitz, K. (2008). Last mile distribution in humanitarian relief. *Journal of Intelligent Transportation Systems*, 12(2), 51–63. <https://doi.org/10.1080/15472450802023329>
- Janjevic, M., & Winkenbach, M. (2020). Characterizing urban last-mile distribution strategies in mature and emerging e-commerce markets. *Transportation Research Part A: Policy and Practice*, 133, 164–196. <https://doi.org/10.1016/j.tra.2020.01.003>
- Cardenas, I., Borbon-Galvez, Y., Verlinden, T., Van de Voorde, E., Vanelslander, T., & Dewulf, W. (2017). City Logistics, urban goods distribution and last mile delivery and Collection. *Competition and Regulation in Network Industries*, 18(1–2), 22–43. <https://doi.org/10.1177/1783591717736505>
- Escudero-Santana, A., Muñuzuri, J., Lorenzo-Espejo, A., & Muñoz-Díaz, M.-L. (2022). Improving e-commerce distribution through last-mile logistics with multiple possibilities of deliveries based on time and location. *Journal of Theoretical and Applied Electronic Commerce Research*, 17(2), 507–521. <https://doi.org/10.3390/jtaer17020027>

- Melkonyan, A., Gruchmann, T., Lohmar, F., Kamath, V., & Spinler, S. (2020). Sustainability assessment of last-mile logistics and distribution strategies: The case of local food networks. *International Journal of Production Economics*, 228, 107746. <https://doi.org/10.1016/j.ijpe.2020.107746>
- Janjevic, M., Winkenbach, M., & Merchán, D. (2019). Integrating collection-and-delivery points in the strategic design of urban last-mile e-commerce distribution networks. *Transportation Research Part E: Logistics and Transportation Review*, 131, 37–67. <https://doi.org/10.1016/j.tre.2019.09.001>
- Liu, W. (2020). Route optimization for last-mile distribution of rural e-commerce logistics based on ant colony optimization. *IEEE Access*, 8, 12179–12187. <https://doi.org/10.1109/access.2020.2964328>
- Penna, P. H., Santos, A. C., & Prins, C. (2017). Vehicle routing problems for Last Mile Distribution after major disaster. *Journal of the Operational Research Society*, 69(8), 1254–1268. <https://doi.org/10.1080/01605682.2017.1390534>
- Tilk, C., Olkis, K., & Irnich, S. (2021). The last-mile vehicle routing problem with delivery options. *OR Spectrum*, 43(4), 877–904. <https://doi.org/10.1007/s00291-021-00633-0>
- Seghezzi, A., Siragusa, C., & Mangiaracina, R. (2022). Parcel Lockers vs. home delivery: A model to compare last-mile delivery cost in urban and rural areas. *International Journal of Physical Distribution & Logistics Management*, 52(3), 213–237. <https://doi.org/10.1108/ijpdlm-03-2020-0072>
- Wang, X., Zhan, L., Ruan, J., & Zhang, J. (2014). How to choose “last mile” delivery modes for E-fulfillment. *Mathematical Problems in Engineering*, 2014, 1–11. <https://doi.org/10.1155/2014/417129>

Appendix A: “The questionnaire for the interviews with CEOs of courier companies”

6 Courier companies: 6 Chief Executive Officers (CEOs)

Question 1: Has e-commerce affected the profitability of the company? If yes, how much? Is it reflected in logistic activities or investments?

Question 2: Which delivery method do you prefer, delivery to the client place, to a locker or receipt from the store, and why? Or in which classification and why?

Question 3: Which are the most important problems/risks in delivery? How do you manage these and what can make these smoother?

Appendix B: “The questionnaire for the interviews with consumers”

Receiver: 10 Consumers

Question 1: Do you prefer to buy from physical store or online, why? In which criterion do you choose the online store that you make the purchase: the way of payment, the transportation cost, the service or environmental awareness? Why?

Question 2: Which receipt method do you prefer: delivery to your place, receipt from the store or from locker, and why? Or in which classification and why?

Question 3: Do you think that traceability of the parcel in last mile is helpful, why? Do you consider that the follow-up of the company from which you buy online and of the courier company is helpful? Why?

Author's Statement:

I hereby expressly declare that, according to the article 8 of Law 1559/1986, this dissertation is solely the product of my personal work, does not infringe any intellectual property, personality and personal data rights of third parties, does not contain works/contributions from third parties for which the permission of the authors/beneficiaries is required, is not the product of partial or total plagiarism, and that the sources used are limited to the literature references alone and meet the rules of scientific citations.