VAASAN AMMATTIKORKEAKOULU
UNIVERSITY OF APPLIED SCIENCES

Duong Tran

Optimizing Last-Mile Logistics in Sustainable Global Supply Chains: Balancing Efficiency and Environmental Responsibility

International Business
2024

VAASAN AMMATTIKORKEAKOULU (koko 12)
Koulutuksen nimi (esim. Sähkötekniikka/ Liiketalous/ Hoitotyö, fontti koko 12). Huomaa, että koulutuksen nimi tulee aina koulutuksen kielellä myös englanninkielisessä abstraktissa.)

TIIVISTELMÄ (koko 14)

Tekijä	Duong Tran
Opinnäytetyön nimi	Opinnäytetyön nimi : Mahdollinen alaotsikko
Vuosi	2023
Kieli	Englantia
Sivumäärä	
Ohjaaja	Teemu Myllylä

Tiivistelmässä käytetään rivinväliä 1. Tiivistelmä kirjoitetaan täydellisinä lauseina. Sähketyyliä ei käytetä, ei liioin alleviivauksia, kursivointeja tai harvennuksia. Tiivistelmän pituus on 75 - 200 sanaa. Teksti on hyvä jakaa kappaleisiin luettavuuden takia, esimerkiksi seuraavan kaavan mukaan:

Ensimmäisessä kappaleessa kuvaillaan lyhyesti tutkimuksen taustaa ja tutkimusongelmaa sekä tutkimuksen tehtävää.

Toisessa kappaleessa kuvaillaan lyhyesti tutkimuksen teoreettista viitekehystä, keskeisiä käsitteitä sekä tutkimuksessa käytettyjä menetelmiä ja tutkimusaineistoa.

Kolmannessa kappaleessa esitetään lyhyesti tutkimuksen keskeisiä havaintoja ja tuloksia sekä keskeisiä johtopäätöksiä ja tulkintoja.

Note: Only Finnish students include an abstract in Finnish if the thesis is writ-ten in English.

Avainsanat	oppiminen, tehokkuus, opetusmenetelmät (4–5 avainsanaa)

VAASAN AMMATTIKORKEAKOULU
UNIVERSITY OF APPLIED SCIENCES (font size 12)
International Business

ABSTRACT (font size 14)

Author	Duong Tran
Title	Optimizing Last-Mile Logistics in Sustainable Global Supply Chains: Balancing Efficiency and Environmental Responsibility
Year	2024
Language	English
Pages	70
Name of Supervisor	Teemu Myllylä

The logistics industry has seen a significant evolution in the era of globalization and electronic commerce due to the COVID-19 pandemic, which forces logistic firms to promote and develop appropriate solutions to address the challenges. The delivery process consists of three major stages: first-mile, middle-mile, and last-mile. Nevertheless, this thesis will focus specifically on the last-mile delivery in response to the main question.

This thesis will analyze two separate perspectives: the customer's viewpoint and the company's viewpoint. The purpose of the study is to demonstrate that although the demand is currently increasing slightly, advancements in technology and transportation have enabled us to widen and improve various aspects of our Businesses.

The primary focus of the research plan is on the logistics involved in last-mile delivery. The primary inquiry revolves around the implementation of sustainable last-mile logistics strategies in global e-commerce operations, with the aim of reducing costs, enhancing consumer satisfaction, and mitigating the impact on the environment.

Keywords logistics, supply chain, solution, last-mile

ABBREVIATIONS AND TERMS

SCM	Supply chain management
GPS	Global positioning system
LSCM	Logistic and Supply Chain Management
3PL	Third party logistics
4PL	Fourth-party logistics
5PL	Fifth-party logistics
CSR	Corporate Social Responsibility
SRM	Supplier Relationship Management
ISCM	Integrated Supply Chain Management
ERP	Enterprise Resource Planning
TQM	Total Quality Management
ECR	Efficiency Customer Response
LML	Last mile logistic
B2C	Business to customers
PCI	Per Capita Income
AFC	Airborne Fulfilment Center
EVs	Electronic Vehicle

TABLE OF CONTENTS

List of Figure

I. INTRODUCTION

1. Background

Internet has changed our life. It has brough a new way of communicating, of transferring information and do business (Galindo, 2016). Based on the booming E-commerce, logistics and supply chain management (LSCM) has been greatly influenced when we are now already overwhelmed by its successes in both developed and emerging economies. (Ying Yu, Xin Wang,Ray Y. Zhong,George Q. Huang, 2016) . Due to the rise of e-commerce, the last mile has got more and more attention of the private sector during the Covid-19 pandemic. These two elements have created a sophisticated and linked system called global electronic commerce, where commodities and services transcend borders with ease. Technology and globalization have given firms new opportunities to reach global customers. This progress has also created several problems. However, one of the biggest challenges is optimizing product delivery.

The last mile connects business activity to end customers and is often critical. This crucial step evaluates financial indicators and customer satisfaction. Customers encourage last-mile logistics management improvements, making it more vital. Logistic firms should fulfill worldwide market needs with greater last-mile customer expectations. Logistics firms have to concentrate on customer satisfaction. Logistics and supply chain management are not just operational necessities but are also strategic tools that shape the very fabric of global business operations. This research investigates the tactics, concepts, and techniques that optimize this key supply chain component while addressing sustainability and efficiency. Technology serves as a solution, with the use of drones and electronic vehicles that avoid harm to the environment and the ecosystem.

2. Research Problem

Logistics plays an important role in contributing to the domestic economy's structure, supporting, associating, and elevating socio-economic growth, raising the

value of products, improving the economies and trade's competitiveness. When logistics is developed into a service sector, it would not only increase added value but also connect the services of logistics to the manufacturing growth, import-export, and national trade. (Uyen, 2023) These include last-mile logistics optimization, disruptive technology improvements, and strategies used by major global e-commerce companies. The reason that why logistics are really important is because the more efficiently raw materials can be purchased, transported, and stored until used, the more profitable the business can.

The modern logistics have become the most important means to improve the efficiency of material flow, reduce distribution costs in various industries; at the same time, the recent development of E-commerce also contributed to the expansion of the logistics market, promote the development of technologies related to logistics. (Ying Yu, Xin Wang,Ray Y. Zhong,George Q. Huang, 2016). E-commerce logistics concepts and supporting strategies, highlighting challenges, opportunities, and future perspectives. The research problem is: "How can global e-commerce operations implement sustainable last-mile logistics strategies to reduce costs, improve customer satisfaction, and reduce environmental impact?" Through this research, main outcome is to understand a multifaceted challenge faced by businesses, economic, technology and society and from it as well as could figure out how to examine how sustainable works in last-mile and connect to the future solution.

The primary goal of this research is to optimize and enhance the implementation of sustainable last-mile logistics methods for firms in the global e-commerce industry. The research will look at how these tactics affect cost structures and the environment, offering key insights into how firms might balance ecological responsibility with economic sustainability. Ultimately, the outcomes of this research will expand our understanding of sustainable last-mile logistics by providing a path for future solutions that match the increasing needs of industries, technology, and society, including the utilization of drones, electric vehicles, and cargo management,

II. THEORETICAL FRAME OF REFERENCE

1. Logistics in Supply Chain management

1.1. Definition of Logistics

In this chapter, a number of logistics concepts will be defined. According to Investopedia website referring to Will Kenton claims that logistics is the whole process of efficiently managing the procurement, storage, and transportation of resources to their final destination timely and intact delivery of commodities which called last-mile delivery. Similarly, according to more academic source, it provided as "Logistics is the art of managing the supply chain and science of managing and controlling the flow of goods, information and other resources like energy and people between the point of origin and the point of consumption in order to meet customers' requirements" (Techishce Univatat Munchen, n.d.). The management of operations is a vital part of the logistics sector, where the requirement to execute operations in a cost-effective and efficient method has a crucial role within the contemporary competitive landscape. Logistics is now used widely in the business sector, particularly by companies in the manufacturing sectors, to refer to how resources are handled and moved along the supply chain. However, the ultimate goal of logistic management is to the right amount of a resource or input at the right time. Advanced end-to-end logistics management solutions drive efficiency by optimizing inventory, cutting costs and overhead, and delivering improved customer service and profits. Indeed, logistics can be separate into three main categories and these are military logistic, medical logistic and business logistic. However, looking logistic as history point of view, logistics are based on military terms.

Before the 1950s, logistics was thought of in military terms. It had to do with procurement, maintenance, and transportation of military facilities, materiel, and personnel. Although a few authors before this time began talking about trading one cost for another, such as transportation costs with inventory costs, and discussed the benefits to the firm of getting the right goods to the right place at the right time, the organization within the typical firm around the activities currently associated

with logistics was fragmented (Ballou, 2007). Similarly, early references to logistics refer primarily to military logistics, which has reached its expansion during both World Wars, when the amount of troops and equipment (and its diversity) increased (Luttwak, 1971). In other words, military logistics is one of the most important disciplines in the field of implementation and support of military expeditions and the development of military strategies. Logistics began in ancient Greek and Roman wartime when military commanders supplied and distributed supplies. This was done to allow the soldiers to move from their base to a new forward position efficiently, which could be a crucial factor in determining the outcome of wars.

According to my research, there are 5 elements of logistics. The role of each element of logistics often defines logistic activities within supply chain. It involves storage, warehousing and materials handling, Packaging and unitization, Inventory, Transport (Navata, 2020). The role of each element of logistics often defines the logistics activities within a supply chain. (University, Conventry, 2022). It involves the integration of information, transportation, inventory, warehousing, material handling, and packaging. (Techishce Univatat Munchen, n.d.) Let break each of components then I will analyze it below.

1.1.1. Warehousing & Storage

There is usually an imbalance between the consistent supply and the unexpected demand. Numerous commodities are frequently held in warehouses as a temporary measure until their use becomes necessary, particularly in situations where demand is above production capacity. A possible solution is to keep excess items generated by a producer until they are required by customers. This method is may also call as just in case inventory in order to avoid running out of products due to a sudden increase in consumer demand. This trend has been especially noticeable in recent years to dealing with the emergence and growth of electronic commerce.

In addition, for the supply chain to run smoothly afterward they might include some warehouse strategies that include processing item, daily condition report and storage security. These strategies has a particular part of visual management in product management aspect. Firstly, the role of processing items is to make sure

that all the items coming in are the right model, color, size, etc, which help avoiding costly backup should these issues be discovered later in the supply chain. Secondly, this aspect more likely related to the quality issue, is reporting such as damage or lack of quantity which should be tackle as fast as possible. Finally, A proper storage warehouse should include a climate-controlled environment that is monitored 24/7/365 and is spacious enough to allow your items to be stored safely. (McDaniel, Hilldrup, 2022)

1.1.2. Inventory Management

Inventory is a logistics element that is closely related to storage and warehousing. It is concerned with what stock to hold, where the stock is located and how much stock to hold. (Navata, 2020). A proper inventory management system will allow you to see all of this information in real-time, which subsequently, ensures the warehouse crew can pull items for shipment as quickly and efficiently as possible (McDaniel, Hilldrup, 2022). In order to improve their inventory management, companies should utilize sales data, product information, users information and other insights to predict consumer demand for certain products, by that they could meet customer demand. The control and tracking of goods and materials at various stages in the supply chain, from raw materials to finished products. Inventory management is certainly a function of logistics but the influences impacting inventory extend beyond the logistics network. Inventory requires a capital investment to build and stock finished goods (Navata, 2020). It includes managing stock levels, ordering, and optimizing storage to ensure products are available when needed. As a result, they may boost their inventory of high-demand items before variation such as a rise, reducing shortages or backorder issues. However, inventory is essential as the time a consumer is willing to wait for a product may be much less than the time it takes to manufacture the product and then ship the product to the customer's need location. Inventory management considers a number of complex variables including risk, lead time, cost, location, transport, and service levels. (Navata, 2020)

1.1.3. Packaging

The Chartered Institute of Logistics and Transport defines logistics as "getting the right product, in the right quantity, in the right condition, at the right place, at the right time, to the right customer, at the right price." (López, 2021). In short, proper product condition is linked to packaging. Since the cube is the easiest product to handle and store due to the necessity to take care of and keep the original shape, packing and unitization attempt to pack all various sizes and shapes of goods as near to a cubic shape form as possible. Proper packaging ensures items arrive undamaged and ship for the lowest possible cost. (Jenkins, Netsuite, 2022). From the customer point of view, they are expected product that keep in shape and work-well whether it is new or secondhanded, it should go through a strict investigation and review of items in order to identify any defects or troubles before their shipment. Order fulfillment is critical for customer satisfaction and involves coordinating various logistics processes (Sahebi)

1.1.4. Transportation and Trucking

The main element of logistics as well as last-mile delivery I would like to mention is transportation. In fact, transportation and trucking are one of the most critical aspects of logistics. This includes all modes of transport including road vehicles, freight trains, cargo shipping and air transport. Without transport, goods would be unable to move from one stage to another within a supply chain. (Navata, 2020). Likewise, transportation management is the fundamental aspect of logistics, encompassing the organization and synchronization of diverse transportation modes such as trucks, trains, planes, and ships. It requires determining an appropriate transport mode for particular items, delivering on schedule, and managing expenses. Transportation management additionally requires understanding and following regional goods movement legislation.

One of the biggest keys in transportation and logistics is utilizing a logistics partner with the proper assets and staff to maintain a steady movement of goods through the supply chain (McDaniel, Hilldrup, 2022). The example for utilizing logistic partnership is to connect logistic business with the staffs, cars, and other

assets to meet our company demand which also call as connect with 3PLs, 4PLs or 5PLs. The decision of whether to use a 3PL, 4PL or 5PL will ultimately depend on the needs of your business and whether you have the capacity to manage your logistics in-house because they are essentially used to describe the breadth of services offered by an external logistics provider. (Perrin, 2020) . Some goods with short supply chains, such as foods, do not travel far. Other more complex products consist of many components that can be transported from all over the world. (Navata, 2020)

1.1.5. Information and Control in Logistics

As I was mentioned above about the importance of each information of user's. product and sales data in inventory management, it would be easier to decide on which orders should be picked and packed in warehouses and enable transportation preparation and organization. Information and control's role is to help design information systems that can control operational procedures. They are also key in the forecasting of demand and inventory as already mentioned. (Navata, 2020). The word of logistics originates from the ancient Greek logos (λόγος), which means "ratio, word, calculation, reason, speech, oration". The branch of science having to do with procuring, maintaining and transporting material, personnel and facilities (Techishce Univatat Munchen, n.d.)

Not only physical products or material enter the supply chain, but there are also numerous data transferred across the supply chain, including vehicle whereabouts, inventory changes, and other data, details. Similar to the products, this information must be secured, accessible and delivered as fast as possible. Effective inventory control involves monitoring stock levels, predicting demand, and making informed decisions about when and how much to reorder (Sahebi).

2. Definition of Supply Chain Management

Supply chains are not static – they evolve and change in size, shape, and configuration, and in how they are coordinated, controlled and managed (Bart L. MacCarthy, Constantin Blome, Jan Olhager, Jagjit Singh Srai, Xiande Zhao, 2016). The objective of every supply chain should be to optimize the overall value thanks to a

good supply chain management structure. Based on provided data on investopia.com by Adam Hayes has point out that supply chain management definition is a principle emphasizing the utilization of an efficient integrated system of suppliers, producers, warehouses, retailers, and customers, so that items can be produced and distributed system-wide at the right quantities, locations, and time to minimize costs and maximize services. Supply chain management (SCM) is an extensive field that oversees the entire life cycle of a product, from raw material sourcing to delivering the final product to consumers. Good supply chain management results in lower costs and a faster production cycle.

Supply chain management could additionally be described as "an integrative philosophy for managing the total flow of a distribution channel from the supplier to the final user.". This also means greater coordination of business processes and activities, such as inventory management, across the entire channel and not just between a few channel pairs. Similarly, according to Supply Chain Management Strategy, Planning, and Operation book page 13, the definition of supply chain consists of all parties involved, directly or indirectly, in fulfilling a customer request. The supply chain includes not only the manufacturer and suppliers, but also transporters, warehouses, retailers, and even customers themselves (Perter Meindl, Sunil Chopra, 2012). Similarly, Simchi-Levi and Kaminsky (Simchi-Levi, 2004) defined supply chain as “a set of methods used to efficiently integrate suppliers, managers, warehouses, and stores to produce and distribute merchandise at the right quantities, locations, and times to minimize system costs and meet service-level requirements. Supply chain includes logistics, marketing, financing, and many more tasks that make operations run smoothly”.

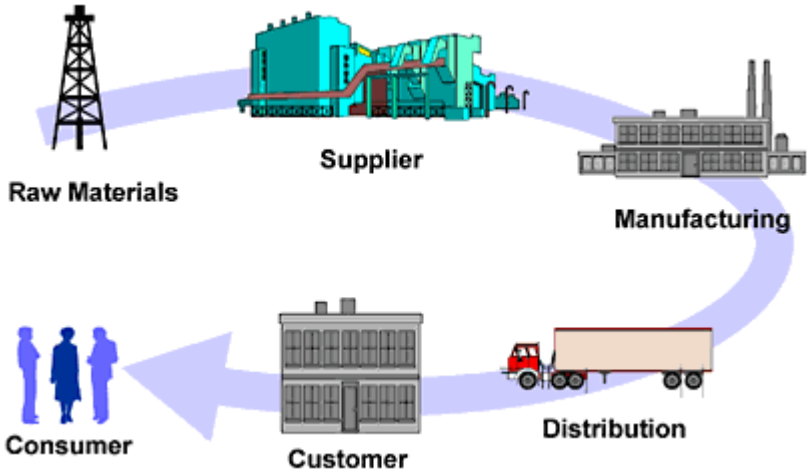


Figure 1 Supply Chain Model (Weber State University)

A supply chain features a constant flow of information, products, and funds. A supply chain begins with raw materials, which are then transferred from suppliers to production locations, and from those manufacturing points, completed goods are produced using the raw ingredients. Following this step, finished goods are sent off to distribution facilities, from whence they will eventually be shipped out to clients. The logistics of the supply chain function just like that. In this section, a discussion will be had on a variety of the basic kinds of operations that are offered by suppliers of logistics services. Each stage in a supply chain is connected through the flow of products, information, and funds. These flows often occur in both directions and may be managed by one of the stages or an intermediary. In other words, SCM includes the high-level processes involved in sourcing and buying raw materials and eventually creating finished goods. SCM uses logistics to deliver goods to the consumer, but it ultimately strives to boost the bottom line and increase a business's competitive edge (Jenkins, Netsuite, 2022). There is a close connection between the design and management of supply chain flows and the success of a supply chain.

2.1. Supply chain Evolution

Today, the practice of supply chain management is becoming extremely important to reduce costs and improve quality and customer service, with the end objective of improving competitiveness. Keys factor of supply chain management contain supply chain planning, procurement, manufacturing, distribution, reverse

logistic as well as supply chain integration which involves coordinating all activities in the supply chain. It's about sharing information, aligning goals, and working collaboratively across different functions to optimize the overall supply chain performance.Many firms are just now becoming aware of the advantages of supply chain integration.

Supply chain management is an outgrowth and expansion of lean and Six Sigma activities and has grown in popularity and use since the 1980s (Mihai Felea , Irina ALBĂSTROIU, 2012). The Lean and Six Sigma methodologies involve continuous and constant improvement. Since the 1980s, there has been a significant transformation leading to today's results.

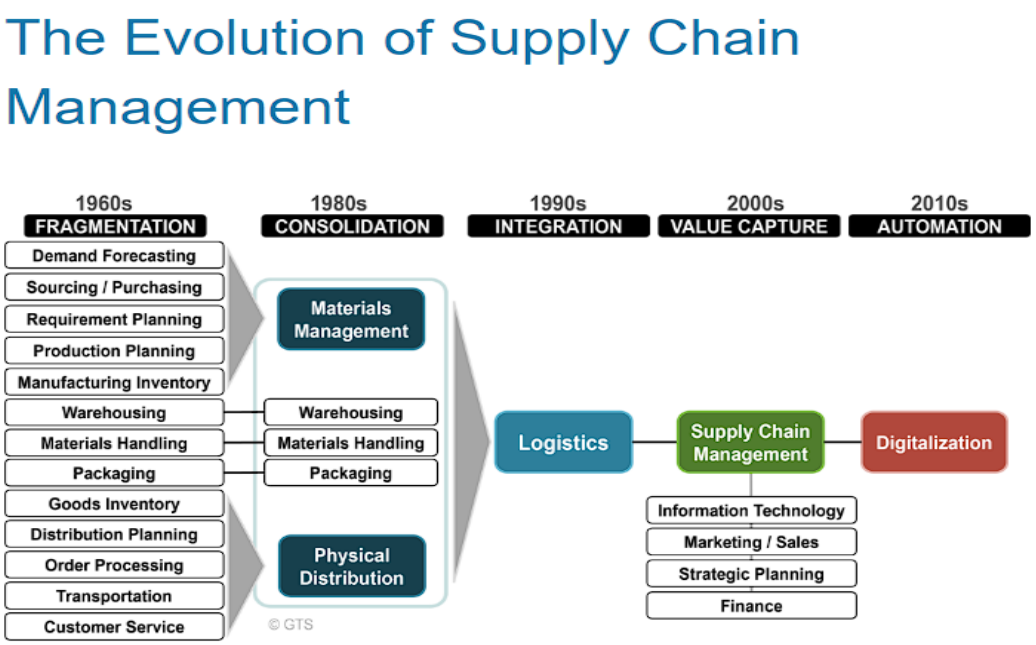


Figure 2 The Evolution of Supply Chain Management

Somani pointed out that "there are five main stages of supply chain management which is included the duration 1960s, 1980s. 1990s, 2000s, 2010"s. The primary goal was to move products from point A to point B as efficiently as possible, with little emphasis on the management of inventory or the coordination of suppliers and manufacturers. (Somani, 2023). However, as organizations expanded and globally connected, supply chain management got more challenging. This forced the inno-

vation of new technologies and software that assist in the management of the transportation of goods and information across different suppliers, manufacturers, and distributors. Let break it down and analysis it.

Supply Chain Management Stages

SCM Stage	Management Focus	Organizational Design
Stage 1 to 1960s Warehousing and Transportation	Operations performance Support for sales/marketing Warehousing Inventory control Transportation efficiencies	Decentralized logistics functions Weak internal linkages between logistics functions Little logistics management authority
Stage 2 to 1980 Total Cost Management	Logistics centralization Total cost management Optimizing operations Customer service Logistics as a competitive advantage	Centralized logistics functions Growing power of logistics management authority Application of computer
Stage 3 to 1990 Integrated Logistics Management	Logistics planning Supply chain strategies Integration with enterprise functions Integration with channel operations functions	Expansion of logistics functions Supply chain planning Support for TQM Expansion of logistics management functions
Stage 4 to 2000 Supply Chain Management	Strategic view of supply chain Use of extranet technologies Growth of co evolutionary channel alliances Collaboration to leverage channel competencies	Trading partner networking Virtual organization Market co evolution Benchmarking and reengineering Supply chain TQM metrics
Stage 5 2000+ e-Supply Chain Management	Application of the Internet to the SCM concept Low-cost instantaneous sharing of all databases e-Information SCM synchronization	Networked, multi-enterprise supply chain .coms, e-tailers, and market exchanges Organizational agility and scale ability

(Source: Ross, 2003:6)

Figure 3 Supply Chain Management Stages

2.1.1. Stage 1- Warehousing and Transportation

During the beginning stages of supply chain management, the logistics aspect is not completely familiar with this industry, resulting in a poor connection between logistic management and a restricted level of authority in logistics management within the organizational designs. During 1950s and 1960s the concept of SCM was unknown, and in this period, new product development was slow and counted only in the firm own technology and capacity. Inventory cushioned bottleneck operations in order to maintain a balanced line low, resulting in huge investment in work in process (WIP) inventory (Tan, 2001). This also means that in order to manage the

inventory would really be difficult to calculate and handle in the early stage of supply chain management. Due to this type of uncertainty forecasting, it would only attract random purchases and maybe one-time customers instead of sustainable purchasing cycle.

The foundations of supply chain management can be found in the areas of purchasing, production, logistics and process integration or collaboration between trading partners (Mihai Felea , Irina ALBĂSTROIU, 2012). In this stage, it can be considered as a foundation for the development of supply chain management in whole part of the evolution. In this stage, it contains solid and manual process such as demand forecasting, sourcing, purchasing, planning, inventory management, packing, order processing, and even customer service. In this stage, management focus on operation preferment, warehousing, and transportation efficiencies. In other words, the early stages of supply chain management, companies focused on optimizing their internal processes, such as production and inventory management. The focus was on increasing efficiency and reducing costs (Somani, 2023). To simplify this stage, the main goals are to optimize inventory management, enhance sales and marketing strategies, focusing on quality product and demonstrate raw organizational design of supply chain. At this stage, there is no customer service and supplier management, it just barely focusses on production quality, without planning. designing and lack of communication.

2.1.2. Stage 2- Total cost management

In the next stage, business has recognized the value of logistic. This is a massive change in supply chain management evolution. By recognize the value of logistic the firm also have a concept of total cost management and starting to grow power of logistic management authority. In other words, in the late 1980s, organizations redirected their attention from products to the quantity of production. In the second stage, logistics began the migration from organizational decentralization to centralization of core functions driven by new attitudes associated with cost optimization and customer service (Mihai Felea , Irina ALBĂSTROIU, 2012). The primary performance indicators for Stage 2 of the supply chain evolution were manufacturing

capacity and productivity, with a significant focus on cost control. Organizations that began making profits earlier have realized that cutting production costs will not help them make greater profits. As a result, the rapidity of production and the amount of production became crucial.

In the late 1980s, there was a massive change in supply chain management when the business management approach computer and the recognition value of logistic. In the 1980s, personal computing began a significant logistical revolution by significantly improving supply chain management. Computers enabled a major improvement in planning through the utilization of innovative graphical interfaces. The emergence of innovative technologies such as flexible spreadsheets and map-based interfaces has greatly enhanced logistics planning and execution technology. New software like flexible spreadsheets, mapping and route planning made it easier to track costs and maximize profits.

However, the relationship between and supplier was not emerged yet. In other hand, Customers and suppliers have not yet formed partnerships. However, departments begin to look for efficiencies that reduce handling and inventory, procurement and logistics processes improve, marketing forecasts become more reliable, and production planning systems emerge. The cost of audits and capability building at suppliers are often borne by a firm, whereas the benefits from supplier improvement accrue to all that use the supplier (Perter Meindl, Sunil Chopra, 2012). However, the efficiencies come at a cost because they were not obtained through cross-communication. Reduced inventory, for example, may result in shortages, and lower-cost logistics might require longer or be unreliable.

Following up with computing efficiency, there is also a expansion of transportation infrastructure in this duration. In the 1960s and 1970s, the expansion of transportation infrastructure, such as highways and air travel, facilitated the growth of global trade. This led to the emergence of international supply chains, which required new approaches to managing logistics and inventory (Somani, 2023). While transportation has traditionally been seen as a way to travel through space, logistics

is time sensitive. This is achieved by moving to vertical integration, i.e. subcontracting and outsourcing, including the logistics function itself (Ahmed, n.d.). From this, it began to make logistics as a competitive advantage which also contributed to make the widen market and encourage companies to improve their own customer service.

2.1.3. Stage 3- Integrated Logistics Management

Supply chain design, planning, and operation decisions play a significant role in the success or failure of a firm. To stay competitive, supply chains must adapt to changing technology and customer expectations (Perter Meindl, Sunil Chopra, 2012). Adapt is it, company from logistic centralization in to integrated logistics management which make the communication between customer and supplier run smoother, having a faster process by smart warehousing, better strategic and integration with partner. Stage three witnessed the dramatic expansion of logistics beyond a narrow concern with internal warehousing and transportation to embrace new concepts calling for the linkage of internal operations with analogous functions performed by channel trading partners. In this duration, this would be a huge shift from manual to integrated logistics management (Mihai Felea , Irina ALBĂSTROIU, 2012).

During the 1980s and early 1990s, firms dealt with increased demands for "better, faster, cheaper logistical service". As a result, many manufacturers outsourced logistics activities and their focus transferred to core competencies. (Daugherty, 2011). At this stage, as the expansion of logistics functions and the integration with channel operation functions which also mean that the network at the same time should develop to have a stable strategy and planning that support TQM (Total Quality Management) by using Enterprise Resource Planning (ERP) system in the professional working environment. This could also have been a sign of prediction that the connection between customer and supplier had the potential to develop in the next few decades.

In the 1990s, this is the era of the use of Enterprise Resource Planning (ERP) system. In detail, the term ERP was first used in the 1990s by the Gartner Group,

but enterprise resource planning systems actually have their roots deep in the manufacturing industry and can trace their history back to the 1960s (Genius ERP, 2023). Similarly, Enterprise Resource Planning (ERP) took its start in the late 1980's and then properly extended in the 1990's whereas the large area of focus was the huge scale business organizations. These systems are considered as complex, they are expensive, they are powerful while these systems were also considered as the key platform for simplifying the complex operations. (Seyed Ali Nemati, 2012). Enterprise resource planning (ERP) systems provide the transactional tracking and global visibility of information from within a company and across its supply chain. This real-time information helps a supply chain improve the quality of its operational decisions. ERP systems keep track of the information, whereas the Internet provides one method with which to view this information (Perter Meindl, Sunil Chopra, 2012).

2.1.4. Stage 4- Supply chain management

As mentioned above, at the previous stage there are a huge potential of the way that make business to approach consumers in supply chain management. The introduction of Enterprise Resource Planning (ERP) in the 1990s, gave a boost to the evolution of the SCM and buyer - supplier relationship (Mehmeti, 2016). This should be call as efficient as possible if consumers response. In 1992, a group of grocery industry leaders created a joint industry task force called the efficient consumer response (ECR) working group. The group was charged with examining the grocery supply chain to identify opportunities to make the supply chain more competitive (Kurt Salmon Associates Inc, 1993). In this stage, I would assume that it has witness a huge development by the ERP system. Moreover, the relationship buyer – supplier in this period has gone one-step forward, from normal partnership to long-term relationship and strategic alliances. Manufacturers and retailers now commonly exploit supplier strengths and technology in support of new product development, distribution channels, cost reduction etc. (Morgan, J., and Monczka, R.M., 1995).

Therefore, in order to apply and adapt to it, it would require the business to reach the suitable strategies and the right method. The successful adoption of ECR for a manufacturer depends on their ability to maintain manufacturing flexibility which enables them to match supply with demand. Key to this flexibility is a process that tightly integrates demand management, production scheduling, and inventory deployment to allow the company to better utilize information, production resources, and inventory (Weeks, D. and Crawford, F.A., 1994). In short, from this duration, as the concept of channel relationships grew, the old logistics concept gave way, in stage-four, to full supply chain management (Mihai Felea , Irina ALBĂSTROIU, 2012).

2.1.5. Stage 5- E-Supply Chain management

The firth stage of the evolution of supply chain management is e-supply chain management or can be call as an automation era. Today, with the application of Internet technology to the SCM concept, we can describe SCM as entering into stage five, e-SCM (Mihai Felea , Irina ALBĂSTROIU, 2012). E-Supply chain refers to the business activities that incorporate e-business approaches into supply chain processes. e-Supply chain management involves applying e-business technologies to assist and optimize value-adding activities in supply chains (Li, 2005). The management priority the impletion of the Internet to the SCM concept. It is a real evolution for supply chain management because since information technology became an enabler of improving business processes, supply chain management has gained tremendous benefits from applying ICT to various aspects of its tasks (Li, 2005).

As technology has advanced, E-supply chain management (E-SCM) has become an increasingly important topic to businesses. With the emergence of the global economy, today's business environment is more competitive than in the past. Relationships throughout the supply chain are integral to a successful organization (Cheng-Yuan Ku, Sean Lancaster and David C. Yen, 2006). It focuses on a fundamental challenge for supply chain management: how to efficiently integrate and optimize supply chain operations with widespread marketplaces and characteristic

demands using the latest advances in information and communication technologies (Li, 2005).

There is a point of view that I would totally agree with it. It said e-supply chain is focus on core competence. The concept of core competencies deserves special attention because of the implications for operations and supply chain strategies. Core competencies are organizational strengths or abilities, developed over a long period of time, that customers find valuable, and competitors find difficult or even impossible to copy (Mihai Felea , Irina ALBĂSTROIU, 2012). As a researcher and user at the same time, I would classify this element as a unique selling point because I have heard a quote that related to electronic supply chain management and logistics at the same time which is “Best experience always was, it and will be personal”. The quote also proves through Hausman which contain E-SCM also improves customer relationships by assisting the ability to anticipate, track, and respond to customer demand and reactions. E-SCM eliminates stock outs, encourages customer driven demand, and efficiency and tracking of delivery (Hausman, 2000).

According to (Uiterweerd, 2021), professional supply chain manager, when asked about his perspective on the last mile, he replied that "from the pandemic that started last year, we see huge changes happening in the way we do business, the way we do retail". Furthermore, he also affirmed to us very clearly that "It's here to stay. People are used to it and continue to use online business rather than going to the store in the future." (Uiterweerd, 2021). It has been a massive success when shifting from traditional direct delivery to end-users’ location to delivery- box system or pick-up point to customers witnessing combination of logistics and supply chain management that support large market of customers during and after pandemic.

2.2. The relationship of logistics to supply chain management.

All organizations participate in the production and distribution of goods or services to their respective consumer base. Products can be defined as material goods, generally referred to as products, or abstract offerings, commonly known as services which include supply chain and logistic having essential role in this process.

A supply chain is formed by the movement of materials from the initial suppliers, via various intermediaries, to producers, and ultimately to the end customers. Logistics plays an important role in controlling the supply chain flows in the most effective way. There is a definition that considers the connection between supply chain and logistics which is supply chain logistics. It can be defined as the coordinate of the storage and shipping of goods and services across the supply chain. The practice begins with raw materials, continues on to manufacturing and/or distribution and ends when a business delivers finished goods to the customer or when products are returned to their final destination (Jenkins, Netsuite, 2022).

Logistics are a building block of supply chain management. The current supply chain crisis has put a spotlight on logistics in a major way, as it impacts virtually every industry and organization. But what does logistics entail?. (McDaniel, What Are the Five Major Components of Logistics?, 2022). Logistics management is the part of supply chain management that plans, implements, and controls the efficient, effective forward, and reverse flow and storage of goods, services, and related information between the point of origin and the point of consumption in order to meet customer's requirements. (Navata, 2020). At present time, the importance of logistic is increased in many economic branches, especially in industry and business. Logistics is considered to be a science, dealing with the integrated management of all the material and the corresponding information flow from suppliers through transformation of input materials up to the end consumer. (Osijek, 2014)

In other words, logistics and supply chain management are terms often used interchangeably but differ. While logistics refers to planning, implementing, and controlling the movement of goods and services, supply chain management involves coordinating and managing all activities involved in producing and delivering goods and services to customers (BsxLogistic, 2023). Similarly, there is a statement that said supply chain management outlines the strategy and activities that go into planning, sourcing, producing, and delivering goods, as well as handling returns. Logistics focuses on the right products being in the right place at the right time, and how to get them there. (Jenkins, Netsuite, 2022). This process can be

divided into two subcategories: inbound logistics and outbound logistics (University, Michigan State, 2023). In short, inbound logistics brings supplies or materials into a business, while outbound logistics deals with moving goods and products out to customers. Both focus heavily on the transporting of goods. But inbound is all about receiving, while outbound focuses on delivery (Jenkins, Netsuite, 2023).

Inbound vs. Outbound Logistics

ATTRIBUTE	INBOUND LOGISTICS	OUTBOUND LOGISTICS
Direction	Inward	Outward
Focus	Supply	Demand
Role	Receiving	Delivery
Key Relationships	Suppliers, vendors and their distributors	Distributors, wholesalers, retailers, end customers
Processes	Sourcing, procurement, materials handling, putaway	Inventory management, order fulfillment, shipping
Activity	Raw materials or goods coming in from suppliers	Finished products going out to customers
Strategic Imperative	Obtaining goods or materials the company needs to make its products	Meeting customer demand, supporting the sales process to generate revenue

Figure 4 Inbound and Outbound comparison.

However, logistics play an essential role in supply chain management due to the close link and intercrural impact of supply chain logistic management. The successful implementation of supply chain management is strongly dependent on effective logistic management. Logistics is fundamental in supply chain management, and the two are mutually dependent (BsxLogistic, 2023).

2.3. Change management in supply chain management.

As already mentioned in the evolution of supply chain management, it has been thought up and down of the statistic, from that understanding the demand of the customer and the make it run smoothly as currently status of supply chain. In addition to supply chain management (SCM), there is now a debate of demand chain management (DCM) to highlight the crucial role of demand and demand-related

information. Not being able to forecast and control consumer demand will lead to suboptimal performance across the whole supply chain. Changes always need time. Throughout the entire evolution of supply chain management, it transitions from non-communication and non-customer services to indeterminate demand forecasting and, currently, demand analysis, which involves making promotions deals that are targeted at a suitable customer through customer databases. It is an obvious example of change management that we are constantly attempting to optimize, develop, and improve it as the time goes by.

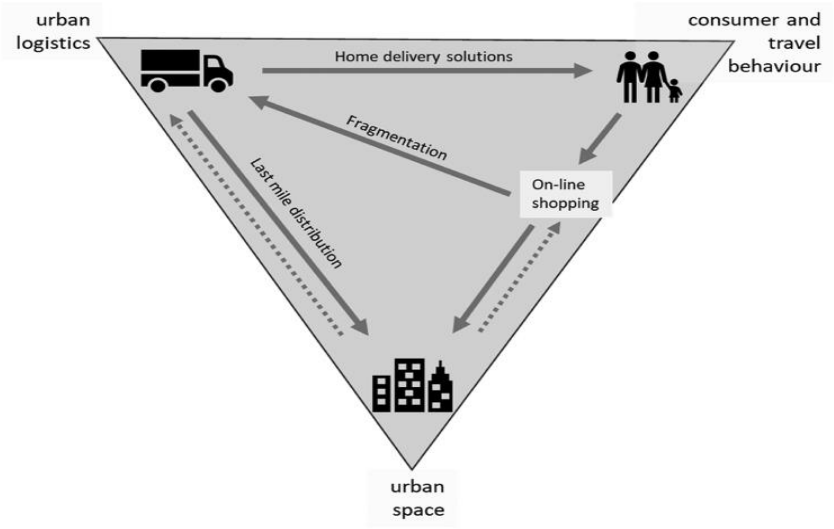


Figure 5 A framework for understanding influences between urban logistics, consumer travel behavior and urban space. (Astrid Bjørgen,, Kristin Ystmark Bjerkan, Odd Andre Hjelkrem, 2021)

Previously, the supply chain lacked clearly defined goals and was unaware of its vision and mission to establish itself as a distinct industry. However, over time, efforts were made to continuously grow it, resulting in its current status as an essential industry. In the early stage of research, several authors before this time had discussed trading one cost for another, such as transportation costs with inventory costs, and the benefits to the firm of getting the right goods to the right place at the right time, but the typical firm's logistics organization was fragmented. The reason could be simply because of the lack of understanding of key cost tradeoffs, inertia of traditions and conventions. However, several changes have been made which

leads to a positive outcome which eliminating the fragmentation such as encourages important tradeoffs to occur that can lower total costs, focus on defining the customer preference area by top management. Not only that, but the firm also sets the structure within which control can take place. The most useful is training and education the mindset so that the business can optimize the result.

Today, the practice of supply chain management is becoming extremely important to reduce costs and improve quality and customer service, with the end objective of improving competitiveness. Many firms are just now becoming aware of the advantages of supply chain integration. Supply chain management is an outgrowth and expansion of lean and Six Sigma activities and has grown in popularity and use since the 1980s (Mihai Felea , Irina ALBĂSTROIU, 2012). Apparently, Lean and Six Sigma methodology is a nonstop improvement that can work in mostly every industry even our daily basis. It not only reduces cost, but it also reduces waiting time, inventory, overproduction, motion, transportation, etc.

2.4. Relationship of logistic companies with customers

2.4.1. Why logistics are important to companies.

There are several reasons that have been shown to demonstrate the critical role of logistics for firms and organizations, allowing them to achieve consumer satisfaction and your bottom line. Logistics efficiency plays a significant role in the customer experience, loyalty and retention both directly and indirectly, and overall customer satisfaction (Burity, 2021). Sezen (2005) argued “the success of a business firm is largely dependent on achieving effective coordination and integration among individual units of the organization. A great deal of literature related with this issue of coordination between parts of an organization is attributed to two major business functions: operations and marketing” (Sezen, 2005)

Logistics centers on the movement of goods, but its effects extend much further. In business, success in logistics translates to increased efficiencies, lower costs, higher production rates, better inventory control, smarter use of warehouse space,

increased customer and supplier satisfaction, and improved customer experience. (Jenkins, Logistics for Business Defined: Importance Role & Benefits, 2022).

According to (Vu, 2021), their recent study, the cost of shipping services continues to rise each year. Experts estimate that the surcharges charged by shipping firms for transporting Vietnamese goods amount to around 1% of the value of the three industries of textiles, footwear, and fisheries. Fees usually rise by 20% a year. Additionally, the cost has been seen as an huge barrier in achieving a balanced budget and managing expenses from the company's perspective. A smooth flow of logistics will help in saving both time and resources. This will positively impact saving costs at all stages of the process. You can plan your stocks optimally with smarter inventory management at all stages (Growth, 2022). Indeed, flexibility will be the watch word (Friedberg, 2021) so there is not only one solution but there are variety of way to improve and boost cost efficiency. Sometimes, effective logistics management helps reduce costs throughout the supply chain. Companies can save money by optimizing routes, consolidating shipments, and reducing inventory. Efficient logistics also enables just-in-time inventory management, reducing the need for excessive stockpiling and associated holding costs. This method can be consider as lean manufacturing because of the use of just-in-time delivery. (LXGlobal, 2023).

Therefore, outsourcing could also be seen as a solution to reducing cost of transportation and storage. With the rise in popularity of global commerce, logistics has evolved into the core of supply chains. Business executives have recognized that they may save expenses by forming agreements with companies that provide transportation and storage. When organizations outsource transportation and storage, they significantly increase their total company efficiency, often substantially. Allowing these partners to handle the transportation of their items to end consumers results in a stronger brand and a better reputation (Transport, 2022).

Logistics performance can be evaluated by considering logistics costs, customer satisfaction, product availability in the market, conforming to the promised delivery dates and quantities, flexibility in all logistics activities, and efficiency in inventory

management (Sezen, 2005). The efficient management of logistics plays a crucial role in determining a company's financial performance. It facilitates the transportation of materials or commodities, the fulfillment of contractual obligations, and the provision of services. Any successful company leader understands the critical nature of well-organized logistics (Transport, 2022). Efficient management of logistics plays an important part in facilitating smooth movement within the supply chain, therefore potentially conferring a competitive edge. Having smooth logistics management will let the company plan every task efficiently to save resources and time. It will help both employees to negate doing repetitive tasks while the management can have greater control over the production of goods with optimal quality. (Growth, 2022).

The responsibilities of the marketing unit are to determine target consumers, understand their thinking and lifestyles, and guide how the company resources will be used in order to meet those requirements of the customers. There are several issues that are related both with the marketing and logistics functions (Sezen, 2005).With the advancements in technology, you would also want to track the movement until it reaches the customers. (Growth, 2022). Once a business has a firm grasp of its customer's expectations, it must devise a plan for achieving them via the use of logistics. This requires the corporation to have a firm grasp on or appraisal of its strategic direction. (Transport, 2022). However, in order to maintain a competitive edge to dominate the market is one of the primary goals of businesses. Efficiently managing logistics is crucial for maintaining a sustained competitive edge in the market. Optimizing logistics results in enhanced operational efficacy throughout the entire supply chain. Successfully delivering the appropriate resource to the designated location and time can serve as a competitive advantage for an organization, enhancing customer satisfaction while simultaneously reducing expenses and increasing revenue.

2.4.2. Why logistics are important to customers.

In this modern day, the development of technology is extremely difficult to predict. As a result, industries across several sectors, including production management and supply chain management, are adopting lean approaches to enhance efficiency and expand their client base. Regardless of your industry, it is essential to ensure that your items are delivered to customers soon enough to meet their needs. Satisfied customers are a business's most valuable asset. They provide the primary impetus for supply chains in all three phases: production, marketing, and logistics (Transport, 2022). Regardless of its current size, every firm aspires to achieve larger levels of success. With the ability to expand the business, logistics will help your company to reach new heights. If you don't have an efficient logistics management system, then it could be tougher to focus on the core business's motives. As logistics will take complete responsibility for product transport, it will be smoother to take care of expansion activities. (Growth, 2022). Lack of coordination between the marketing and the logistics departments may result in weak cooperation and lower overall business performance (Sezen, 2005).

From Covid 19 pandemic perspective, logistic play an crucial role and become indispensable. Covid-19 has changed the day to-day lives of people and increased the burden of supply chain businesses to provide consumers with smarter, quicker and more reliable last-mile deliveries (M. Suguna, Bhavin Shah, S Karthik Raj, M. Suresh, 2021). During the early stages of the pandemic, ensuring safety becomes the top priority for each consumer. Customers were reassured about the safety of receiving packages during the pandemic by the implementation of safety measures, such as contactless delivery and better hygiene practices. Customers acknowledged the aggressive measures implemented by logistics companies to emphasize their welfare. For example, contactless delivery minimizes physical contact between the delivery person and the customer. This involves delivering packages to selected destinations without requiring a direct handoff or signature. Customers embraced the option of contactless delivery since it reduced the risk of virus transmission and created a sense of safety. At the same time, people's demand for clean, hygienic and white-glove home facilities has risen dramatically. Home service providers

must not only increase the pace of their last-mile operations but also ensure that each job is completed professionally and to the highest possible quality standards (M. Suguna, Bhavin Shah, S Karthik Raj, M. Suresh, 2021).

According to the results of the vast majority of academics, the need for trust develops in combination with the increasing reliance on other entities, such as emerging technologies. This is because the complexity of transactions and the uncertainties that are involved in them have increased. Each and every one of the motivations that are there when purchasing anything on a different platform contains it. The model is dependent on the effectiveness of trust, risk, convenience, time-saving environmental cautiousness, financial motivations, and personal inventiveness on the customers' desire to engage in the activity. The potential for promoting sustainable last mile distribution through consumers should, however, be explored further. Interesting aspects that are not extensively addressed in the literature include influences from housing and household characteristics (density, dwelling type etc), use of new mobility solutions (i.e. car sharing) and demand for new delivery services in residential areas. (Astrid Bjørgen,, Kristin Ystmark Bjerkan, Odd Andre Hjelkrem, 2021)

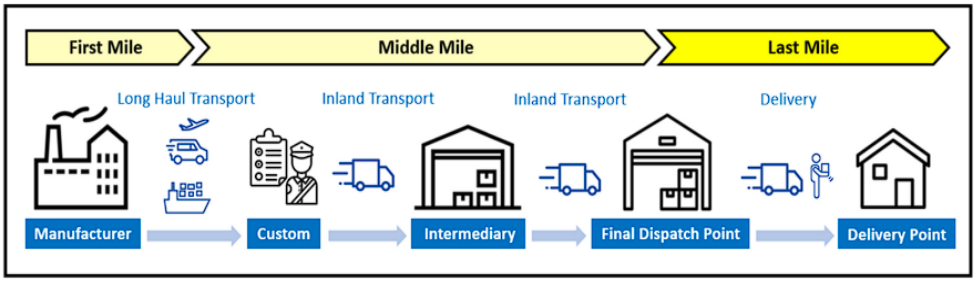
During the period of time surrounded by COVID-19, a significant number of individuals who were previously disinterested about online purchasing have actually made the transition to using online platforms due to it convenience, product variety, delivery time, easy tracking, reviews, and price gap. The outbreak of the Covid-19 virus has opened up a lot of new opportunities for the development of drone delivery technologies. With a non-stop development of technology, the development of logistics might also support the user with the adaptation of technological integration. The latest method that could avoid human physical touch, they use drone to carry necessary around the city. As a consequence of this, it is anticipated that such elements will encourage the introduction of autonomous technology throughout the phase of distribution known as the last mile. Example for avoid human touch and prevent citizens from covid-19, drones have been used to carry face-masks to hospitals around the country (M. Suguna, Bhavin Shah, S Karthik Raj, M. Suresh, 2021).

The most well-known and used is order in application, tracking via notification. Real-time tracking gives customers product location and condition updates. This minimizes uncertainty and increases anticipation of receiving the order by providing timely delivery updates. This system allowed users to follow their order throughout delivery. They can arrange their arrival inside the expected delivery timeframe, boosting delivery reliability. It affects consumer efficiency and time management. Customer engagement through tracking features improves logistics efficiency. Informed and engaged customers are more cooperative, reducing missing deliveries and failed attempts. As a consumer, the delivery app or instruction email is easy to follow. It encourages openness, learning, and contentment. In short, logistics to consumer provides convenience, saves time and money, prevents physical contact, prevents disease spread during the COVID-19 pandemic, and protects the environment from carbon emissions.

3. Last-Mile Delivery Logistics

3.1. Definition of last-mile delivery

Logistics is a long process starting from suppliers through manufacturers to end users. Last mile delivery includes everything associated with getting a product from the closest hub or warehouse to the customer. It’s not really only the last mile; it is a broad term used to describe the last leg of the delivery journey. (Keenan, 2023). In other words, the term "last mile" was initially used in the tele-communications networks, but later is applied in logistics management as well as related fields such as e-commerce or distribution in the supply chain (Phuong, 2020). The state of (Lindner, 2011) has the most aspect to prove the statement that I would want to include in last mile delivery in logistic which is “last-mile logistics the last part of a delivery process. It involves a series of activities and processes that are necessary for the delivery process from the last transit point to the final drop point of the delivery chain”.



Source(s): Adapted from Castillo and Jain (2019); Motavallian (2019)

Figure 6 Last-mile delivery structure.

Last-mile delivery is the crucial part that retailers constantly attempt to develop to become outstanding in the service (Hoda Nseif, Kinga Danesch, 2021). Numerous terms are related to the delivery of goods to customers. However, they have a similar meaning, but emphasize certain aspects: last mile(s) delivery, final delivery, home delivery, residential delivery, door-to-door delivery, doorstep delivery, consumer direct service delivery, B2C e-commerce delivery, extended supply chain etc. The terms last mile delivery and final delivery indicate a place in the supply chain (SC) (Tadić, 2020). The last mile of the supply chain, which includes the last phase of the product's journey from the distribution center to the consumer's door, is the most complex and costly part of international e-commerce logistics.

Furthermore, the last mile is usually the most costly and inefficient part of delivery. The term comes from the early days of telephone service, when wiring homes to the mainline was slow and expensive. Last-mile logistics includes services such as home grocery delivery from a local store and package delivery by a common carrier. Before the last mile, shippers can handle lots of orders at the same time in the same way (for example, they can load dozens of orders going to the same city in one truck). But in the last mile, each delivery requires individual handling because it goes to a single address. Deliveries to addresses get spread over a suburban region or packed within a gridlocked city center where parking is difficult last-mile services account for 41% of overall supply chain costs (Jenkins, Netsuite, 2023). This is a stage in which organizations must try to fulfill the growing demands of their consumers while reducing the environmental effects of their activities.

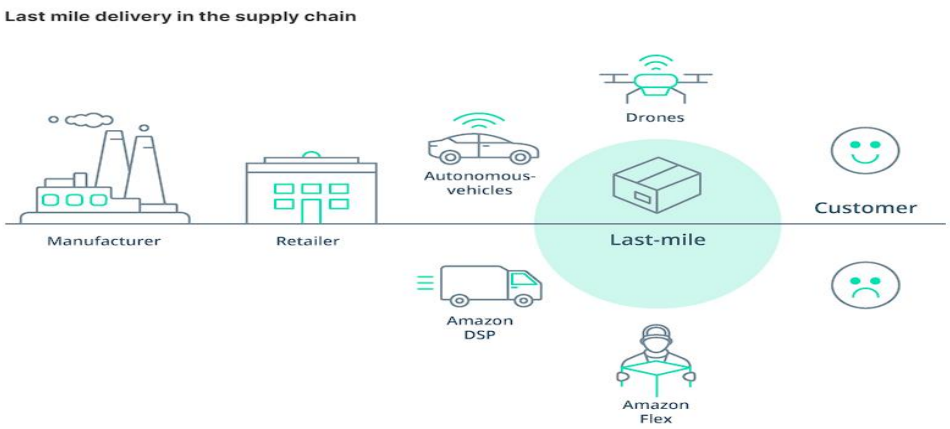


Figure 7 Last-mile delivery structure (Intellias, 2023)

Last-mile logistics (LML) is the final leg in the delivery service business to customer (B2C), in which the cargo is delivered to the recipient and collected either at the receiver's home or at the collection point and has become one of the obstructions of e-commerce.

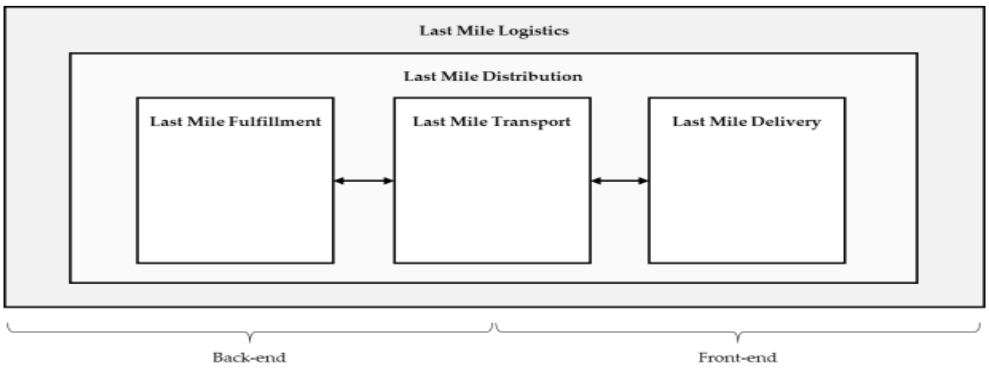


Figure 8 Overall framework composed of five components (John Olsson, Daniel Hellström and Henrik Pålsson, 2019).

The core of the last mile logistics system consists of three central components: last mile fulfillment, last mile transport, and last mile delivery. (John Olsson, Daniel Hellström and Henrik Pålsson, 2019). On the other hand, on the basis of the literature, last mile logistics can be described as the process of planning, implementing, and controlling efficient and effective transportation and storage of goods, from the order penetration point to the final customer (John Olsson, Daniel Hellström and

Henrik Pålsson, 2019). The transportation of products and services to last mile locations is often characterized by complexities and significant expenses for suppliers. So on, last mile logistics has become a big business and a central focus for both providers of services and consumers. In further, last mile logistics for product delivery have become a central focus for retailers in the e-commerce era (HAYES, 2023). Last mile fulfillment is the process of executing an order by making it ready for delivery.

The logistics function carries an important role in linking the two most important functions of a company, operations, and marketing. (Sezen, 2005). The characteristics of home delivery affect the level of service, the level of demand and customer satisfaction, efficiency, costs and profitability of the delivery organizer, as well as the environment in which these processes take place (Tadić, 2020). Following, (Vanelslander, Deketele, & Van Hove, 2013) some of the characteristics and parameters of delivery are almost completely controlled by the organizer such as start point and return flow. According to (Lim, Jin, & Srai, 2018) other aspects are primarily related to customer decisions (e.g. end point of delivery) however, most of them are dependent on a variety of factors and conditions of different stakeholders.

3.2. The benefit of last-mile delivery

Last mile delivery refers to the activities necessary for physical delivery to the final destination chosen by the receiver. Last mile delivery can also be seen as the front-end, where the last mile meets the receiver. Last mile delivery and last mile transport are strongly interrelated and, therefore, are often researched in combination. The largest share focuses on emerging technologies and innovations, particularly goods reception solutions (John Olsson, Daniel Hellström and Henrik Pålsson, 2019). With increasing globalization, logistics play a crucial role in enabling businesses to effectively contact clients on a global scale. Effective shipping and transportation networks enhance the accessibility of items to clients across different geographical areas, hence broadening the market reach and providing more options for consumers. Indeed, the primary goal of the logistic system is to reach customer

expectation and satisfaction. E-commerce channels are relatively new and challenging for retailers. They have established their ecommerce channel and are seeking for improvements nowadays (Kooijman, 2014). At this point I will analyze three form of last-mile delivery according to the basis structure of the online retail supply chain model represented in the provided figure, following from that, I will mention each benefit of unique type of delivery. In addition, we also cover order delivery options, such as attended and unattended home delivery, in-store pickup, and third-party pickup locations.

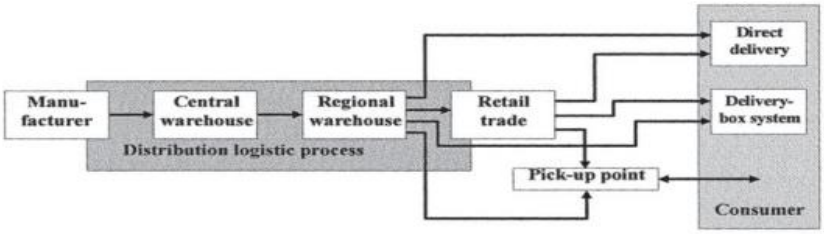


Figure 9 Basic structure of the online retail supply chain(Fleischmann, Klose, Daduna, & Lenz, 2005)

Logistics advancements have expanded the variety of options for direct delivery, offering a wider variety of delivery methods and the availability of pick-up places in closer proximity to the end or final destination. This feature enables customers to comfortably schedule the time at which they will pick up their order, resulting in minimizing the total distance traveled in comparison to traveling directly to the store. If the consumer is near the store, they can choose between direct delivery or ordering through the app and picking it up at their convenience. Below are operations in e-grocery that simplify demonstrate the whole process of e-grocer as an intermediary in the supply chain. From reliable research article, last mile delivery reception box can be divided into three main delivery concept which include (1) independent reception box is installed at the garage or home yard of the customer; (2) delivery box is equipped with a docking mechanism and will be retrieved after goods inside are taken away; (3) shared reception box is installed near customers for their shared usage (Xuping Wang, Linmin Zhan, Junhu Ruan, and Jun Zhang, 2014).

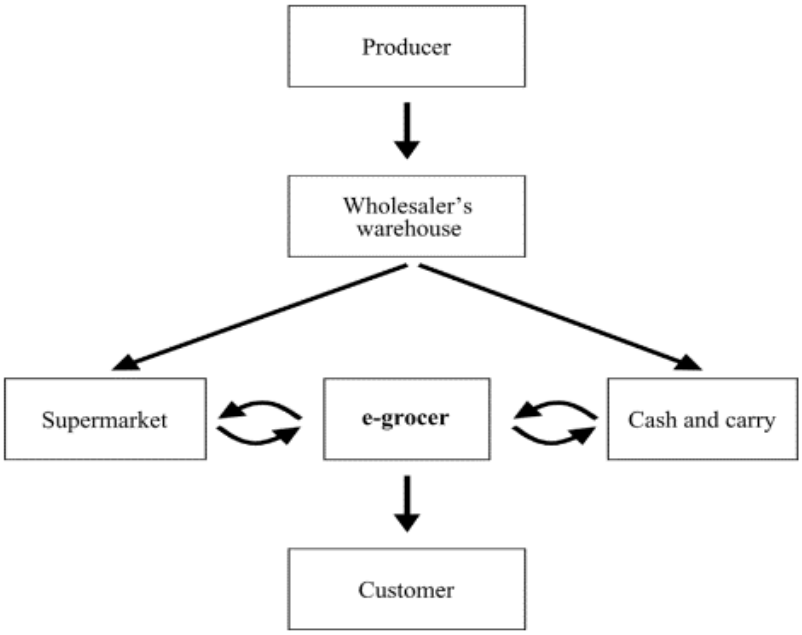


Figure 10 The e-grocer as an intermediary in the supply chain.

a. Direct delivery

Home delivery can be defined as direct or indirect delivery of goods to the customer home address, which is partially or fully realized by the retailer, manufacturer or third party (logistics provider, crowd worker) (Tadić, 2020). The main reason that makes this type of shopping popular is saving time, money, convenience as well as a huge development of logistic and customer service. Indeed, according to home delivery: concept and characteristics journal, it said home delivery of items purchased online is appealing to those for whom going out to shop is difficult for various reasons, such as physical disability, the need to care for small children, the lack of adequate or convenient transportation, and/or a busy lifestyle. Buying groceries and other products online unchains consumers from physically driving to and shopping in traditional stores (Tom Hays,Pınar Keskinocak, Virginia Malcome de L´opez, 2004).

From my research, there is a statement that demonstrated last-mile delivery resulted in a decrease in carbon emissions. Instead of each customer wanting to purchase any type of product they have to use their transportation to go to shopping

mall, find and buy it which already time-consuming and cause an impact on environment. As the shift of shopping hobbies since Covid-19 pandemic, clients can use the app to make purchases and payments, and then await their order to come to their personal location provided from the application which means not only reduced carbon dioxide but also reduce in traffic. As a result, the reduction in traffic, enhanced convenience, and decrease in accidents have led to an improvement in the quality of life and social environment for city residents.

Sometimes customers would like to have personal information about certain products, particularly from expensive and credence goods (such as laptops, cars, and medication). At the moment, it is increasingly common to buy these types of products via the online channel from pure online players and multichannel retailers (Kooijman, 2014). Consequently, two revolutionary last-mile delivery approaches have emerged: a delivery box system and a pick-up station. These options offer customers the convenience of choosing a location and time that suits their needs and time management.

b. Delivery box system.

From the expansion of delivery method, the most common type of home delivery within online grocery shopping is attended delivery, but unattended delivery offers many advantages too. Unattended delivery (mailbox delivery) is more common with non-grocery online shopping (Kooijman, 2014) . The empty boxes are collected on the day following delivery or later. The secured delivery box solution potentially enables a faster growth rate and higher flexibility of the investments because of a smaller investment required per customer. (Mikko Punakivi, Hannu Yrjola, and Jan Holmstrom, 2001)

The groceries are delivered to locked refrigerated boxes, which are located in the households. By using reception boxes, customers become independent of the delivery timetable, i.e. they do not need to be at home to receive the goods. The reception boxes also reduce home delivery costs for the e-grocer (Vesa Kamarainen, Juha Saranen,Jan Holmstrom, 2001). Reception box can be defined as an unattended home delivery solution. The delivery service was integrated seamlessly

with temperature-controlled reception boxes installed outside of participating consumers' homes. Each reception box included a built-in refrigerator and freezer, Internet connection, a digital lock to ensure that only the intended recipient received each delivery and remote-control access through a mobile application (John Olsson, Daniel Hellstrom and Yulia Vakulenko, 2021). Also in this alternative, someone has to invest in the reception boxes. Currently, there are many different kinds of reception boxes entering the market (N. Bennett, 2000) .

c. Pick up point.

With the shared reception box method, the customers are independent of the delivery timetable, i.e. they do not have to be at home to receive the goods. The groceries are delivered to locked reception boxes that are allocated to a specific customer with every delivery, which makes it possible for many customers to use the same reception box. The customer receives the number of the box and the code needed to unlock the box, for example to his mobile phone by text message (Vesa Kamarainen, Juha Saranen,Jan Holmstrom, 2001). Indeed, this article also determines the reception box operates in many temperatures and keeps the groceries in good condition for as long as a normal refrigerator would. By using shared reception boxes, it is possible to drop off many orders at one stop and reduce the delivery time per customer. This is the most cost-effective solution for the e-grocer when delivery is required. However, the service level perceived by the customer only improves significantly if the reception boxes are located near the household (Vesa Kamarainen, Juha Saranen,Jan Holmstrom, 2001).

I have a personal case that illustrates the application of the pick-up point last-mile delivery approach. During that time, JYSK was doing a Christmas sales campaign. Because my mattress and sheets were not providing enough warmth during Finland's winter. I bought a duvet and bed sheets because my mattress and sheets weren't warm enough in Finland's winter, I chose the option to pick up my order in-store, and later that day, I collected my order after receiving a notification from the store that it was ready. However, there was an error in which the bed sheets were incorrectly acknowledged as a duvet cover instead of actual bed sheets. I did not

see this issue during my "Click and collect" process. Upon returning home, I immediately proceeded to launder the item without first assessing its fit. However, I soon realized that it was the incorrect product, so I repackaged it and went to the store the next day. The following day, I reported my trouble, and it turned out the website's translation process made a mistake because it didn't offer English.

As a consequence, the reverse logistics and logistics service proceeded well, as they approved my request and allowed my return and replacement of my product with the correct one. In its basic form, the mistake that can rarely be committed by both stores and customers is the language translation and information infusion.

3.3. Challenges in the last mile delivery

One of the biggest challenges in B2C e-commerce is the so-called “last mile”, the home delivery service for the customer (Mikko Punakivi, Hannu Yrjola, and Jan Holmstrom, 2001).The first challenges for last-mile logistics come from the competition of courier companies. The growing demand needs fast, efficient, and cost-effective delivery of products and goods to consumers. Having said this, there might be chances that logistics companies face a number of challenges (Patel, 2023) .The fast delivery market is promising land for investors (Phuong, 2020).

This (near) zero cost is increasing the demand for next-day and same-day deliveries. These pricing models are forcing logistics companies to promote loss-leading tactics to compete with one another (Oliver Bates, Adrian Friday , Julian Allen , Tom Cherrett , Fraser McLeod , Tolga Bektas, ThuBa Nguyen , Maja Piecyk , Marzena Piotrowska , Sarah Wise , Nigel Davies, 2018). In an environment where free delivery and short lead-times have become the norm, costs are rapidly mounting, resulting in very little margin on delivery (Deloitte, 2020a). Last mile delivery is the most inefficient and costly activity of the supply chain (Boysen et al., 2020). Statistics estimate that the last mile delivery accounts for 13–51% (with some estimations reaching 75%) of total supply chain cost, depending on different factors (Millar, 2016; Skiver and Godfrey, 2017). Thus, last mile delivery imposes a heavy burden on the bottom line of companies as they have to keep up with the expectations of customers while keeping their costs down (ShipHero, 2019).

Despite its potential advantages that has been mentioned above, the e-grocer model has its drawbacks. Brick-and-mortar stores have established locations, brand names, and a large customer base. A majority of consumers still prefer to buy groceries from a retail store. They may like to smell the vegetables and squeeze the fruit, or they may like to unwind from a long day by walking among the fresh breads of the bakery (Tom Hays,Pınar Keskinocak, Virginia Malcome de L´opez, 2004). As the aspect of the final destination, last-mile deliveries and collections rely heavily on appropriate stopping locations. Only 5% of the stops made by our drivers were made at off street locations (e.g. locations not directly outside of delivery locations) (Oliver Bates, Adrian Friday , Julian Allen , Tom Cherrett , Fraser McLeod , Tolga Bektas, ThuBa Nguyen , Maja Piecyk , Marzena Piotrowska , Sarah Wise , Nigel Davies, 2018). The drawback is the additional cost of collecting the empty boxes (Mikko Punakivi, Hannu Yrjola, and Jan Holmstrom, 2001). E-retail has still presented many cost-effective related challenges. Especially, challenges within order picking and home delivery appear to be major obstacles. Many different forms in order picking, home delivery and pick-up points have been established. In-store order picking seems to be the best solution in regions with few customers (Kooijman, 2014).

The analysis concludes that the term "last mile logistics" is broad, as the many definitions and scopes identified in the literature demonstrate massive variations. The study of current definitions indicates that there is a specific need for clarification regarding three key elements: commercial transaction, channels, and the method of delivery. As digital marketplaces continue to grow, we're witnessing a shift in consumers' demands and expectations. Today they're looking for cost-effective yet quick delivery options. (Ross, 2021). The relationship between logistics performance and E-commerce customer loyalty is much closer in E-commerce business than in any other industries (Ramanathan, 2010).

3.4. Sustainability in the last mile delivery

In the rising of e-commerce and its successful diffusion in most commercial activities, last mile distribution led to more and more trouble with delivery in urban

areas all over the globe. In 2018, e-commerce is in a steady increase and more and more commercial goods are ordered online. In 2018, e-commerce still showed a worldwide growth rate of 23.3% (Statista, 2018). The growing significant of volumes lead to high demand to be delivered toward to customer house increase the number of delivery vans or transport potentially entering the city centers could able to add congestion, pollution, and negative health impact. However, thanks to high demand and organization innovation, the concept of the last mile delivery method has a huge upgrade. Therefore, they involve and try to raise the awareness of all partners (stores, individuals, clients, couriers, logistics service providers) to achieve their sustainability objectives. For example, anti-waste platforms offer corporate social responsibility (CSR) workshops to their clients and assist them in carrying out a carbon assessment. (Moncef, 2021). Last-mile delivery, particularly in urban areas, is where sharing economy initiatives seem most likely to develop (Carbone, 2017)

Our review of the literature suggests that organizational sustainability, at a broader level, consists of three components: the natural environment, society, and economic performance. (Craig Carter,Dale Rogers, 2008). According to Harvard business school online, the triple bottom line is a business concept that states firms should commit to measuring their social and environmental impact—in addition to their financial performance—rather than solely focusing on generating profit, or the standard "bottom line. (Miller, 2020). the triple bottom line suggests that at the intersection of social, environmental, and economic performance, there are activities that organizations can engage in which not only positively affect the natural environment and society, but which also result in long-term economic benefits and competitive advantage for the firm (Craig Carter,Dale Rogers, 2008).

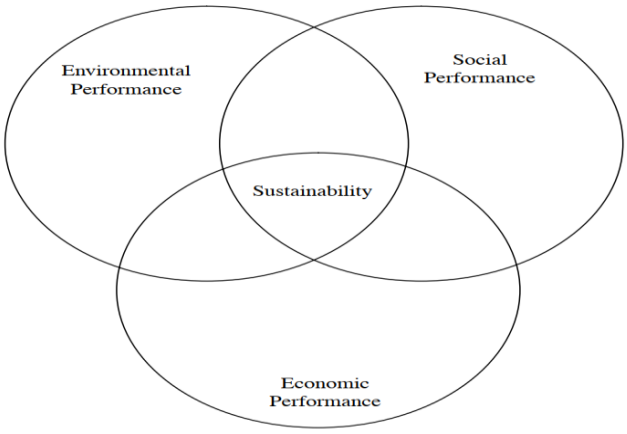


Figure 11 Sustainability: the triple bottom line

3.5. Example of sustainability in last-mile delivery

One of the most well-known and popular example for nature environment is include bicycle delivery in food industry. The light vehicles used to deliver products within the urban areas help reduce the harmful environmental degradation associated with heavy vehicles (Mariki, 2021). Bicycle delivery and food delivery platforms also claim to have a "green delivery" approach. However, food delivery initiatives increasingly rely on scooters, thus generating a clear negative impact due to CO2 emissions. This impact is difficult to assess due to the problem of illegal (unlicensed) vehicles and the lack of information on the overall number of scooters being used. (Moncef, 2021). From my own perspective, after quite a lot of traveling, I can have a conclusion that Netherlands, Finland, Danmark, Germany could have the large usage of bicycle delivery for application which can named as Wolt, foodora, Hungry.dk, Just Eat, Uber Eats more and more delivery services.

According to recently updated, Amazon has come up with using drone to have delivery. the company came up with an idea of "airborne fulfillment center (AFC)" which has a capability to fly at 45,000 feet or more and will store items for delivery to customers purchased through their website. The delivery to the customers will be done using drones that will pick up the lightweight items for delivery. The AFCs will store inventories of product that it sells online.

3.6. The impact of sustainable e-commerce last-mile model on environmental

Home delivery is not a new service in the grocery business. In fact, the Internet has just helped to reintroduce an old service. The Internet has had an enormous effect on the ordering process, making it cheaper and faster (Vesa Kamarainen, Juha Saranen,Jan Holmstrom, 2001). However, in the opposite way, when the home delivery fails, it contributes to several issues, not only to the shopper, but also to the shipper. It would increase the cost on the companies as they will spend extra money to redeliver the parcels again in addition to the increase of pollution emissions, traffic congestion and many other concerns (Lachapelle, U., Burke, M., Brotherton, A., & Leung, A, 2018).

Firstly, the significant influence of an e-commerce company on the ecological environment involves the fact that all these processes may be carried out without the need for physical documentation. On this basis, the e-commerce firms operate since order processing involves the placement of orders by customers, checking the order status, confirmation of the order availability, payment processing, and last-mile delivery to the customer. All these processes are done virtually without paperwork, which eventually helps in the ecological environment's sustenance (Mariki, 2021).

Secondly, as I mentioned above, last-mile logistics have a positive impact on the environment by adopting sustainable practices in purchasing and procurement. Advancements in logistics have expanded the range of solutions for direct delivery, providing a wider selection of delivery methods and the convenience of pick-up locations located closer to the final destination. This involves shifting away from the traditional approach of purchasing products and services to order delivery options, such as attended and unattended home delivery, in-store pickup, and third-party pickup locations. Reducing the transportation distance or the number of transports would help reduce the environmental impact of any distribution channel, since it would result in less CO2e emissions (Coelho, 2021).

However, according to Triple Bottom Line of 21st Century Business there are four main type of e-commerce last-mile logistics impact on cities which cover economic impact, social impact, environmental impact, technological impact (Elkington, 1999). Sustainable procurement looked into the social, economic and ecologic environment and implications of the goods and services purchased. There is supply chain professor has a statement that strongly affirm that "E-Commerce's Time Savings and Efficiency Are Here To Stay"

Figure 12 Types of e-commerce-related last-mile logistics impact on cities. (Elkington, 1999)

a. Economic Impact

Based on the discussion above in sustainability in last-mile delivery, it is clear that sustainable last-mile logistics have a positive impact on the environment, particularly the ecological environment, by reducing carbon emissions. Moreover, refer from impact of e-commerce last-mile mode, it also points out that sustainable last-mile logistics also contributed to the economic environment by cutting on costs incurred in shopping and transport by customers and the logistics companies. Sustainable last-mile logistics also improved the quality of life of customers (Mariki, 2021).

The positive economic impact of last-mile delivery is the expansion of the job market, which helps prevent unemployment and leads to the retaining of workers

and a growth in per capita income in a particular country. Nevertheless, overconsumption of it can have negative consequences. The continued use of traditional delivery trucks can result in traffic congestion, which in turn can cause businesses to experience reduced productivity and higher fuel expenses. As mentioned above, last mile delivery is the most expensive part of the total supply chain cost (estimations reaching 75%). In order to prevent these costs, business can implement advanced technologies and route optimization techniques which enable a shorter departing distance and the optimization of delivery routes. Furthermore, from the consumer's point of view, the savings arise because they gain access to goods at more competitive prices (Marta Viu-Roig and Eduard J. Alvarez-Palau, 2020).

b. Social Impact

As regard, social impact of last mile delivery could consider as the aspects associated with people's quality of life, infrastructures, and health risks due to noise and accidents (Marta Viu-Roig and Eduard J. Alvarez-Palau, 2020). The Amazon Go case study has resulted in a highly important and significant shift in the customer and commercial aspects of last-mile delivery. In my analysis of this example, I have seen that several social elements have significantly impacted Amazon's economic strategy across all aspects of their campaign. There is a strict connection between economic impact and social impact on purchasing decision. For this reason, there has been a rise in online shopping and a growing preference to first research and evaluate desired products on the internet. Second and third element that affect social to purchasing product based on Amazon strategy is easy access to internet. Indeed, this strategy has increased convenience and comfort among consumers to purchase high-value products like laptops and smartphones. (Desai, 2021). As the development of technology that time, the widespread availability of internet access to teenagers has resulted in a general rise in their wishes and wants, thereby leading to an increase in overall purchasing activity.

The success of their strategy can be ascribed to their exactly defined vision and target demographic. Moreover, it goes without saying that the delivery services offered by Amazon in that era were of tremendous assistance to individuals and busy

families, particularly in regard to grocery purchasing. Amazon archive prosperity through the implementation of measures that optimized the purchasing experience for every individual consumer. However, as the technology advancement, drone also used to make a last-mile delivery that I will mention in technology impact part

c. Technological Impact

As a soon as innovations needed with a key concept is sustainability sustainable last-mile logistic operation has come up with the idea of reducing CO2 content in last mile logistics requires technological innovation and the e-commerce giant "Amazon" has come up with such an innovation. The company came up with an idea of "airborne fulfillment center (AFC)" which has a capability to fly at 45,000 feet or more and will store items for delivery to customers purchased through their website. The delivery to the customers will be done using drones that will pick up the lightweight items for delivery (Mohamed Awwad, Abhijeet Shekhar and Abhishek Sundaranarayanan Iyer, 2018).

This development can be seen as a significant advancement in last-mile delivery technology. When apply drones on last-mile delivery, it potentially reduces the carbon emissions if compared to traditional delivery transportation. In other words, apply electric vehicles (EVs) also be a long-term solution as well as drone. They both include and offers a significant reduction in carbon emissions. EVs don't put any pollution into the air when they're running, which helps clean the air and lowers our total carbon footprint. Even so, it is important to take into account the negative environmental effects of producing and discharging batteries for electric vehicles. However, the use of drones in this business is still in the development phase due to its high cost and relative unfamiliarity. A significant number of consumers remain unwilling to embrace drone delivery due to concerns over privacy, safety, and security. The most well-recognized ways that can still be used in the current scenario consist of pick-up points, direct delivery, delivery box systems, electric vehicle, or bicycle delivery in order to reduced carbon emission as much as possible. Nevertheless, drone and EVs are considered as a future solution for this type of industry for it own speed and efficiency as well as it bring environmental benefits. These

factors inspire a significant number of investors that share the same goal for ecological responsibility.

d. Environmental Impact

In short, environmental impact can be defined as a contribution to environmental management, including matters pertaining to natural resources, climate and meteorology, and environmental pollution. The growing demands of customers for last mile delivery necessitate the need of such innovations in technology. The innovations are not only the results of growing customer demands but are also due to stricter policies imposed by the government (Mohamed Awwad, Abhijeet Shekhar and Abhishek Sundaranarayanan Iyer, 2018).

According to Tan et al. (2009), last-mile logistics in e-commerce has encouraged sustainable warehousing, positively impacting the environment (Mariki, 2021). Pollutant releases that contain the major greenhouse gas carbon dioxide, utilizing the non-renewable fossil fuel, land, and aggregates, junk products such as oil, tires and other items, the loss of wildlife habitats and connected threat to wild sort. (Hoda Nseif, Kinga Danesch, 2021). These components could include side-aspect such as warehouse, ecological, social, and environmental impacts of the products and services purchased were considered during sustainable procurement. First, let's mention about sustainable warehouse. According to Mariki's research, sustainable warehousing includes the adoption of sustainable carbon emission methods, which involve the utilization of renewable energy sources like solar power in warehouses. These sources drastically decreased carbon emissions.

Moreover, utilizing sustainable packaging material is also a practical and efficient alternative. Utilizing sustainable packaging materials along with strategies like including recycled or biodegradable materials can significantly reduce the environmental impact connected with e-commerce. When combining lightweight and environmentally sustainable packaging, it is possible to reduce transportation costs and minimize waste formation. In order to mitigate the environmental impact of e-commerce, we can employ these strategies to prevent and minimize its effects.

III. RESEARCH METHODOLOGY

1. Choice of methodology

Based on the framework of qualitative research method, I have strictly investigate of the information, data and well-translated material. The accessibility of approved reading materials, professional organizations performing interviews, and documentaries that may reflect their own perspectives, along with a trustworthy and rational frame of mind, corresponds to the findings of my own thesis topic research. The main databases were used to find the suitable article for this thesis is via ProQuest Central, ScienceDirect Emerald, ResearchGate, and others website. However, when applying the criteria for dependable sources in qualitative research, verifying that the data collected is trustworthy, reliable, and credible is crucial, adding significant value to my own thesis research and have a clear vision for supervisor and audience about how to optimize last-mile delivery both from a customer and firms perspective and to reach win-win solutions.

Qualitative research method involves collecting, analyzing and interpreting data by observing what people do and say. In the background of the subject of qualitative research is usually a connection to man-made meanings. In qualitative research observations and statements are in a non-standardized form but qualitative data can be quantified if a translation process has taken place. Qualitative research can be any study that is conducted using an observational technique or unstructured questioning. In qualitative research the subject persons of the study are carefully chosen because of the usually low number of respondents. (Burns & Bush, 2010)

The reason to use qualitative method is because it allows in-depth exploration of customer needs and preferences in the last mile. Comprehending these elements is essential for customizing delivery methods to align with consumer demands. Qualitative research methodology offers flexibility in approaching the process provided in the materials. The last-mile environment is dynamic, characterized by evolving customer behaviors and technological improvements. Qualitative methods offer the flexibility to adjust research approaches and analyze current trends or challenges as they evolve.

The qualitative research study comprehensively investigates the definition of both logistics as well as supply chain management. As a result, this will lead to the development of strategies to enhance the efficiency of the supply chain management process and prioritize sustainability in real-world business operations. Another output of quantitative research, we will be able to understand the demand, forecast the purchasing trend and the expectations of individual customers when using each unique last-mile delivery method. Most importantly, qualitative research supports a cycle of optimization for improving last-mile logistics based on daily news keeps update as well as the latest reading material.

2. Further research

As I mention in the introduction, e-commerce, logistics, and supply chain management (LSCM) have been significantly impacted by their success in developed and emerging economies. The commercial sector is increasingly concentrating on the last mile due to the growth of e-commerce during the COVID-19 epidemic. E-commerce has made online purchasing an important part of current consumer lifestyles. The environmental impact of last-mile logistics is a major concern as virtual retail grows. As e-commerce companies and enterprises balance fast delivery with environmental responsibility, educational programs are crucial. However, the rise of e-commerce has transformed consumer-business interactions. Behavior has and will continue to change over time as awareness of environmental issues rises and sustainable last-mile choices become more widely available.

This long-term study can provide information on the change in customer preferences. For these times, we can have in-depth research that focuses on consumer awareness and choices in sustainable last-mile logistics is substantial. The last-mile delivery phase in global e-commerce is a critical point where operational efficiency, consumer satisfaction, and environmental impact meet. How firms may balance cost reduction, customer happiness, and environmental impact is the focus. This suggestion aims to give advanced knowledge of economic and ecological processes to help last-mile logistics companies reconcile financial sustainability with environmental stewardship. Develop dynamic models that account for changing variables

over time, including evolving technologies, market conditions, and consumer behaviors. This allows for a more realistic representation of the fluid nature of the e-commerce landscape. Predicting human behaviors is still always difficult because it is always related to a certain aspect of surrounding environment. By providing consumers with accurate, accessible information, these initiatives contribute to a more informed and environmentally conscious consumer base. This change in consumer behavior can not only cause instant changes in delivery options, but it can also help bring about a long-lasting shift in culture toward sustainability. Businesses are becoming more aware of how important it is to educate customers. Making smart choices and using sustainable last-mile operations together could lead to a more eco-friendly future for the e-commerce industry.

The topic that I would suggest topic is mostly focus on the customer such as behavioral drivers, behavioral change over time or green consumer attitudes. In addition, in order to sell products as well as sell service, we should prepare how to reach and approach customers, so it is communication strategies to develop to meet the demand of their customer. In short, I would like to suggest doing further research about communication and customer relationships management which how to attract and keep a balance relationship between customers and global e-commerce companies to enhance sustainable last mile logistics. The key to each of the aspects that I mentioned above is to understand customer behavior and preferences in sustainable last mile logistics or just any further reaction of the customer, the way of purchasing. Sustainable methods, especially in last-mile logistics, are changing global e-commerce and these changes are unexpectable and unpredictable so there is some space for segmentation analysis, develop communication strategies. Consumer acceptability and adoption are key to ongoing strategy success. The piece that follows explores consumer behavior and preferences in sustainable last-mile logistics in online retail, focusing on major factors that influence decision-making. For example, when consumers collectively shift their perceptions about environmental protection and alter their shopping behavior, the whole firms in the industry should have been shown how to adapt to the shifting realities.

IV. PRESENTATION AND ANALYSIS OF RESULT.

The success of many online business can be attributed to the ability to plan the idea, schedule supply chain and management supply chain workflows in appropriate way. Referring from Cárdenas and Vanelslanders, two reliable journalist research that illustrate, consumers are always trying to seek alternatives to optimize various factors like price, convenience, and choice, which gives them a completely different shopping experience. What is more, retailers must develop a seamless buying experience. Thus, looking for new possibilities to fulfil the client's expectation is necessary. An agile supply chain fosters more flexibility and freedom to customize the product to the present needs (Cárdenas, I., Beckers, J. and Vanelslander, T, 2017)

Likewise, as convenient is it, the last-mile supply chain can be used to take the drudgery out of the experience—i.e., online grocery shopping is faster, and it can provide one pleasant interaction when groceries are delivered versus two hours of schlepping to, through, and from the store. Where purchases are more personal, or have more possibilities, experience can be refined through last-mile supply chains to be fundamentally different than in traditional stores (Boyer, 2004). Efficient optimization of urban mobility is a key for the economic success of large metropolitan areas and respectively delivery of parcels on time is also crucial factor for companies to satisfy the customers' need (Azamat Seidakhmetov and Omid Fatahi-Valilai, 2022) At this stage, businesses must find a way to combine sustainability and efficiency in order to meet customer needs and reduce the environmental effect of their operations. This process plays a crucial role in determining the quality, cost-effectiveness, and reliability of the products and services as well as sustainability that acquired by an organization.

1. Optimizing Last-Mile Logistics in Supply Chain: Strategies for Sustainability and Efficiency

a. Strategies for Sustainability

According to Gladwin has defined that sustainable development must encompass the concept of security, which, “demands safety from chronic threats and protection from harmful disruption” including, “biodiversity loss, climate change, freshwater scarcity, food insecurity, and population growth.”. Indeed, the term sustainability, which increasingly refers to an integration of social, environmental, and economic responsibilities, has begun to appear in the literature of business disciplines such as management and operations. In addition, companies are beginning to rapidly adopt the term sustainability (Craig Carter,Dale Rogers, 2008).

The five-R analysis for supply chain management includes the concepts of recycle, reuse, reduce, re-design, and re-imagine. All of these concepts are crucial in enhancing waste management practices and promoting environmental sustainability every step of time. As soon as sustainable was defined, developing reusable packaging solutions is an innovative approach that goes beyond traditional single-use packaging, contributing significantly to sustainability efforts in last-mile logistics. The main objective of reuseable packaging solutions is to create packaging solutions that prioritize both the protection of products during transit and the long-term reduction of packaging waste through reusability. This approach allows us to integrate many elements that leverage the use of reusable materials, such as a minimalist design and padded envelopes made from recycled materials, along with water-soluble packing peanuts. Biodegradable materials, such as bioplastics, cornstarch-based polymers, and plant-based fibers, are very appropriate for packaging purposes. These materials break down naturally, reducing the environmental burden of packaging waste.

So, there is a statement of sustainable logistic that could avoid the increase in carbon emissions. Sustainable logistics has gained significant interest due to the increase in CO2 emissions from transportation sector and especially from last mile

logistics operations. Sustainable logistics is defined as a system that measures, analyses and mitigates the impact of logistics operations. It is a promising method to reduce the impacts of CO2 emissions because of logistics activities and focuses on methods or solutions that can reduce the impacts of CO2 emissions (Mohamed Awwad, Abhijeet Shekhar and Abhishek Sundaranarayanan Iyer, 2018). One of the most promising solutions for sustainable last-mile delivery issue is using drones which nowadays already in-use for testing and still in the development stage. However, the drone delivery technologies are redefining the business world by time efficiency, speed, cost minimization and customer satisfaction (Ramona-Alexandra NEGHINĂ1, Valentin-Andrei MĂNESCU, MihaelaRodica Ganciu Dragoș-Georgian Ilie, Gheorghe Militaru, 2019).

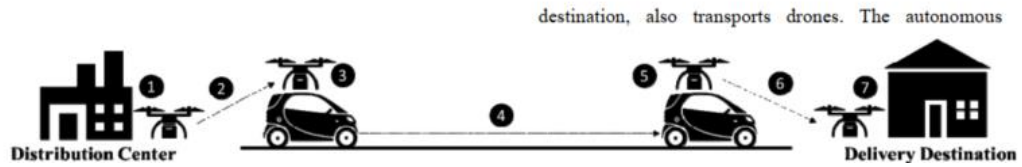


Figure 13 Concept Illustration of a Single DDAM Process (H. D. Yoo, 2018)

Drones are considered as the future of last-mile delivery based on their potential impact on the efficiency and speed of delivery services has generated significant interest. However, for now, it is just a matter of time because at this point, drones are not yet optimized for last-mile delivery and infrastructure needs a lot of training, testing. Moreover, setting up of drone launch pads, aligning the movement of drones with buildings and open operational spaces, licenses, battery charging facilities, software and technology, training facility, and research and development require high investments. For instance, to buy a usable drone costs the firms a lot of money which needs to return on investment. Therefore, it may have a risk of drone abuse or the weather conditions make the delivery process cannot run as smoothly as it should be. On the one hand, the use of drones in the delivery process reduces noise and avoids both the increase of congestion in the urban area and CO2 emissions. On the other hand, drones have a lower capacity (they can carry low weight parcels) and working time (low flight endurance) than classical vehicles. Overall, drones have a positive impact (Luigi Di Puglia Pugliese, Francesca Guerriero, Giusy Macrina, 2020).

Drones are naturally subject to weather occurrences as well as attacks from wild animals and birds. High-speed wind, turbulence, freezing, precipitation, fog, and clouds, for example, may have a significant impact on drone travel distance and control system due to their design, reliance on battery level, and lightweight. Any microclimate contrast, temperature change, or overcoming the physical obstacle as hills will consume the battery; a burst of wind, heavy rain, icing, etc. will not only consume more battery, but will also force the unmanned autonomous aircraft to fall. The safety is the fundamental disturbance for both consumers and regulators and weather are the first danger for drone's safe operation (Azamat Seidakhmetov and Omid Fatahi-Valilai, 2022). In short, both drones and electronic vehicles still considered as future solutions to mitigate of environmental problems such as minimize the energy waste and protect the whole ecosystem.

b. Strategies for Efficiency

Change in life, and business, is constant. Much as we acknowledge that fact, it also scares us. We tend to resist it. However, last mile supply chains present an opportunity to take advantage of change (Boyer, 2004). The Covid-19 pandemic serves as an illustrative case of how large corporations like Amazon handle such challenges. In addition, there are a variety of opportunities for entrepreneurs to startup of an end-to-end project that consist supply chain combine with logistic which gain a win-win solution as well as resulting in mutually beneficial outcomes. Customers are key to success. Beyond the operational contexts and transformations of various methods, a key to sustainability also lies in the hands of consumers. As the increasing of the demand and expectation, we would need a decent strategy and effective approach in order to keep promoting and attracting more and more customer to this industry field. In recognition of the growing importance of a consumer-centric approach to supply chain management, consumer research in last-mile delivery is increasing, albeit slowly, and it remains fragmented (John Olsson, Daniel Hellstrom and Yulia Vakulenko, 2021).

Drones have become a valid alternative to support the delivery process and several big companies, such as, Amazon and DHL, have started to use them for parcels deliveries (Luigi Di Puglia Pugliese, Francesca Guerriero, Giusy Macrina, 2020). As a delivery firm, DHL recognizes the potential benefits of using drones for mid and last-mile delivery. This technology can help reduce the pressure on the supply chain caused by increasing e-commerce orders, worsening traffic congestion in cities, and a shortage of truck drivers. The cost could become a barrier when using drone for last-mile delivery. The expenses associated with drone delivery are typically substantial, which limits the commercial potential of this approach for specific products and scenarios. One of the most prominent business application of drone delivery is eCommerce, since this business area deals with a lot of packages that need to be delivered as soon as possible to the end consumer. Thus, drone delivery can create a revolutionary change for a faster and more efficient alternative delivery method in eCommerce (Ramona-Alexandra NEGHINĂ1, Valentin-Andrei MĂNESCU, MihaelaRodica Ganciu Dragoș-Georgian Ilie, Gheorghe Militaru, 2019).

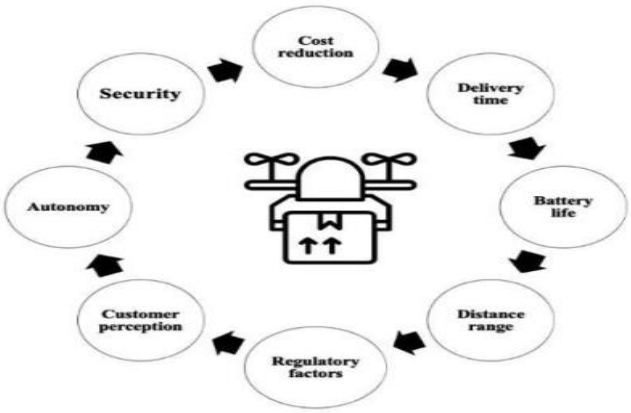


Figure 14 Identified success factors for drone delivery.

Cost is consistently a significant factor in drone delivery. Occasionally, it is necessary to figure out a balance between speed and cost. Although drone delivery is efficient, it can also be costly. For organizations that prioritize cost management, opting for sea or rail shipping can be a more economical alternative. Although these alternatives require more time, they have the capacity to transport larger quantities

of commodities simultaneously, resulting in potential long-term cost savings. Nevertheless, it is crucial to consider additional expenses such as the cost of warehousing products during the waiting period or the potential consequences of delays resulting in late arrival of goods.

Effective management strategies such as late arrival of goods or unexpected occasion might happened are vital. It is also very important to consider how far the items need to go and how quickly they need to move. Air transport is typically the most cost-effective alternative, despite the fact that it is more expensive when anything needs to be transported from one continent to another in a short amount of time, such as essential documents or emergency supplies. In contrast, if the delivery is not time-sensitive, such as when it is a shipment of apparel or non-perishable commodities to a store, then the use of road or rail transportation is frequently sufficient. It is possible that some modes are slower, but they may be more cost-effective, particularly for shorter distances travel. To integrate the drones into delivery processes, DHL Express has entered into a strategic partnership with EHang to launch this autonomous delivery solution, addressing the challenges of traditional deliveries. The drone delivery service was successfully implemented for a DHL customer in China, the parcels being shipped within 8 km from the customer's headquarters to the DHL processing point. The Falcon EHang drones transport capacity is 5 kg, reducing delivery time to 8 km from 40 minutes to 8 minutes, with delivery costs reduced by up to 80% (Ramona-Alexandra NEGHINĂ1, Valentin-Andrei MĂNESCU, MihaelaRodica Ganciu Dragoș-Georgian Ilie, Gheorghe Militaru, 2019).

The way in which customers perceive last-mile drone delivery is dependent upon a wide range of factors, including the potential advantages, concerns, and overall innovation of the technology. From a customer perspective, the level of public acceptability is frequently dependent on the extent to which the public perceives the technology. At this stage, the influence of media and local communities play an important role in order to push awareness of social experience, emotional experience and customer satisfaction to inform the public about how drone delivery works, safety measures in place, and the benefits it brings. Demonstration could be a suitable way for companies and regulatory organizations to launch educational

campaigns to educate the public about the working mechanics of drone delivery, the safety procedures used, and the benefits it provides. The more information a corporation provides about drone delivery, the more customers are encouraged to test it. It is possible for early adopters and opinion leaders within communities to have an impact on public opinion. Therefore, public engagement and feedback are essential components in the development and operation of drone delivery systems. Involving the public in decision-making reduces concerns, builds trust, and guarantees the technology meets community expectations. Customers are more likely to continue using a product or service when they have access to information, a supportive community, and positive media coverage, as these factors directly contribute to establishing trust and acceptance.

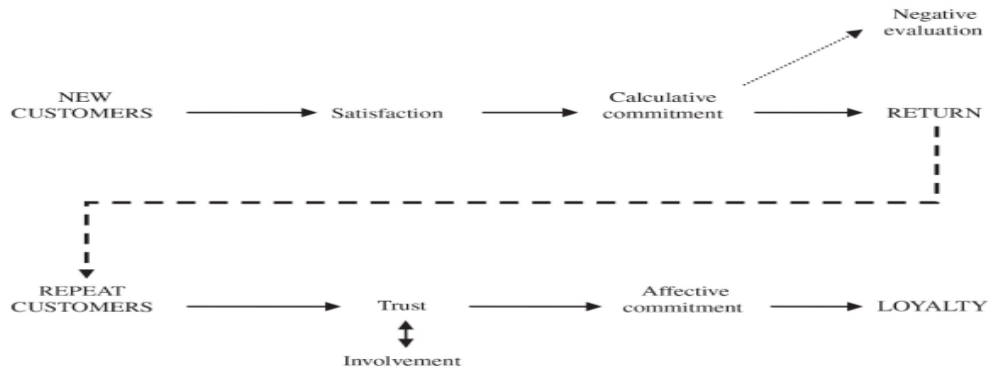


Figure 15 Strategy for creating loyal customers.

As worldwide consumers enjoy the convenience of ordering products from anywhere on the planet, the need for an efficient and sustainable last-mile logistics system has become increasingly vital. If a customer is seeking convenience, there is little point in trading the time to travel to a store, shop, and return home simply for an extended, difficult ordering experience. Thus, companies must offer ordering methods (whether via the Internet, fax, or phone) that give customers the features they are looking for and are quick and easy to use (Boyer, 2004). It is not hard to understand that today, convenience has drive customers purchasing habit. Logistic and supply chain face a huge challenge to align cost-effective with environmental friendliness in last mile in general aspects.

V. CONCLUSIONS AND LIMITION

1. Conclusions

These days, the management of the supply chain is the single most important factor in determining the performance of businesses and the level of satisfaction they provide to their customers. An example of one of the ways that is currently being investigated is how the cost of a supply chain should be optimized so that it is considered to be the most efficient in order to achieve the best possible result. The supply chain includes logistics, marketing, financing, and various other duties that ensure the smooth running of a business. A suitable description for supply chain management is a principle that highlights the use of an effective integrated system involving suppliers, producers, warehouses, retailers, and customers. This system ensures that products are manufactured and distributed throughout the entire system in the right quantities, locations, and at the right moment to reduce costs and enhance services. Effective supply chain management leads to reduced expenses and a faster production turnover.

Similarly, logistic management is also considered as the second important factor in determining the performance of businesses and the level of satisfaction they provide to their customers. Logistics involves managing the movement, storage, and flow of goods, services, and information from the point of origin to the end consumer. The primary objective of logistic management is to ensure the optimal quantity of a resource or input is available at the appropriate time. Logistically, there are 7 key factors for achieving customer satisfaction: providing the correct product, in the appropriate amount, quality, location, and time, to the right customer, at the right price.

There is a strong correlation between logistics and the supply chain in last-mile delivery. Logistics and supply chain management are defined by their ability to adapt and respond to the ever-changing demands of a globalized market. They are critical not only to operational performance but also to encouraging innovation and growth in a variety of areas. In an era where efficiency and speed are critical, these fields provide the frameworks and tools required for firms to prosper. The term "7

R's" describes consumers' preferences when working with last mile delivery. The 7 Rs are the following: the right product, the right customer, the right pricing, the right amount, the right condition, the right time, and the right location which enhance.

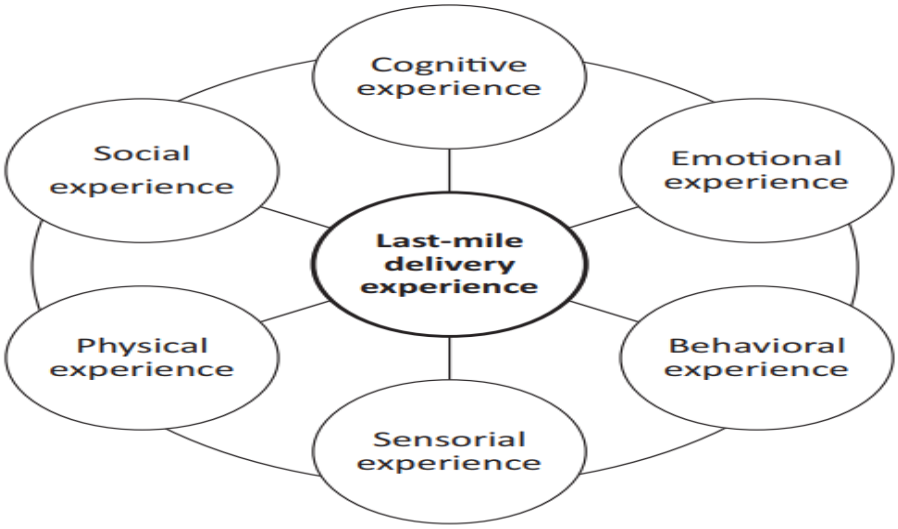


Figure 16 Customer experience dimensions in last-mile delivery (John Olsson, Daniel Hellstrom and Yulia Vakulenko, 2021)

An organization that is able to efficiently provide omnichannel support and a unified shopping experience across all customer interactions, as well as a brand that has a comprehensive understanding of the needs and desires of its customers. In the past, the best experience has always been, and will continue to be, a personal one. In a nutshell, over the course of this study, it is considered as "customer centric. "The best experience always was, is and will always be personal. In short, it is consider as a term of customer-centric in this research. The most satisfying experience consistently remains personal, both in the past, present, and future. It is through the application of technology that an organization will be able to achieve success in optimizing the whole supply chain and logistical processes. Implementing efficient risk management measures, such as real-time order tracking and notifying customers of order locations, helps minimize the possibility of potential risks. This process is crucial as it determines the quality of the product, reliability of the product, the capacity, and capabilities to reach the company's needs as well as the service the organization brings to the customers.

As an organized system in successful logistic and supply chain management, it is possible to save both time and resources by ensuring the logistics process performs smoothly. There will be a beneficial influence on cost savings throughout the entire process as a result of this. More effective inventory management at every level allows you to plan your supplies in the most efficient manner possible. Supply chain management is an integrated theory that involves controlling the entire flow of a distribution channel from the supplier to the final user. This includes improved coordination of business processes and operations, such as inventory control, throughout the whole distribution network rather than just among a limited number of channel suppliers. Indeed, as society becomes increasingly concerned about climate change, sustainability becomes a significant as well as notable point for both customers and companies.

In conclusion, my topic "Optimizing Last-Mile Logistics in Supply Chain: Strategies for Sustainability and Efficiency" presents a compelling opportunity for research that has significant potential to make an actual impact in the real world. The dynamic logistics business, with evolving technologies and regulations, requires flexible research methods and frameworks. Recognizing consumer behavior's impact on last-mile logistics enhances the result of the research. Customers have shown that they have the potential as well as power in shaping an eco-friendly future for sustainability and efficiency last-mile logistic in supply chain.

2. Limitations

Due to countless books and reading material have been published and edited to further investigate the important role of last mile logistics and surrounding aspects which might be acknowledged and comprehended in a variety of ways. Logistics and the supply chain is a vast industry and if we are not able to study and research well, we can easily get lost and provide a misunderstanding for the reader, so that every input must be qualify and strictly selected. However, in the era of globalization, logistic companies could have different systems which would related to their working environment culture, this thesis is a research about how organizations would react and make improvements for future solution of last-mile logistic.

Furthermore, the last-mile delivery field also relates to e-commerce which requires a lot of information and data. Therefore, access to detailed and up-to-date data from e-commerce companies and logistics providers can be a limitation which could cause a difficult to collect and gather from real world data. The accuracy and consistency of data obtained from diverse sources are uncertain. Inaccurate analysis and conclusions might result from inconsistent or untrustworthy data. In addition, the research focuses on the most recent and closest data available from last-mile logistics.

Technology development tends to be unpredictable nowadays, always surprising humans with new inventions and cutting-edge last-mile logistics. The dynamics of technology, customer preferences, and global economic situations are continually changing, making it difficult to predict and plan for all future unforeseen circumstances. As a result, any offered solutions or tactics may have limitations in adapting to unexpected developments. Similarly, it is important to note that, while the research gives valuable information based on current conditions, the effectiveness of sustainable last-mile measures because of future uncertainties remains challenging to assess. It kept changing so it is impossible to keep following and updating it day by day. “You cannot change the past but do not lose anything from the past because with the past and present the company can build the future.”

Last but not least, inside the framework of international business, last-mile logistics optimization is a complicated issue that requires careful consideration. The goal of this optimization is to maximize both the sustainability and the efficiency of the delivery process. In order to make it possible, businesses must find a way to combine sustainability and efficiency in order to meet customer needs and reduce the environmental effect of their operations as well as enhancing customer satisfaction while simultaneously reducing expenses and increasing revenue.

VI. REFERENCES

1) Fleischmann, Klose, Daduna, & Lenz. (2005). *Online Shopping and Changes in Mobility Distribution Logistics.* Berlin: Springer Berlin Heidelberg.

2) Ahmed, D. M. (n.d.). *Evolution of supply chain management and Logistics*. Retrieved from https://www.scmdojo.com/history-and-evolution-of-supply-chain-and-logistics/

3) Astrid Bjørgen,, Kristin Ystmark Bjerkan, Odd Andre Hjelkrem. (2021). E-groceries: Sustainable last mile distribution in city planning.

4) Azamat Seidakhmetov and Omid Fatahi-Valilai. (2022). Drone based Delivery System: Restrictions and Limitations.

5) Ballou, R. H. (2007). The evolution and future of logistics and supply chain management.

6) Bart L. MacCarthy, Constantin Blome, Jan Olhager, Jagjit Singh Srai, Xiande Zhao. (2016). Supply chain evolution – theory,concepts and science.

7) Boyer, K. K. (2004). *Extending the Supply Chain : How Cutting-Edge Companies Bridge the Critical Last Mile into Customers' Homes.*

8) BsxLogistic. (2023, 2 15). Retrieved from https://bsxlogistics.com/the-relationship-between-logistics-and-supply-chain-management/

9) Burity, J. (2021). The Importance of Logistics Efficiency on Customer Satisfaction.

10) Burns & Bush. (2010). *Marketing Research. 6th Edition.* USA: Pearson Education, Inc.

11) Carbone, V. R. (2017). *The rise of crowd logistics: a new way to co-create logistics value.*

12) Cárdenas, I., Beckers, J. and Vanelslander, T. (2017). E-commerce last-mile in Belgium: Developing an external cost delivery index.

13) Cheng-Yuan Ku, Sean Lancaster and David C. Yen. (2006). E-supply chain management: an evaluation of current web initiatives.

14) Coelho, D. A. (2021). The Environmental Impact of E-commerce .

15) Craig Carter,Dale Rogers. (2008). International Journal of Physical Distribution & Logistics Management. *Our review of the literature suggests that organizational sustainability, at a broader level, consists of three components: the natural environment, society, and economic performance.*

16) Craig Carter,Dale Rogers. (2008). International Journal of Physical Distribution & Logistics Management. *A framework of sustainable supply chain management: moving toward new theory*.

17) Daugherty, P. (2011). *Review of logistics and supply chain relationship literature.*

18) Decker, M. (2014). Last Mile Logistics for Disaster Relief Supply Chain Management. *Challenges and Opportunities for*.

19) Desai, A. (2021). Amazon Go - Case study .

20) Elkington, J. C. (1999). Triple Bottom Line of 21st Century Business.

21) Friedberg, M. (2021, 12 8). *The importance of logistics in the mordern world*. Retrieved from https://www.cevalogistics.com/en/ceva-insights/the-importance-of-logistics-in-the-modern-world

22) Galindo, L. D. (2016). The Challenges of Logistics 4.0 for the Supply Chain Management and the Information Technology. 3.

23) *Genius ERP*. (2023, 8 29). Retrieved from A Brief History of ERP: https://www.geniuserp.com/resources/blog/a-brief-history-of-erps#:~:text=The%20term%20ERP%20was%20first,track%2C%20and%20control%20their%20inventory.

24) Growth, I. (2022, 5 30). *WHY IS LOGISTICS IMPORTANT TO COMPANIES?* Retrieved from Corlett: https://corlettexpress.com/why-is-logistics-important-to-companies/

25) H. D. Yoo, S. M. (2018). Drone-delivery Using Autonomous Mobility: . *An Innovative Approach to Future Last-mile Delivery Problems*.

26) Hausman, W. (2000). *Supply Chain Performance Metrics.* Stanford, CA: Stanford University.

27) HAYES, A. (2023, 9 11). *https://www.investopedia.com/*. Retrieved from https://www.investopedia.com/terms/l/lastmile.asp#:~:text=In%20supply%20chain%20management%2C%20the,increasing%20efficiency%2C%20and%20improving%20infrastructure.

28) Hoda Nseif, Kinga Danesch. (2021). E-commerce Related Last Mile Logistics — The Prospect Towards Sustainable Last Mile Logistics in Urban Areas.

29) *Intellias*. (2023, 8 29). Retrieved from https://intellias.com/last-mile-delivery-logistics/

30) Jenkins, A. (2022, 9 19). *Logistics for Business Defined: Importance Role & Benefits*.

31) Jenkins, A. (2022, 6 25). *Netsuite*. Retrieved from Supply Chain Management vs Logistics: Differences, Similarities and Roles: https://www.netsuite.com/portal/resource/articles/erp/supply-chain-management-vs-logistics.shtml#:~:text=Logistics%20focus%20on%20the%20efficient,to%20retailers%20and%2For%20consumers.

32) Jenkins, A. (2023, 9 8). *Netsuite*. Retrieved from Guide to Inbound and Outbound Logistics: Processes, Differences and How to Optimize: https://www.netsuite.com/portal/resource/articles/inventory-management/inbound-outbound-logistics.shtml#:~:text=What%20Is%20the%20Difference%20Between,on%20the%20transporting%20of%20goods.

33) John Olsson, Daniel Hellström and Henrik Pålsson. (2019). Framework of Last Mile Logistics Research: A Systematic Review of the Literature.

34) John Olsson, Daniel Hellstrom and Yulia Vakulenko. (2021). Customer experience dimensions in last-mile delivery: an empirical study on unattended home delivery.

35) Keenan, M. (2023, 8 2). *shopify*. Retrieved from https://www.shopify.com/retail/last-mile-delivery#1

36) KENTON, W. (n.d.). *Logistics: What It Means and How Businesses Use It*. Retrieved from https://www.investopedia.com/terms/l/logistics.asp#citation-2.

37) Kooijman, L. (2014). Practices and trade-offs in the logistics of online retail.

38) Kurt Salmon Associates Inc. (1993). *Efficient Consumer Response: Enhancing Consumer Value in the Grocery Industry, Food Marketing Institute,.* Washington, DC.

39) Lachapelle, U., Burke, M., Brotherton, A., & Leung, A. (2018). Parcel locker systems in a car dominant city: Location, characterisation and potential impacts on city planning and consumer travel access.

40) Li, D. (2005). e-Supply chain management.

41) Lim, S. F., Jin, X., & Srai, J. S. (2018). . Consumer-driven e-commerce, International Journal of Physical Distribution & Logistics Management.

42) Lindner, J. (2011). Last mile logistics capability: a multidimensional system requirements analysis for a general modelling and evaluation approach.

43) López, Á. J. (2021, 11 19). Retrieved from https://www.linkedin.com/pulse/what-logistics-7-rs-%C3%A1lvaro-l%C3%B3pez-senluis/

44) Luigi Di Puglia Pugliese, Francesca Guerriero, Giusy Macrina. (2020). Using drones for parcels delivery process.

45) Luttwak, E. (1971). *A Dictionary of Modern War. Harper & Row: New York.* New York.

46) LXGlobal. (2023, 6 5). *The Importance of Logistics in modern business and how it impacts industries.* Retrieved from https://www.linkedin.com/pulse/importance-logistics-modern-business-how-impacts-industries/

47) M. Suguna, Bhavin Shah, S Karthik Raj, M. Suresh. (2021). A study on the influential factors of the last mile delivery projects during Covid-19 era.

48) Mariki, D. E. (2021). Impacts of e-commerce last-mile modes on the environment and the mediating role of sustainable logistics technology. *A case study of selected Finnish cities*.

49) Marta Viu-Roig and Eduard J. Alvarez-Palau. (2020). The Impact of E-Commerce-Related Last-Mile Logistics on Cities. *A Systematic Literature Review*.

50) McDaniel, C. (2022, 1 11). *Hilldrup*. Retrieved from https://www.hilldrup.com/help-and-support/blog/what-are-the-five-major-components-of-logistics/

51) McDaniel, C. (2022, 1 11). *What Are the Five Major Components of Logistics?* Retrieved from https://www.hilldrup.com/help-and-support/blog/what-are-the-five-major-components-of-logistics/

52) Mehmeti, G. (2016). EVOLUTION, A LITERATURE REVIEW ON SUPPLY CHAIN MANAGEMENT.

53) Mihai Felea , Irina ALBĂSTROIU. (2012). Supply Chain Strategies.

54) Mikko Punakivi, Hannu Yrjola, and Jan Holmstrom. (2001). Solving the last mile issue: reception box or delivery box?

55) Miller, K. (2020, 12 8). *THE TRIPLE BOTTOM LINE: WHAT IT IS & WHY IT'S IMPORTANT*.

56) Mohamed Awwad, Abhijeet Shekhar and Abhishek Sundaranarayanan Iyer. (2018). Sustainable Last-Mile Logistics Operation in the Era of ECommerce.

57) Moncef, B. (2021). *Last-mile logistics in the sharing economy: sustainability paradoxes.*

58) Morgan, J., and Monczka, R.M. (1995). Alliances for new products". Purchasing.

59) N. Bennett. (2000). Homeport addresses the delivery dilemma. *The Daily Telegraph*.

60) *Navata*. (2020, 11 18). Retrieved from https://navata.com/cms/logistics-definition/#:~:text=The%20Five%20Elements%20of%20Logistics,Transport

61) Oliver Bates, Adrian Friday , Julian Allen , Tom Cherrett , Fraser McLeod , Tolga Bektas, ThuBa Nguyen , Maja Piecyk , Marzena Piotrowska , Sarah Wise , Nigel Davies. (2018). *Transforming Last-Mile Logistics:Transforming Last-Mile Logistics: Opportunities for more Sustainable Deliveries.* Canada.

62) Osijek, C. (2014). Business Logistics in Modern Management 2014. *14th International Scientific Conference*.

63) Patel, R. (2023, 8 9). *10 Last-mile Delivery Challenges and How to Overcome Them*. Retrieved from https://www.upperinc.com/blog/last-mile-delivery-challenges/

64) Perrin, L. (2020, 5 20). Retrieved from https://www.hemisphere-freight.com/knowledgehub/3pl-4pl-5pl-whats-the-difference/#5PL

65) Perter Meindl, Sunil Chopra. (2012). Supply Chain Management: Strategy, planning and operation. 13.

66) Phuong, D. T. (2020). Last-Mile Logistics in Vietnam in Industrial Revolution 4.0: Opportunities and Challenges. 172.

67) Ramanathan, R. (2010). *The moderating roles of risk and efficiency on the relationship between logistics performance and customer loyalty in E-commerce." Transportation Research Part E: Logistics and Transportation Review.*

68) Ramona-Alexandra NEGHINĂ1, Valentin-Andrei MĂNESCU, MihaelaRodica Ganciu Dragoș-Georgian Ilie, Gheorghe Militaru. (2019). SUCCESS FACTORS IN USING DRONES FOR DELIVERIES.

69) Ross, S. (2021, 3 26). *Seven Last-Mile Delivery Challenges, and How to Solve Them*. Retrieved from https://www.supplychainbrain.com/blogs/1-think-tank/post/32800-last-mile-delivery-challenges-and-how-to-solve-them

70) Sahebi, D. (n.d.). Introduction to Logistics and Supply Chain Management.

71) Seyed Ali Nemati, D. M. (2012). Impact of Enterprise Resource Planning in Supply Chain Management.

72) Sezen, B. (2005). The role of logistics in linking operations and marketing and influences on business performance.

73) Simchi-Levi. (2004). *Managing the supply chain the definitive guide for the Business Professional.*

74) Somani, P. (2023, 2 27). *EVOLUTION OF SUPPLY CHAIN MANAGEMENT*.

75) *Statista*. (2018). Retrieved from https://www.statista.com/statistics/288487/forecast-of-global-b2c-e-commerce-growt/. .

76) Tadić, M. V. (2020). International Journal for Traffic and Transport Engineering. *HOME DELIVERY: CONCEPT AND CHARACTERISTICS*.

77) Tan, K. C. (2001). A framework of supply chain management literature.

78) Techishce Univatat Munchen. (n.d.). *Logistics. Theory and Practice.* Retrieved from Logistics. theory and practice. - tum. (n.d.). https://wwwmayr.in.tum.de/konferenzen/Jass08/courses/2/berseneva/paper_berseneva.pdf

79) Tom Hays,Pınar Keskinocak, Virginia Malcome de L´opez. (2004). *STRATEGIES AND CHALLENGES OF INTERNET GROCERY RETAILING LOGISTICS.* Dordrecht, The Netherlands: Kluwer Academic.

80) Transport, N. R. (2022, 10 17). *6 Importance of Logistics That Helps Businesses*. Retrieved from https://navata.com/cms/importance-of-logistics/

81) Uiterweerd, M. (2021, 8 27). Capgemini Invent Talks: The Future of Last Mile Delivery.

82) University, Conventry. (2022, 10 2022). FutureLearn. *The Five Elements of Logistics*. Retrieved from https://www.futurelearn.com/info/courses/principles-global-management-logistics-assets/0/steps/65243

83) University, Michigan State. (2023, 6 26). Retrieved from https://www.michiganstateuniversityonline.com/resources/supply-chain/is-logistics-the-same-as-supply-chain-management/

84) Uyen, N. Q. (2023). Current status and solutions to develop e-logistics in Vietnam.

85) Vanelslander, T., Deketele, L., & Van Hove, D. (2013). Commonly used e-commerce supply chains for fast moving consumer goods: comparison and suggestions for improvement, International Journal of Logistics Research and Applications.

86) Vesa Kamarainen, Juha Saranen,Jan Holmstrom. (2001). The reception box impact on home delivery efficiency in the e-grocery business. *International Journal of Physical Distribution & Logistics*.

87) Vu, H. P. (2021). VIETNAM'S LOGISTICS COST PARADOX CAUSES AND OPTIMAL SOLUTION.

88) Weeks, D. and Crawford, F.A. (1994). Efficient consumer response: a mandate for food manufacturers?". *Food Processing,*, 34.

89) Xuping Wang, Linmin Zhan, Junhu Ruan, and Jun Zhang. (2014). How to Choose ‘‘Last Mile’’ Delivery Modes for E-Fulfillment.

90) Ying Yu, Xin Wang,Ray Y. Zhong,George Q. Huang. (2016). E-commerce Logistics in Supply Chain Management: Practice Perspective.